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Latent profile analysis of nurses' perceived professional benefits: a cross-sectional study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-078051
Article Type:	Original research
Date Submitted by the Author:	22-Jul-2023
Complete List of Authors:	Sun, Changli; Third Affiliated Hospital of Zunyi Medical University Jiang, Hu; Affiliated Hospital of Zunyi Medical University Yao, Qingfang; The Third Affiliated Hospital of Zunyi Medical University Wang, Xianwei; The Third Affiliated Hospital of Zunyi Medical University Wen, Xueke; Third Affiliated Hospital of Zunyi Medical University Liu, Hanmei; Zunyi Medical University
Keywords:	Burnout, Professional, Burnout, China

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4 **1 Latent profile analysis of nurses' perceived professional benefits: a**
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6 **2 cross-sectional study**
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9 **3 Running Head: LPA of nurses' perceived professional benefits**
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4 14 **Latent profile analysis of nurses' perceived professional benefits: a**
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7 15 **cross-sectional study**

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9 16 **ABSTRACT**

10 17 **Aim:** To identify profiles of nurses' perceived professional benefits as well as their
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13 18 predictors.

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15 19 **Design:** Cross-sectional descriptive study.

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17 20 **Methods:** From July 6 and July 27, 2022, a total of 1,309 registered nurses participated
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19 21 in the survey by convenient sampling. We collected the Nurses' Perceived Professional
20
21 22 Benefits Questionnaire (NPPBQ) and demographic data. Using latent profile analysis
22
23 23 (LPA), subgroups of nurses' perceived professional benefits were identified. Moreover,
24
25 24 univariate and multinomial logistic regression analysis were conducted to find the
26
27 25 factors that were linked with the profiles.

28
29 26 **Results:** The survey was validly completed by 1309 nurses. The findings of the LPA
30
31 27 demonstrated three unique profiles: low perceived professional benefits (11.8%),
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33 28 moderate perceived professional benefits (57.1%), and high perceived professional
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35 29 benefits (31.1%). There was a correlation between marital status, the number of night
36
37 30 shifts performed each month, and job title.

38 31 **No Patient or Public Contribution.**

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42 33 **Keywords:** nurse, perceived professional benefits, latent profile analysis, cross-
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44 34 sectional study

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1 INTRODUCTION

It is estimated that 69% of the global health workforce consists of nurses¹. Yet, the present physical and mental health of nurses is not encouraging, as they confront high levels of stress, burnout, turnover, and their own ageing²⁻⁴. Nursing is no longer a desirable and appealing profession⁵, which makes nurse shortages a widespread worldwide concern⁶. These issues have a direct bearing on the sustainability and continued growth of the nursing workforce. In recent years, nursing in China has experienced remarkable growth, and the most recent statistics indicate that China has more than 5 million registered nurses⁷. Chinese nurses are extremely susceptible to burnout, and a high desire to leave is a serious concern^{8,9}. However, there is a dearth of comprehensive study and viable remedies.

The mental health of nurses is receiving increasing attention from managers and researchers in the context of positive psychology. It is beginning to be recognized that nurses' own positive psychology promotes job satisfaction and professional identity, lessens burnout, and hence reduces turnover rates^{10,11}. Moreover, despite the fact that nursing is a high-risk, high-stress profession, nurses are able to achieve benefit findings¹²⁻¹⁴. In recent years, the concept of nurses' perceived professional benefits arises naturally, and has gradually attracted the attention of researchers.

1.1 Background

Regarding nurses' perceptions of their professional perks, there is no universally agreed definition. Nurses' perceived professional benefits (NPPB) refer to nurses' perceptions of the gains and benefits they receive in their profession during the hiring process, as well as their belief that working in nursing can promote their overall growth and development^{15,16}. Essentially, perceived professional benefits can be classified as an emotional experience and cognitive evaluation, which has two aspects: actual benefits and spiritual benefits¹⁵.

The profession of nursing can be beneficial to nurses in a number of ways. Previous studies^{17,18} reported that nursing preceptorship offers many benefits, and nurses may find themselves being more committed to the position as a result. A

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4 66 qualitative study ¹⁹ found that nurses who were involved in caring for dying patients
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6 67 got a great lot of experience and benefited considerably; they can create a personal
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8 68 philosophy on death and life, in addition to professional growth. Nurses who served
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10 69 as advanced practice nurse roles perceived numerous benefits, including improved
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12 70 patient care quality and safety, professionalism, personal development, career
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14 71 development, intrinsic satisfaction with the role, and impact on other professional
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16 72 groups ²⁰. A person's perception of professional benefit is an endogenous motivation
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18 73 for his or her development and has a positive effect on that person's career. According
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20 74 to prior study, improving the perceived professional benefit of nurses reduces burnout
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22 75 reduction and enables nurses to approach their work with a good attitude and obtain
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24 76 more favorable comments ^{21 22}.

