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Effect and Significance of Comprehensive Training in Infection Prevention and Control on the Psychological Health of Oral Health Staff

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Abstract: *Background:* Oral health staff have close contact with patients in the process of diagnosis and treatment, and it is inevitable for them to come into contact with patients' secretions. Therefore, oral health staff are at greater risk of infectious diseases in their daily work, and their psychological health is also greatly challenged. *Objective:* To study the effect and significance of comprehensive training in infection prevention and control on the psychological health of oral health staff. *Methods:* We selected 400 oral health staff from a tertiary stomatological hospital in Guangzhou, China in this study. The respondents were randomly divided into an intervention group and a control group. After the first round of investigation, the intervention group received comprehensive training in prevention and control of infection for three months, while the control group received no intervention. *Results:* The comprehensive training in infection prevention and control improved the respondents' psychological health and job satisfaction. Further strengthening infection prevention and control training for oral health staff will increase their self-confidence, improve their mental health, and increase their job satisfaction. *Conclusion:* For oral health staff, it is particularly important to formulate an effective and operable preventive and control training program and then implement it in a standardized manner.

Keywords: Oral health staff; Infection prevention; Infection control; Psychological health; Comprehensive training; Job satisfaction

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1. Introduction

Studies have shown that medical workers need to be in close contact with patients of various diseases in the diagnosis and treatment process; thus, they will be at high risk for infection [1]. This situation has a significant impact on the psychological health of medical workers, as they experience varying levels of anxiety and stress due to fears of possible infection or the possibility of transmitting diseases to their family members [2]. In a study, medical staff were invited to participate in a questionnaire survey on the level of anxiety to infectious diseases. The results showed that a large proportion of medical staff expressed significant anxiety and fear of getting infected by infectious diseases [3].

Since secretions act as a transmission medium for certain infectious diseases, and oral health workers are unable to avoid exposure to these substances in their daily work, the risk of infection faced by staff in the department of stomatology, compared with other specialties, is relatively high [4,5]. The droplets formed

by high-speed dental handpieces, air/water guns, ultrasonic dental cleaning, and other oral medical equipment or the droplet nuclei formed by these substances can be suspended in the air in the form of aerosols for more than half an hour [6]. If these substances with the source of infection permeate in the air or splash onto the face or eyes, they can cause infection. Therefore, the psychological health of oral health workers is greatly challenged. In a survey of dentists, it was found that most of respondents were worried about suffering from infectious diseases upon exposure to secretions during oral treatment [7]. Through psychological assessments, it was found that half of the respondents showed some symptoms of anxiety. The most common concern of the respondents was the possibility of them contracting infectious diseases and then passing them on to their family, followed by anxiety about their own risk of infection at work [8]. A survey has found that most nurses in dental clinics were worried about being infected in clinical activities [9].

2. Research model and hypotheses

2.1. Impact of comprehensive training in infection prevention and control on the psychological health of oral health staff

Studies have shown that some oral health workers are unfamiliar with prevention and control measures and lack prevention and control training. Furthermore, there is no guarantee for these high-risk workers in terms of occupational protection. According to a survey on oral health staff's understanding of their protection status [10], a significant proportion of respondents lacked knowledge of prevention and control of nosocomial infection and scored lower than average in terms of awareness of infection transmission pathways, infective fluids, human immunodeficiency virus (HIV) transmission, and unhealthy behaviors. From this, the conclusion was that some practitioners in dental institutions lacked training in nosocomial infection [10]. The risk of infection among medical staff and the predisposition to negative emotions, such as fear and anxiety, increase with the lack of basic knowledge of hospital infection prevention and control, familiarity with the standardized nosocomial infection prevention and control operation procedures, as well as the standardized implementation of prevention and control measures.

2.2. Role and significance of comprehensive training in infection prevention and control

In a survey on dental students, the vast majority of respondents deemed that knowledge training in nosocomial infection prevention and control has a guiding role in personal infectious disease prevention and control [11]. It has also been pointed out that dentists need to have good psychological health as well as scientific and effective knowledge reserves on prevention and control. If they can effectively protect themselves, they may have higher confidence in the diagnosis and treatment of diseases, thus overcoming their fears [12].