25 77 Measures created by researchers to evaluate the perceived professional benefits
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27 78 of nurses were still in little supply. The Preceptor's Perspective of Benefits and
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29 79 Rewards (PPBR) measure was designed by Dibert and Goldenberg ²³ to evaluate the
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31 80 perceived benefits of clinical preceptor nurses, however, it is not relevant to general
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33 81 clinical nurses. A questionnaire entitled Nurses' Perceived Professional Benefits
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35 82 Questionnaire (NPPBQ) was developed to assess how Chinese nurses perceive the
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37 83 gains and benefits of their employment ^{16 24}. This questionnaire has been utilized in a
38
39 84 lot of research to date. While we now have a better grasp of nurses' perceptions of
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41 85 professional benefits, but the heterogeneity of the population is still lack, screening
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43 86 strategies for future precision interventions cannot be developed for identifying low-
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45 87 benefit populations.

46 88 The use of latent profile analysis (LPA) is frequently used to determine the
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48 89 number of subpopulations in a given sample. LPA is a statistical method that use
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50 90 potential category variables to explain the link between exogenous continuous-type
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52 91 indicators, permitting the assessment of the correlation between exogenous indicators
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54 92 and the maintenance of local independence among exogenous indicators ²⁵.

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56 93 To our knowledge, no studies have been conducted using LPA-based analyses of
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58 94 the perceived professional benefits of nurses have been done. The current study was
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60 95 created to bridge that gap. This study's objective was to examine the characteristics

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4 96 and determinants of nurses' perceived professional benefits as well as the predictors of
5 97 these latent profiles.
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99 **2 THE STUDY**

100 **2.1 Study design**

101 An online survey was used in this study to conduct a cross-sectional analysis. This
102 study was designed and reported in accordance with the guidelines for Strengthening
103 the Reporting of Observational Studies in Epidemiology (STROBE).
104

105 **2.2. Sample size estimation**

106 An examination of the latent profiles of perceived professional benefits among
107 nurses was conducted in this study. LPA needs a sample size larger than 500^{25 26},
108 therefore, the minimum sample size for this study was 500.
109

110 **2.3 Participants**

111 Participants in this study required to meet the inclusion criteria and be registered
112 nurses. To be considered, candidates had to satisfy the following criteria to be
113 considered: (1) having worked as a nurse in a medical facility for at least one year,
114 and (2) being willing to participate in this study. The following were the exclusion
115 criteria: having been diagnosed with a severe psychological or physical disorder.
116

117 **2.4 Instruments**

118 **2.4.1 Demographic**

119 This study gathered and evaluated demographic data including age, gender, greatest
120 degree of education, marital status, and other participant characteristics.
121

122 **2.4.2 Nurses' Perceived Professional Benefits Questionnaire (NPPBQ)**

123 The questionnaire was designed by Hu and Liu¹⁶ to investigate the gains and benefits
124 that nurses perceived from their jobs. The authors then reduced it to 17 items by 2020
125²⁴. The questionnaire has five dimensions: personal growth, a good nurse-patient

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4 126 relationship, recognition from family and friends, a positive occupational perception,
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6 127 and team belonging. Items are scored on a 5-point Likert scale (1 = strongly disagree,
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8 128 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree). Cronbach's alphas for the
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10 129 questionnaires were 0.94, and the NPPBQ subquestionnaires' alphas were 0.84, 0.83,
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12 130 0.74, 0.79, and 0.85.

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17 133 **2.5 Data collection**

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19 134 During the dates of July 6 and July 27, 2022, data was gathered. Wenjuanxing
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21 135 (www.wjx.cn) was used to develop a web-based questionnaire. Wechat was used to
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23 136 send the URL and QR code for the web questionnaire. The survey can be completed
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25 137 by clicking on the link or scanning the QR code.

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28 29 139 **2.6 Statistical analyses**

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31 140 Latent profile analysis was conducted using Mplus 7.4 software. Log likelihood (LL),
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33 141 Akaike information criterion (AIC), Akaike Information Criterion (BIC), Adjusted
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35 142 Bayesian Information Criteria (aBIC), Entropy, Lo-Mendell-Rubin (LMR), and the
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37 143 Bootstrapped Likelihood Ratio Test (BLRT) were used to assess model fit and
38
39 144 determine the appropriate number of categories. In order to decide which model best
40
41 145 fit the data, the models from each category's fitting results were combined with the
42
43 146 aforementioned indicators. The data was examined using the SPSS 26.0 statistical
44
45 147 program. We utilized frequency and composition ratios for categorical data, whereas
46
47 148 mean and standard deviation were utilized for continuous variables. The chi-square
48
49 149 test was performed to compare category variables across groups. ANOVA was used
50
51 150 to compare continuous variables among multiple groups. A multivariate logistic
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53 151 regression model was employed to analyze the variations in demographic variables. A
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55 152 statistically significant difference was indicated by $p < 0.05$.