2.3. Impact of psychological health of oral health workers on job satisfaction

Studies have shown that the fear and pressure that doctors endure in diagnosis and treatment have a great impact on job satisfaction. A study has found that mental stress can lead to chronic fatigue and unhealthy lifestyles among doctors, thereby being an important factor that affects job satisfaction [13]. A survey on 1,100 medical staff has shown that psychological health status is significantly related to job satisfaction and significant psychological health issues could reduce job satisfaction and affect the quality of service provided to patients [14].

2.4. Research model

Through literature study, we can infer the priori hypothesis linking the three observed variables: "knowledge and norms of infection prevention and control," "degree of psychological impact," and "job

satisfaction of oral health staff." We used these variables as the observed variables in this study and constructed a hypothetical model (**Figure 1**).

Studies have shown that strengthening the training in infection prevention and control plays an important role in improving the psychological health and job satisfaction of oral health workers. Through literature review, previous research on the psychological health of oral health workers predominantly remained in a relatively isolated or static perspective. Recruiting oral health staff in Guangzhou, China as respondents, we conducted two rounds of surveys to evaluate the changes of oral health staff, such as their psychological health and job satisfaction, after receiving intervention (comprehensive knowledge and skills training in infection prevention and control).

Figure 1. Hypothetical model

H1: The degree of comprehensive training in the knowledge and norms of infection prevention and control negatively affects the degree of psychological impact of oral health staff.

H2: The degree of psychological impact of oral health staff negatively affects their job satisfaction.

3. Method

3.1. Respondents and source

The respondents of this study were stomatologists and nurses from a tertiary stomatological hospital in Guangzhou, age ranging from 18 to 60. Guangdong Province occupies a considerable proportion of China's oral healthcare system and is currently one of the three major national medical centers in China. Guangzhou, as the capital of Guangdong Province, has taken on a leading role in China's medical and health development. This hospital is a specialized stomatological hospital with great influence in South China oral industry in terms of its technical level, social benefit, and scale; it is a representative hospital of the industry. This study was reviewed and approved by Medical Ethics Committee of Affiliated Stomatological Hospital of Guangzhou Medical University. The participants provided written informed consent prior to participating in this study.

3.2. Survey design and implementation

The survey was conducted using printed and electronic questionnaires. The data were organized in a database by a specially designated person and checked by two independent people. The first round of survey (R1) was carried out in October 2021, and the samples were selected based on the inclusion criteria. After the end of R1, the researchers analyzed the data to understand the respondents' scores on each subscale as a baseline to verify the hypothesized relationship. Thereafter, the respondents were randomly divided into two groups. One group was selected to receive comprehensive knowledge and skills training in nosocomial infection prevention and control for a period of three months, and this group was named "intervention group"; the other group did not receive training, and was named "control group." After training, the second round of survey (R2) was conducted in March 2022. The questionnaire was the same one used in R1. Differences between the two cross-sections and two groups were assessed by data analysis from both rounds of survey.

3.3. Comprehensive knowledge and skills training in nosocomial infection prevention and control for the intervention group

3.3.1. Establish a training group

The training group was made up of experts who were infection control management professionals from both inside and outside the hospital and had participated in systematic, standardized, and comprehensive knowledge and skills training in nosocomial infection as well as obtained appropriate certification of competency.

3.3.2. Professional theoretical training

Relevant knowledge of infectious disease prevention and disinfection as well as quarantine was explained by the experts. They demonstrated the standard procedure of putting on and taking off protective clothing. The oral health staff were required to put on and take off their protective clothing on site. The issues found in the current operation of each team member in wearing and taking off their protective clothing were corrected to enhance the staff's ability and awareness of emergency protection against infectious diseases as well as improve the basic skills of the trained staffs in putting on and taking off personal protective equipment.

3.3.3. Skills training

(i) With reference to corresponding international and national norms and guidelines, the staff were trained to specify the types of personal protective equipment (PPE) and gain proficiency in the methods and procedures of wearing and taking off PPE. The standard PPE includes masks, medical protective clothing, and gloves.

(ii) The staff were trained in hand hygiene, encouraged to implement the five hand hygiene indicators of the World Health Organization (WHO) in accordance with the requirements of standard prevention, and learned the seven-step hand washing method.

3.4. Instrumentation

Based on the research model and literature review, we developed a measurement system on the basis of the mature scales applied in related research. Subscales based on three major variables were established, so were the corresponding measurement dimensions of each variable. The research framework based on literature review is shown in **Table 1**.

(i) Knowledge and norms of infection prevention and control: standard diagnosis and treatment (SDT), hand hygiene (HH), and personal protection (PP).

(ii) Degree of psychological impact: psychological impact of work (PIW) and psychological impact of life (PIL).

(iii) Job satisfaction: general feeling (GF), management style (MS), and work autonomy (WA).

Table 1. Research framework

Variables	Dimensions	Sources
Knowledge and norms of infection prevention and control	SDT, HH, PP	[15]
Degree of psychological impact	PIW, PIL	[16,17]
Job satisfaction	GF, MS, WA	[18]

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

3.5. Scale construction

3.5.1. Delphi method

On the basis of the established dimensions and index system and in line with literature review, we integrated the items that meet the research design goals and used Excel to build an item pool. Two experts with good nosocomial infection knowledge and familiarity with the diagnosis and treatment process were commissioned to classify and sort the items according to the research design using the Q-sort technique. Through three rounds of sorting, the experts had basically the same opinions on sorting and classification. In combination with the results, we screened out items with relatively good validity to formulate the initial scale.

3.5.2. Preliminary investigation

We randomly selected eight oral health staff from the hospital who met the inclusion criteria and invited them to fill in the initial scale. Based on their feedback, some items were inappropriately expressed. Therefore, we made further modifications and identified the official version of the formal questionnaire. The questionnaire mainly consisted of closed-ended questions in seven-point Likert scale (1 = strongly disagree; 7 = strongly agree).

3.5.3. Encoding and translation

We coded the measurement items of each dimension accordingly. The coding principle was as follows: English initial abbreviation of the dimension corresponding to the item + item serial number." Taking the subscale corresponding to SDT as an example, the item codes are as follows: SDT1, SDT2, …SDT7. Part of the measurement items were taken from literatures in English, so the preliminary questionnaire was compiled in English (the questionnaire can be obtained from https://www.scidb.cn/s/7jeUn2). However, since the survey was conducted in China, we invited a bilingual translator who is familiar with both Mandarin and English to translate the preliminary English-version questionnaire into Chinese and then invited another bilingual translator to translate the Chinese-version questionnaire into English, so as to make sure that both the English and the Chinese versions are accurate.

3.5.4. Statistical analysis

SPSS 24.0 and Amos 21 were used for statistical processing.

(i) SPSS 24.0 was used for the following processing: data entry, reliability analysis, validity analysis (exploratory factor analysis), statistical description, correlation analysis, and difference analysis.

(ii) Amos 21 was used for the following analyses: confirmatory factor analysis and establishment of structural equation model.

4. Results

4.1. Descriptive statistics

A total of 413 questionnaires were distributed in R1, and 405 questionnaires were collected, with a collection rate of 98.1%. There were 400 valid questionnaires, with an overall effective rate of 98.8%. Among the respondents, 210 (52.5%) were male, and 190 (47.5%) were female; 317 (79.3%) had a master's degree or above, while 83 (20.8%) had a bachelor's degree or below; 193 were doctors (48.3%), while 207 were nurses (51.8%); 360 (90%) were married, while 40 (10%) were single or divorced; 311 (77.8%) had children, while 89 (22.3%) were childless; 208 (52%) did not live alone, while 192 (48%) lived alone.

4.2. Reliability and validity analysis

Through adaptive test of each subscale, the Kaiser-Meyer-Olkin (KMO) value of each subscale was greater

than 0.9, and Bartlett's test of sphericity showed that $P < 0.001$. Therefore, principal component factor analysis could be performed on each subscale. We used the varimax method to orthogonally rotate the factors, analyzed the results of 25 iterations of convergence, and extracted principal components with eigenvalues greater than 1 as common factors. The factor load value of all measurement items was more than 0.6. The items included in the eight common factors were all consistent with the original questionnaire design dimensions. The questionnaire had good validity.