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58 59 154 **2.7 Ethical considerations**

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4 155 The Ethics Committee of the First People's Hospital of Zunyi (2022-016) approved
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6 156 the study, and participants gave permission for data collection. Before to completing
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8 157 the survey, participants will be informed of the major substance of the study and the
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10 158 objective of the investigation, and they will have the option to provide informed
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12 159 consent. In addition, participants were also informed that the study's findings would
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14 160 be given in aggregate form and that no participant could be identified. If a person
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16 161 declined to complete the questionnaire, the collection was immediately ended.
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19 163 **3 RESULTS**

20 164 **3.1 Participant characteristics**

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23 165 A total of 1409 nurses completed the questionnaire, while 58 nurses denied
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25 166 participation, for a total number of 1351 questionnaires received. 42 surveys were
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27 167 considered invalid due to insufficient or inaccurate information. 92.9 percent of the
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29 168 final 1309 surveys were correctly returned. The ages of the participants varied from 18
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31 169 to 59 years old, with a mean age of 32.25 (SD: 6.18) years old. The bulk of participants
32
33 170 were female (86.7%), whereas the minority were male (3.2%).
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36 172 **3.2 Characteristics of the different classes**

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39 173 On the basis of the NPPBQ's five dimensions, it was established that a model with three
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41 174 latent classes provided the greatest match. Table 1 provides the results. While the AIC
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43 175 and BIC in class 4 were lower in class 4 than in class 3, the entropy was greater;
44
45 176 nonetheless, the lowest category probability in class 4 was 1.4%, which is
46
47 177 unsatisfactory. As a consequence, we decided that the best-fitting model is class 3.
48
49 178 Using a three-class model, Figure 1 illustrates the mean scores for each category within
50
51 179 the NPPBQ's dimensions. The percentages increase from class 1 to class 3 as follows:
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53 180 11.8% (155 nurses), 57.1% (747 nurses), and 31.1% (407 nurses). For the sake of
54
55 181 brevity, based on the profile scores, we named class 1 as the low perceived professional
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57 182 benefits, class 2 as the moderate perceived professional benefits, and class 3 as the high
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59 183 perceived professional benefits.
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185 3.3 The scale and dimension scores of different profiles

186 The findings of a one-way ANOVA indicated statistically significant differences in the
187 scale and dimension scores of different profiles (both $p < 0.001$). The results were shown
188 in Figure 2 demonstrates the outcomes.

190 3.4 Demographic and related characteristics of each profile

191 The ANOVA and chi-square tests indicated statistically significant differences
192 between the three profiles differed statistically in terms of age, marital status, children,
193 professional title, job title, working years, and number of night shifts per month. Table
194 2 is a summary of the results.

195 A multivariate logistic regression model was constructed using the variables with
196 statistically significant differences as determined by ANOVA and chi-square tests. Of
197 the three profiles, the class 3 was chosen as a reference to find the predictors linked
198 with NPPBQ. As shown in Table 3, nurses who were single/divorced/widowed were
199 more likely to belonged to low perceived professional benefits ($OR: 1.984$,
200 $95\%CI: 1.028-3.828$). The number of night shifts worked per month was associated with
201 low perceived professional benefits ($OR: 0.633$, $95\% CI: 0.405-0.988$), compared to
202 those with more than five night shifts, those without night shifts tended to fall into the
203 high perceived professional benefits. Nurses without a job title were more likely to be
204 in the moderate perceived professional benefits ($OR: 1.489$, $95\% CI: 1.028-2.157$).
205 Other variables were not statistically significant in the multivariate logistic regression.

206 4 DISCUSSION

207 The purpose of this research was to identify distinct profiles of nurses' perceived
208 professional benefits. Furthermore, the current study employed multinomial logistic
209 regression to investigate predictors of these profiles.

210 In this study, we investigated 1309 nurses who validly completed the questionnaire.
211 As a result, three latent profiles were identified: low perceived professional benefits,
212 moderate perceived professional benefits, and high perceived professional benefits. Our
213 research revealed that the majority of nurses had a moderate or higher levels of
214 perceived professional benefits, with just 11.8% of nurses belonging to the category of
215 nurses with low perceived professional benefits. Most studies reported nurses had an
216 upper-moderate level of perceived professional benefits^{27 28}, and our findings are
217 consistent with those of previous studies.

218 In the last three years, nurses have been a key part of the fight against the COVID-
219 19 outbreak. Despite heavy job pressure, nurses have had a feeling of professional
220 calling and value²⁹, which has effectively enhanced their sense of professional benefit
221¹². At the same time, the critical role of nurses in defending people's lives and health
222 has earned the society's respect and recognition, as well as a positive social image^{30 31},
223 which can further enhance nurses' sense of professional benefit. Our survey was
224 conducted during the COVID-19 epidemic, and nurses' perceptions of professional
225 benefit may be elevated.

226 Another finding of our study revealed that the membership of profiles can be
227 predicted by some characteristics such as the number of night shifts, job title, and
228 marriage status. Nursing is a continuous, 24-hour profession, and nurse's work normally
229 takes the form of night shifts. It is widely proven that night shifts negatively impact the
230 physical and emotional health of nurses³²⁻³⁵. Nurses working rotating night shifts were
231 normally younger, and they had the lower scores of job satisfaction, quality of sleep,
232 and quantity of sleep³⁶, these factors resulted in a low perceived professional benefits.
233 Consistent with past research, our findings indicate that the greater the frequency of
234 night shifts, the lower the perceived professional benefit²⁸.