4.3. Differences in the scores of different individual characteristics in each dimension

In order to compare the differences in scores of the corresponding items in each dimension among respondents with different gender, age, educational background, marital and childbirth status, and occupation, we used an independent sample *t*-test to analyze the results. The results showed that the difference in scores of respondents with different gender were not statistically significant ($P > 0.05$). Compared with the respondents in the "40–59" age group, those in the "18–39" age group had lower mean scores in PIW and PIL, but their mean scores in PP, GF, and MS were higher, and the difference was statistically significant ($P < 0.05$). See **Table 2** for details.

Table 2. Difference tests of ages and variables

Index	Age	Mean	Standard deviation	*t*	*P*
PIW	18–39	2.826	1.019	-3.804	0.000
	40–59	3.293	1.016		
PIL	18–39	2.844	1.003	-2.777	0.006
	40–59	3.183	1.042		
SDT	18–39	3.142	1.057	1.840	0.067
	40–59	2.911	0.993		
HH	18–39	2.992	1.068	1.930	0.054
	40–59	2.741	1.108		
PP	18–39	3.000	0.993	2.258	0.024
	40–59	2.727	1.022		
GF	18–39	3.046	1.028	2.940	0.003
	40–59	2.682	1.018		
MS	18–39	3.049	1.042	3.047	0.002
	40–59	2.662	1.088		
WA	18–39	3.004	1.053	1.273	0.204
	40–59	2.841	1.093		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

As shown in **Table 3**, compared with respondents with "bachelor's degree or below," those with "master's degree or above" had lower mean in PIW and PIL, and the difference was statistically significant ($P < 0.05$). There were no significant differences in the scores of the remaining dimensions.

Table 3. Difference tests of education background and variables

Index	Educational background	Mean	Standard deviation	*t*	*P*
PIW	Master's degree or above	2.863	0.998	-2.301	0.023
	Bachelor's degree or below	3.178	1.139		
PIL	Master's degree or above	2.814	0.996	-4.106	0.000
	Bachelor's degree or below	3.320	1.017		
SDT	Master's degree or above	3.097	1.042	0.204	0.839
	Bachelor's degree or below	3.071	1.068		
HH	Master's degree or above	2.978	1.090	1.528	0.127
	Bachelor's degree or below	2.775	1.036		
PP	Master's degree or above	2.974	0.982	1.279	0.203
	Bachelor's degree or below	2.807	1.079		
GF	Master's degree or above	2.996	1.030	1.149	0.251
	Bachelor's degree or below	2.849	1.053		
MS	Master's degree or above	2.995	1.055	1.159	0.247
	Bachelor's degree or below	2.843	1.090		
WA	Master's degree or above	2.968	1.073	-0.017	0.987
	Bachelor's degree or below	2.970	1.029		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

In terms of marital and childbearing factors, compared with "single or divorced" respondents, "married" respondents had higher mean in PIW and PIL, but lower mean in SDT, HH, PP, GF, MS, and WA. All differences were statistically significant ($P < 0.05$), as shown in **Table 4**. Compared with respondents "without children," those "with children" had higher mean in PIW and PIL, and the difference was statistically significant ($P < 0.05$). There was no significant difference in the scores of other dimensions (see **Table 5**).

Table 4. Difference tests of marital status and variables

Index	Marital status	Mean	Standard deviation	*t*	*P*
PIW	Married	2.992	1.034	4.283	0.000
	Single or divorced	2.358	0.871		
PIL	Married	2.958	1.033	2.825	0.007
	Single or divorced	2.561	0.820		
SDT	Married	3.049	1.039	-2.436	0.015
	Single or divorced	3.471	1.052		
HH	Married	2.885	1.092	-3.460	0.001
	Single or divorced	3.396	0.860		
PP	Married	2.877	1.010	-4.876	0.000
	Single or divorced	3.507	0.745		
GF	Married	2.921	1.044	-3.058	0.003
	Single or divorced	3.369	0.859		

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Index	Marital status	Mean	Standard deviation	t	*P*
MS	Married	2.894	1.058	-4.573	0.000
	Single or divorced	3.594	0.902		
WA	Married	2.929	1.070	-2.457	0.017
	Single or divorced	3.319	0.937		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

Table 5. Difference tests of procreation status and variables

Index	Procreation status	Mean	Standard deviation	*t*	*P*
PIW	With children	3.001	1.037	2.624	0.009
	Without children	2.676	0.995		
PIL	With children	2.983	1.028	2.382	0.018
	Without children	2.693	0.963		
SDT	With children	3.056	1.041	-1.265	0.207
	Without children	3.215	1.063		
HH	With children	2.920	1.099	-0.581	0.562
	Without children	2.993	1.017		
PP	With children	2.919	1.002	-0.762	0.446
	Without children	3.011	1.014		
GF	With children	2.934	1.046	-1.140	0.255
	Without children	3.076	0.994		
MS	With children	2.910	1.071	-1.897	0.058
	Without children	3.152	1.018		
WA	With children	2.973	1.081	0.160	0.873
	Without children	2.952	1.001		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

Compared with nurses, doctors had higher mean in PIW, but lower mean in SDT, HH, PP, GF, MS, and WA, and the difference was statistically significant ($P < 0.05$). There was no significant difference in PIL between doctors and nurses (see **Table 6**).

Table 6. Difference tests of occupation and variables

Index	Occupation	Mean	Standard deviation	*t*	*P*
PIW	Doctor	3.131	1.017	3.843	0.000
	Nurse	2.740	1.019		
PIL	Doctor	3.007	1.014	1.676	0.095
	Nurse	2.836	1.021		
SDT	Doctor	2.884	1.040	-3.899	0.000
	Nurse	3.285	1.017		

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Index	Occupation	Mean	Standard deviation	*t*	*P*
HH	Doctor	2.727	1.049	-3.799	0.000
	Nurse	3.131	1.076		
PP	Doctor	2.753	0.979	-3.649	0.000
	Nurse	3.114	0.999		
GF	Doctor	2.808	1.028	-2.964	0.003
	Nurse	3.112	1.023		
MS	Doctor	2.773	1.055	-3.508	0.001
	Nurse	3.141	1.043		
WA	Doctor	2.772	1.021	-3.618	0.000
	Nurse	3.151	1.071		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

4.4. Building a structural equation model

We built a structural equation model in this study to verify the research hypothesis. First, Amos 21 was used to establish a structural equation model based on the hypothesis, as shown in **Figure 2**. Each fitting index of the model reached the ideal value, indicating that the model fits well (minimum discrepancy function by degrees of freedom divided [CMIN/DF] = 1.357; root mean square error of approximation [RMSEA] = 0.03; normed fit index [NFI] = 0.903; incremental fit index [IFI] = 0.973; Tucker-Lewis index [TLI] = 0.971; comparative fit index [CFI] = 0.972; root mean square residual [RMR] = 0.065).