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4 235 The majority of nurses in the moderate perceived professional benefits group
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6 236 lacked a work title, while the majority of nurses in the highly perceived professional
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8 237 benefits group held a job title. This has been validated by other research, and our
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10 238 work provides more support for this notion ²⁸. Holding a managerial position at a
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12 239 hospital is a means of advancing one's career, and nurses highly value this
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14 240 opportunity.

15
16 241 Our study found that nurses who were single/divorced/widowed were more
17
18 242 likely to belong to low perceived professional benefits, which is consistent with
19
20 243 earlier findings ²⁸. This may be because, unlike single/divorced/widowed nurses,
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22 244 married nurses receive more social support from their spouses and other family
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24 245 members.

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26 246 Unfortunately, our research failed to demonstrate that the profiles can be predicted
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28 247 by other factors in the model variables. Our findings in the univariate analysis results
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30 248 were consistent with earlier research. Nevertheless, because the bulk of prior research
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32 249 did not employ multi-factor models, it was impossible to compare our findings could
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34 250 not be compared to those of others. In addition, certain putative contributing elements
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36 251 were not adequately proven, and further research is required to confirm them in the
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38 252 future.

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40 253 Professional benefit for nurses is a psychological process that is dynamic and
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42 254 impacted by a number of elements. According to our results, 57.1% of nurses perceived
43
44 255 professional benefits as moderate. However, they may perceive low professional
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46 256 benefits as a result of personal, organizational, environmental or social reasons.
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48 257 Although many studies have been conducted to investigate the relationship between
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50 258 professional benefits, professional identity, and burnout, they only make spectacular
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52 259 observations without delving into the mechanisms and theories. As Willetts and Clarke
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54 260 ³⁷ argued, using social identity theory as a research framework may assist in clarifying
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56 261 and describing nurses' professional identities. In order to better understand how nurses
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58 262 perceive the benefits of having a career, it is necessary to develop additional theoretical
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60 263 models.

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4 264 Our research has theoretical and practical implications for the future study of
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6 265 nurses' perceived professional benefits. In this survey, we presented a unique
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8 266 perspective and a basis for future research on the perceived career benefits of nurses.
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10 267 Additionally, our research has identified subgroups of registered nurses based on their
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12 268 perceptions of professional benefits and offers treatments based on these findings. It is
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14 269 important to realize that there are many interventions available for addressing job
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16 270 satisfaction ³⁸ and burnout ³⁹. In the future, further assistance programs targeting
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18 271 perceived professional benefits should be implemented.
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21 273 **4.1 Limitations**

22
23 274 The research was limited in some ways. First, this was a web-based survey, and the
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25 275 sample process and self-reporting strategy may have resulted in some bias. Second, we
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27 276 only polled nurses in mainland China, and our sample only reflected the current
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29 277 situation in a single nation. Lastly, the constraints of the study's design prohibited an
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31 278 in-depth assessment of the psychological factors behind nurses' perceptions of their
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33 279 professional benefit. As a result, more rigorously designed studies will be required in
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35 280 the future to investigate this issue in depth.
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38 282 **5 CONCLUSION**

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40 283 Our study identified three professional benefits profiles among nurses. The results of
41
42 284 our study indicated that nurses enjoy a high level of professional benefits.
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44 285 Notwithstanding the study's limitations of the study and the present condition of
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46 286 nursing, it is vital that we engage on several levels to encourage a stable nursing
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48 287 workforce, including policy, organisation, financial income, and career development,
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50 288 so that nurses experience a sense of professional gain.
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4 290 **Acknowledgements**

5 291 None.

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9 293 **CONFLICT OF INTEREST**

10
11 294 The authors have no conflicts of interest to declare.

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14
15 296 **AUTHOR CONTRIBUTIONS**

16
17 297 Jiang Hu and Sun Changli were responsible for the conception and study design. Yao

18
19 298 Qiangfang, Wang Xianwei and Liu Hanmei performed the data collection. Yao

20
21 299 Qiangfang, Wang Xianwei and Wen Xueke contributed to the analysis of the data.

22
23 300 Sun Changli and Jiang Hu were involved in drafting the manuscript and revising it.

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25 301 All authors have read and approved the final manuscript.

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29 303 **FUNDING**

30
31 304 This study was funded by the Science and Technology Fund Project of Guizhou

32
33 305 Provincial Health and Health Commission (gzwjkj2019-1-030).

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Table 1 Potential profile analysis indicators (N=1309)

Model	LL ^a	AIC ^b	BIC ^c	aBIC ^d	Entropy	LMR ^e <i>p</i> -value	BLRT ^f <i>p</i> -value	Category probability
Class 1	-14709.353	29438.706	29490.476	29458.711	-	-	-	-
Class 2	-13420.425	26872.850	26955.682	26904.857	0.905	< 0.001	< 0.001	0.654/0.346
Class 3	-12583.629	25211.257	25325.152	25255.268	0.936	0.007	< 0.001	0.118/0.571/0.311
Class 4	-12307.807	24671.613	24816.570	24727.627	0.940	0.036	< 0.001	0.151/0.014/0.530/0.306

a Akaike information criterion, b Bayesian information criterion, c Sample adjusted bayesian information criterion, d Lo-Mendell-Rubin Likelihood Ratio Test, f Bootstrapped Likelihood Ratio Test.

Table 2 Demographic and characteristics by latent profile (N=1309)

Variables	Class 1	Class 2	Class 3	χ^2/F	<i>p</i>
Age (SD)	30.94 (5.37)	31.76 (5.91)	33.64 (6.71)	16.545	< 0.001
Gender				0.600	0.741
Male	6 (3.9)	25 (3.3)	11 (2.7)		
Female	149 (96.1)	722 (96.7)	396 (97.3)		
Highest Degree				1.602	0.449
Junior college and below	29 (18.7)	111 (14.9)	60 (14.7)		
Bachelor's and above	126 (81.3)	636 (85.1)	347 (85.3)		
Marital status				25.768	< 0.001
Single/divorced/widowed	62 (40.0)	218 (29.2)	80 (19.7)		
Married	93 (60.0)	529 (70.8)	327 (80.3)		
Children				26.943	< 0.001
Yes	87 (56.1)	481 (64.4)	311 (76.4)		
No	68 (43.9)	266 (35.6)	96 (23.6)		

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Professional title				23.589	< 0.001
Junior Level	102 (65.8)	448 (60.0)	207 (50.9)		
Intermediate level	50 (32.3)	280 (37.5)	172 (42.3)		
Senior level	3 (1.9)	19 (2.5)	28 (6.9)		
Job title				17.086	< 0.001
Yes	18 (11.6)	86 (11.5)	82 (20.1)		
No	137 (88.4)	661 (88.5)	325 (79.9)		
Working years (years)				32.903	< 0.001
≤5	52 (33.5)	217 (29.0)	79 (19.4)		
6–15	91 (58.7)	438 (58.6)	241 (59.2)		
≥16	12 (7.7)	92 (12.3)	87 (21.4)		
Average monthly income (yuan)				7.990	0.239
≤3000	23 (14.8)	75 (10.0)	43 (10.6)		
3001~6000	93 (60.0)	415 (55.6)	217 (53.3)		
6001~9000	27 (17.4)	179 (24.0)	105 (25.8)		

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5	≥9001	12 (7.7)	78 (10.4)	42 (10.3)	
6					
7	Number of night shifts per				
8	month				17.797
9					0.001
10	0	42 (27.1)	233 (31.2)	164 (40.3)	
11					
12	1-4	22 (14.2)	143 (19.1)	73 (17.9)	
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14	≥5	91 (58.7)	371 (49.7)	170 (41.8)	
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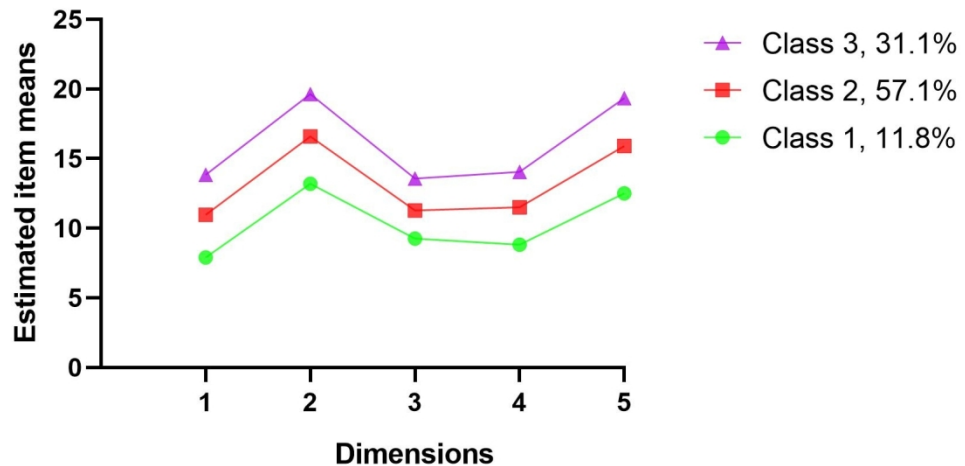
Table 3 Predictors of latent profile membership

Variables	Class 1 VS Class 3			Class 2 VS Class 3		
	β	<i>OR</i>	95% <i>CI</i>	β	<i>OR</i>	95% <i>CI</i>
Age (SD)	0.004	1.004	0.941-1.070	-0.005	0.995	0.957-1.034
Marital status						
Single/divorced/widowed	0.685	1.984*	1.028-3.828	0.115	1.122	0.716-1.760
Married (Ref)						
Children						
No	0.177	1.194	0.622-2.293	0.240	1.272	0.822-1.967
Yes (Ref)						
Professional title						
Junior Level	0.368	1.444	0.334-6.241	0.359	1.433	0.661-3.105
Intermediate level	0.378	1.460	0.370-5.766	0.429	1.535	0.764-3.085
Senior level (Ref)						
Job title						
No	0.139	1.984	1.028-3.828	0.398	1.489*	1.028-2.157

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5	Yes (Ref)						
6							
7	Working years (years)						
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9	≤5	0.781	2.184	0.666-7.161	0.411	1.508	0.748-3.042
10							
11	6–15	0.721	2.057	0.847-5.000	0.228	1.256	0.773-2.039
12							
13	≥16 (Ref)						
14							
15	Number of night shifts per						
16	month						
17							
18	0	-0.458	0.633*	0.405-0.988	-0.223	0.800	0.601-1.064
19							
20	1–4	-0.354	0.702	0.400-1.231	0.089	1.094	0.768-1.558
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22	≥5 (Ref)						
23							