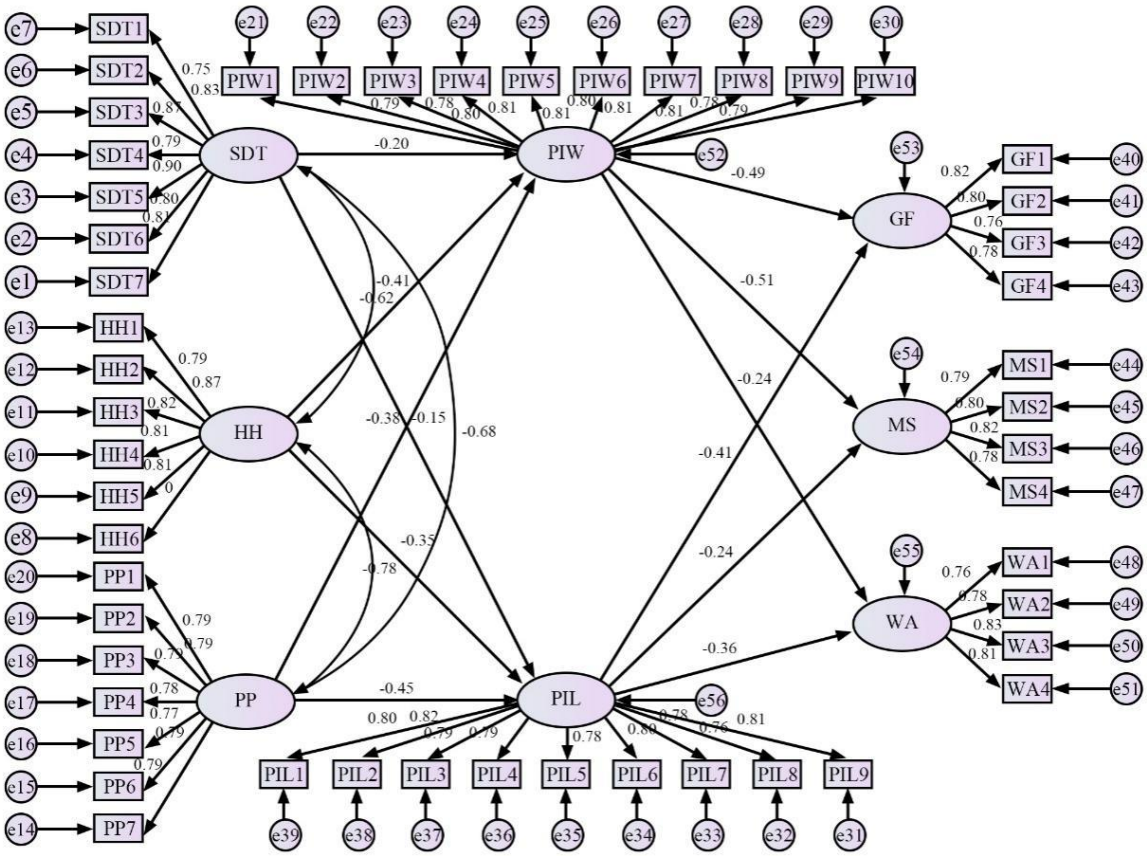

Figure 2. Structural equation model

According to **Table 7**, in the full sample, SDT (β = -0.196, *P* = 0.000), HH (β = -0.405, *P* = 0.000), and PP (β = -0.379, *P* = 0.000) had significant direct negative effect on PIW; SDT (β = -0.149, *P* = 0.000), HH (β = -0.352, *P* = 0.000), and PP (β = -0.454, *P* = 0.000) had significant direct negative effect on PIL. Therefore, each dimension (SDT, HH, and PP) under the variable "knowledge and norms of infection prevention and control" in the research hypothesis model had significant negative effect on each dimension (PIW and PIL) of the variable "degree of psychological impact" (H1 supported). We also learned through analysis that PIW (β = -0.491, *P* = 0.000) and PIL (β = -0.412, *P* = 0.000) had significant direct negative effect on GF; PIW (β = -0.512, *P* = 0.000) and PIL (β = -0.236, *P* = 0.001) had significant direct negative effect on MS; PIW (β = -0.240, *P* = 0.003) and PIL (β = -0.360, *P* = 0.000) had significant direct negative effect on WA. Therefore, each dimension under the variable "degree of psychological impact" in the research hypothesis model had significant negative effect on each dimension (GF, MS, and WA) of the variable "job satisfaction" (H2 supported).

Table 7. Model analysis results

Path	SE	Estimate	S.E.	C.R.	*P*
SDT→PIW	-0.196	-0.196	0.042	-4.679	0.000
SDT→PIL	-0.149	-0.149	0.044	-3.392	0.000
HH→PIW	-0.405	-0.412	0.057	-7.289	0.000
HH→PIL	-0.352	-0.359	0.058	-6.135	0.000
PP→PIW	-0.379	-0.387	0.061	-6.367	0.000
PP→PIL	-0.454	-0.465	0.065	-7.103	0.000
PIW→GF	-0.491	-0.509	0.066	-7.764	0.000
PIW→MS	-0.512	-0.501	0.074	-6.773	0.000
PIW→WA	-0.240	-0.214	0.072	-2.962	0.003
PIL→GF	-0.412	-0.426	0.064	-6.681	0.000
PIL→MS	-0.236	-0.230	0.070	-3.288	0.001
PIL→WA	-0.360	-0.321	0.074	-4.362	0.000

Abbreviations: SE, standardized effect; C.R., critical ratio; GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; S.E., standard error; WA, work autonomy.