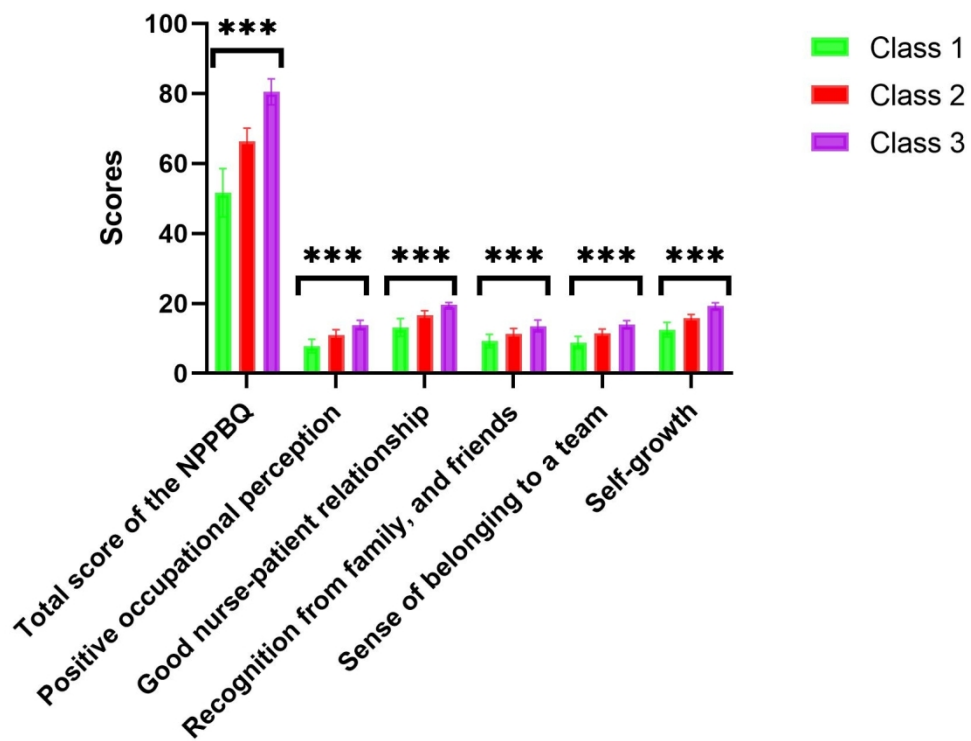
* $p < 0.05$; OR, Odds ratio; 95% CI, 95% Confidence Interval; Ref, Reference.

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Latent profiles of NPPBQ
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The scale and dimension scores of different profiles

145x114mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Latent profile analysis of nurses' perceived professional benefits in China: a cross-sectional study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-078051.R1
Article Type:	Original research
Date Submitted by the Author:	04-Oct-2023
Complete List of Authors:	Sun, Changli; Third Affiliated Hospital of Zunyi Medical University Jiang, Hu; Zunyi Medical University Yao, Qingfang; The Third Affiliated Hospital of Zunyi Medical University Wang, Xianwei; The Third Affiliated Hospital of Zunyi Medical University Wen, Xueke; Third Affiliated Hospital of Zunyi Medical University Liu, Hanmei; Zunyi Medical University
Primary Subject Heading:	Occupational and environmental medicine
Secondary Subject Heading:	Nursing, Occupational and environmental medicine
Keywords:	Burnout, Professional, Burnout, China

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9 **3 Running Head: LPA of nurses' perceived professional benefits**
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14 5 Changli Sun¹, Hu Jiang^{1*}, Qingfang Yao², Xianwei Wang², Xueke Wen¹ and Hanmei
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26 11 Hospital of Zunyi Medical University (The First People's Hospital of Zunyi), Zunyi,
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4 14 **Latent profile analysis of nurses' perceived professional benefits in**
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7 15 **China: a cross-sectional study**

8
9 16 **ABSTRACT**

10 17 **Objective:** To identify profiles of nurses' perceived professional benefits as well as
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13 18 their predictors.

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15 19 **Design:** Cross-sectional study.

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17 20 **Setting:** The study was carried out online in China.

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19 21 **Methods:** From July 6 and July 27, 2022, a total of 1,309 registered nurses participated
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22 22 in the survey by convenient sampling. We collected the Nurses' Perceived Professional
23
24 23 Benefits Questionnaire (NPPBQ) and demographic data. Using latent profile analysis
25
26 24 (LPA), subgroups of nurses' perceived professional benefits were identified. Moreover,
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28 25 univariate and multinomial logistic regression analysis were conducted to find the
29
30 26 factors that were linked with the profiles.

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32 27 **Results:** The survey was validly completed by 1309 nurses, with a 92.9% effective
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34 28 return rate. The findings of the LPA demonstrated three unique profiles: low perceived
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36 29 professional benefits (11.8%), moderate perceived professional benefits (57.1%), and
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38 30 high perceived professional benefits (31.1%). There was a correlation between marital
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40 31 status, the number of night shifts per month, and leadership role.

41
42 32 **Conclusions:** According to our research, registered nurses have three unique
43
44 33 professional benefit profiles. In order to sustain the nursing workforce, despite the fact
45
46 34 that nurses get a high level of professional benefits, interventions are necessary to
47
48 35 increase nurses' perception of their professional value.

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50 36
51 37 **Keywords:** nurse, perceived professional benefits, latent profile analysis, cross-
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53 38 sectional study

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56 40 **Strengths and limitations of this study:**

- 57
58 41 ● A total of 1,309 registered nurses participated in the survey across the country.
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60 42 ● Three unique professional benefit profiles and influencing factors were found

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4 43 among nurses.

5 44 ● The generalization of this study was limited by the web-based cross-sectional

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7 45 design and convenient sampling method.
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46 INTRODUCTION

47 Despite the fact that nursing is a high-risk, high-stress profession, nurses are able
48 to achieve benefit findings [1-3]. In recent years, the concept of nurses' perceived
49 professional benefits arises naturally, and has gradually attracted the attention of
50 researchers. Nurses' perceived professional benefits (NPPB) refer to nurses'
51 perceptions of the gains and benefits they receive in their profession during the hiring
52 process, as well as their belief that working in nursing can promote their overall
53 growth and development [4, 5]. Essentially, perceived professional benefits can be
54 classified as an emotional experience and cognitive evaluation, which has two
55 aspects: actual benefits and spiritual benefits [4]. However, there is a lack of in-depth
56 research on the group heterogeneity of perceived professional benefits among nurse
57 populations.

58 Background

59 It is estimated that 69% of the global health workforce consists of nurses [6].
60 Yet, the present physical and mental health of nurses is not encouraging, as they
61 confront high levels of stress, burnout, turnover, and their own ageing [7-9]. Nursing
62 is no longer a desirable and appealing profession [10], which makes nurse shortages a
63 widespread worldwide concern [11]. These issues have a direct bearing on the
64 sustainability and continued growth of the nursing workforce. In recent years, nursing
65 in China has experienced remarkable growth, and the most recent statistics indicate
66 that China has more than 5 million registered nurses [12]. Chinese nurses are
67 extremely susceptible to burnout, and a high desire to leave is a serious concern [13,
68 14]. However, there is a dearth of comprehensive study and viable remedies.

69 The mental health of nurses is receiving increasing attention from managers and
70 researchers in the context of positive psychology. It is beginning to be recognized that
71 nurses' own positive psychology promotes job satisfaction and professional identity,
72 lessens burnout, and hence reduces turnover rates [15, 16].

73 The profession of nursing can be beneficial to nurses in a number of ways.
74 Previous studies [17, 18] reported that nursing preceptorship offers many benefits,
75 and nurses may find themselves being more committed to the position as a result. A

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4 76 qualitative study [19] found that nurses who were involved in caring for dying
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6 77 patients got a great lot of experience and benefited considerably; they can create a
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8 78 personal philosophy on death and life, in addition to professional growth. Nurses who
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10 79 served as advanced practice nurse roles perceived numerous benefits, including
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12 80 improved patient care quality and safety, professionalism, personal development,
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14 81 career development, intrinsic satisfaction with the role, and impact on other
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16 82 professional groups [20]. A person's perception of professional benefit is an
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18 83 endogenous motivation for his or her development and has a positive effect on that
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20 84 person's career. According to prior studies, improving the perceived professional
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22 85 benefit of nurses reduces burnout reduction and enables nurses to approach their work
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24 86 with a good attitude and obtain more favorable comments [21, 22].

25 87 Measures created by researchers to evaluate the perceived professional benefits
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27 88 of nurses were still in little supply. The Preceptor's Perspective of Benefits and
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29 89 Rewards (PPBR) measure was designed by Dibert, et al. [23] to evaluate the
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31 90 perceived benefits of clinical preceptor nurses, however, it is not relevant to general
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33 91 clinical nurses. A questionnaire entitled Nurses' Perceived Professional Benefits
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35 92 Questionnaire (NPPBQ) was developed to assess how Chinese nurses perceive the
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37 93 gains and benefits of their employment [5, 24]. This questionnaire has been utilized in
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39 94 a lot of research to date. While we now have a better grasp of nurses' perceptions of
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41 95 professional benefits, but the heterogeneity of the population is still lack, screening
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43 96 strategies for future precision interventions cannot be developed for identifying low-
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45 97 benefit populations.

46 98 To our knowledge, it has not been shown that sufficient evidence exists to
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48 99 answer the questions of whether nurses' perceived professional benefits differ in
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50 100 groups and what factors contribute to these differences. The current study was created
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52 101 to bridge that gap. This study's objective was to examine the characteristics and
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54 102 determinants of nurses' perceived professional benefits as well as the predictors of
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56 103 these latent profiles.

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59 105 **MATERIALS AND METHODS**

106 Study design

107 An online survey with convenient sampling was used in this study to conduct a cross-
108 sectional analysis. This study was designed and reported in accordance with the
109 guidelines for Strengthening the Reporting of Observational Studies in Epidemiology
110 (STROBE)[25].