5. Comparison of results of the two rounds of survey

5.1. Comparison of scores between groups before and after R2

The 400 respondents who participated in R1 were randomly divided into an intervention group and a control group, with 200 individuals in each group. In order to ensure the reliability of the verification, a pre-test was carried out on the two groups before R2 to evaluate the differences in scores of the two groups in each dimension. Through analysis, no significant difference was observed between the two groups in their scoring (PIW: *t* = 0.096, *P* = 0.923; PIL: *t* = 0.082, *P* = 0.935; SDT: *t* = -0.314, *P* = 0.754; HH: *t* = -0.485, *P* = 0.628; PP: *t* = -0.121, *P* = 0.904; GF: *t* = -0.398, *P* = 0.691; MS: *t* = 0.023, *P* = 0.981; WA: *t* = -1.212, *P* = 0.226).

After the intervention group completed the training as planned, the second round of survey was carried out. A post-test was carried out for both the groups, and *t*-test was used to compare and analyze the differences in scores of each dimension between the two groups in the second round of survey. According to **Table 8**, it can be seen that the mean scores of the intervention group in PIW and PIL, compared with the control group, were lower, but the mean scores in other dimensions were higher, and the difference was

statistically significant ($P < 0.05$).

Table 8. Post-test difference analysis

Index	Group	Mean	Standard deviation	*t*	*P*
PIW	Intervention group	2.608	0.892	-3.267	0.001
	Control group	2.918	1.000		
PIL	Intervention group	2.584	0.841	-4.014	0.000
	Control group	2.933	0.897		
SDT	Intervention group	3.404	0.931	3.298	0.001
	Control group	3.086	0.999		
HH	Intervention group	3.251	0.992	2.655	0.008
	Control group	2.983	1.023		
PP	Intervention group	3.345	0.916	4.114	0.000
	Control group	2.966	0.928		
GF	Intervention group	3.414	0.963	3.994	0.000
	Control group	3.025	0.983		
MS	Intervention group	3.309	0.933	3.561	0.000
	Control group	2.958	1.036		
WA	Intervention group	3.305	0.999	3.206	0.001
	Control group	2.978	1.044		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

5.2. Difference in scores between groups in the two rounds of survey

We compared and analyzed the scores of the control group for each dimension in the two rounds of survey, and the results showed that the difference in the mean scores of the control group in the two rounds of survey was not statistically significant ($P > 0.05$). According to **Table 9**, the mean scores of the intervention group in the second round of survey were lower compared with those in the first round of survey in terms of PIW and PIL but higher in other dimensions. The differences were statistically significant ($P < 0.05$).

Table 9. Difference tests of the intervention group in R1 and R2

Index	Survey	Mean	Standard deviation	*t*	*P*
PIW	R1	2.934	1.034	13.135	0.000
	R2	2.608	0.892		
PIL	R1	2.923	1.025	12.487	0.000
	R2	2.584	0.841		
SDT	R1	3.075	1.045	-11.368	0.000
	R2	3.404	0.931		
HH	R1	2.910	1.086	-11.934	0.000
	R2	3.251	0.992		
PP	R1	2.934	1.010	-15.021	0.000
	R2	3.345	0.916		

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Index	Survey	Mean	Standard deviation	t	*P*
GF	R1	2.945	1.042	-12.954	0.000
	R2	3.414	0.963		
MS	R1	2.965	1.054	-8.328	0.000
	R2	3.309	0.933		
WA	R1	2.904	1.066	-10.592	0.000
	R2	3.305	0.999		

Abbreviations: GF, general feeling; HH, hand hygiene; MS, management style; PIL, psychological impact of life; PIW, psychological impact of work; PP, personal protection; SDT, standard diagnosis and treatment; WA, work autonomy.

6. Discussion

6.1. Relationship between variables and dimensions

Based on our results, our hypothesis is supported. The more inferior their prevention and control capabilities, the more pronounce the negative impact on the psychological health and job satisfaction of oral health staff, and vice versa. Through group test and comparison of results of the two rounds of survey, no significant difference was observed between groups in R1. After the intervention, the scores of the intervention group in terms of "degree of psychological impact" (PIW and PIL) were significantly lower than those of the control group, and the scores of the former in terms of "knowledge and norms of infection prevention and control" (SDT, HH, and PP) and "job satisfaction" (GF, MS, and WA) were significantly higher than those of the latter. In R2, the scores of the intervention group in terms of "degree of psychological impact" significantly decreased, but the scores in "knowledge and norms of infection prevention and control" and "job satisfaction" significantly increased. The difference between scores of the control group in the two rounds of survey was insignificant. Thus, we can see that by receiving comprehensive knowledge and skills training in nosocomial infection prevention and control, the infection prevention and control capability, psychological status, and job satisfaction of the intervention group were significantly better than their own performance in R1 and that of the control group. Therefore, comprehensive training in nosocomial infection prevention and control plays a positive role in enhancing the psychological quality of oral health staff and improving their job satisfaction.

6.2. Influence of different individual attributes on various variables and dimensions

Through analysis, it was observed that the prevention and control capability of young respondents are not as good as that of older respondents. It is believed that this is related to the fact that senior oral health staff have undergone more training in the past and have a relatively solid business foundation. Concerning the relationship between age and job satisfaction, previous studies have revealed different findings. It has been proven that senior professionals bring about stronger job adaptability and higher satisfaction [19]. However, there are also research results suggesting that senior professionals are discriminated against due to the decline of knowledge and skills, thereby reducing job satisfaction [20]. The results of the present study suggested that the satisfaction of young oral health staff is higher than that of older staff. We reason that since senior oral health staff have different career goals, life experiences, living conditions, and demands on working conditions and environment from back when they were younger, their threshold of job satisfaction is higher. In addition, it has also been found that dentists aged 35–55 are more concerned and anxious about their career prospects. Perhaps, this is also one of the causes of their low job satisfaction [21]. In terms of the degree of psychological impact, the impact on those with higher education levels is lesser than those with lower education levels. Education background has a positive effect on individual psychological accomplishment. Medical personnel with higher education levels have advantage in coping

with stress and handling psychological issues since they tend to experience different challenges in learning and academic research. Our results showed that married respondents had poor prevention and control capability but were less psychologically affected and satisfied with their jobs. Dentistry is a high-intensity but high-income occupation, and family ties do affect the investment of oral health staff in medical learning. Also, due to changes in living conditions and levels of demand, they have higher expectations for work, which may cause psychological discrepancy. In addition, research has shown that marriage and family are protective factors of individual psychological health. Individuals who are married and have families are more able to cope with stress and negative emotions, with their spouses acting as an alternative support [22]. The results of the present study are consistent with this conclusion. In our study, the degree of psychological impact was higher in respondents with children. Considering that dental work has a high risk of infection, out of concern for the health of their children, those with children are affected to a certain extent in terms of their psychological status.

7. Conclusion

Greater risk of infection from infectious diseases has brought great challenges to the psychological health of oral health staff engaged in oral diagnosis and treatment. Through this study, we showed that the knowledge and skills of oral health staff in infection prevention and control are closely related to their psychological health and job satisfaction. It is particularly important to formulate an effective and operable protection training program and implement it in a comprehensive and standardized manner for those engaged in high-risk diagnosis and treatment. In addition, due to the particularity of the occupation, differences in their demographics, including education background, age, marital status, and procreation status, have different effects on their professional literacy, psychological quality, and job satisfaction. These factors should be taken into account by hospital managers. In the present study, only one case in China was selected for research. In the future, multiple representative survey cases can be used to carry out further extended research. Qualitative methods such as in-depth interviews and grounded theory can be adopted to further verify or explore the relationship among the variables.

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The authors declare no conflict of interest.

Author Contributions

Data curation: Z.W.

Methodology: Z.W.

Supervision: M.Z.

Validation: M.Z.

Writing – original draft: Z.W.

Writing– review and editing: M.Z.

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