112 Sample size estimation

113 An examination of the latent profiles of perceived professional benefits among
114 nurses was conducted in this study. LPA needs a sample size larger than 500 [26, 27],
115 therefore, the minimum sample size for this study was 500.

117 Participants

118 Participants in this study required to meet the inclusion criteria and be registered
119 nurses. To be considered, candidates had to satisfy the following criteria to be
120 considered: (1) having worked as a nurse in a medical facility, and (2) being willing to
121 participate in this study. The following were the exclusion criteria: logical errors or
122 missing information in questionnaire answers.

124 Measurements**125 Demographic**

126 This study gathered and evaluated demographic data including age, gender, greatest
127 degree of education, marital status, and other participant characteristics.

129 Nurses' Perceived Professional Benefits Questionnaire (NPPBQ)

130 The questionnaire was designed by Jing Hu, et al. [5] to investigate the gains and
131 benefits that nurses perceived from their jobs. The authors then reduced it to 17 items
132 by 2020 [24]. The questionnaire has five dimensions: personal growth, a good nurse-
133 patient relationship, recognition from family and friends, a positive occupational
134 perception, and team belonging. Items are scored on a 5-point Likert scale (1 =
135 strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree).

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4 136 Cronbach's alphas for the questionnaires were 0.94, and the NPPBQ
5 137 subquestionnaires' alphas were 0.84, 0.83, 0.74, 0.79, and 0.85.

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9 139 **Data collection**

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11 140 During the dates of July 6 and July 27, 2022, data was gathered. Wenjuanxing
12 141 (www.wjx.cn) was used to develop a web-based questionnaire. Two researchers
13 142 reviewed the online questionnaire for rigor and verified the feasibility of the
14 143 questionnaire by completing it within the team. A poster was created to present the
15 144 link and QR code. It was clearly shown on the poster who would be included and
16 145 excluded from the survey. We distributed the questionnaire nationwide in China and
17 146 did not limit the source and setting of nurses. The researcher contacted administrators
18 147 or general nurses to disseminate the questionnaire. Wechat was used to send the
19 148 poster and information letter. The survey can be completed by clicking on the link or
20 149 scanning the QR code, completed questionnaires can be returned directly to the web.

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24 151 **Statistical analyses**

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26 152 The use of latent profile analysis (LPA) is frequently used to determine the
27 153 number of subpopulations in a given sample. LPA is a statistical method that use
28 154 potential category variables to explain the link between exogenous continuous-type
29 155 indicators, permitting the assessment of the correlation between exogenous indicators
30 156 and the maintenance of local independence among exogenous indicators [27]. Latent
31 157 profile analysis was conducted using Mplus 7.4 software. Log likelihood (LL),
32 158 Akaike information criterion (AIC), Akaike Information Criterion (BIC), Adjusted
33 159 Bayesian Information Criteria (aBIC), Entropy, Lo-Mendell-Rubin (LMR), and the
34 160 Bootstrapped Likelihood Ratio Test (BLRT) were used to assess model fit and
35 161 determine the appropriate number of categories. In order to decide which model best
36 162 fit the data, the models from each category's fitting results were combined with the
37 163 aforementioned indicators. The data was examined using the SPSS 26.0 statistical
38 164 program. We utilized frequency and composition ratios for categorical data, whereas
39 165 mean and standard deviation were utilized for continuous variables. The chi-square

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4 166 test was performed to compare category variables across groups. ANOVA was used
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6 167 to compare continuous variables among multiple groups. A multivariate logistic
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8 168 regression model was employed to analyze the variations in demographic variables. A
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10 169 statistically significant difference was indicated by $p < 0.05$.

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12 170

14 171 **Ethical considerations**

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16 172 The Ethics Committee of the First People's Hospital of Zunyi (2022-016) approved
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18 173 the study, and participants gave permission for data collection. Prior to completing the
19
20 174 survey, participants will be provided with information about the purpose of the study
21
22 175 and the major substance of the research. They will then be able to provide their
23
24 176 informed consent through a yes or no response. In addition, participants were also
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26 177 informed that the study's findings would be given in aggregate form and that no
27
28 178 participant could be identified. If a person declined to complete the questionnaire, the
29
30 179 collection was immediately ended.

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33 181 **Patient and public involvement**

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35 182 Patients and/or the public were not involved in the design, or conduct, or reporting, or
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37 183 dissemination plans of this research.

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39 184

41 185 **RESULTS**

43 186 **Participant characteristics**

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45 187 A total of 1409 nurses completed the questionnaire, while 58 nurses denied
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47 188 participation, for a total number of 1351 questionnaires received. 42 surveys were
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49 189 considered invalid due to insufficient or inaccurate information. 92.9 percent of the
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51 190 final 1309 surveys were correctly returned. The ages of the participants varied from 18
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53 191 to 59 years old, with a mean age of 32.25 (SD: 6.18) years old. The bulk of participants
54
55 192 were female (86.7%), whereas the minority were male (3.2%).

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57 193

59 194 **Characteristics of the different classes**

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195 On the basis of the NPPBQ's five dimensions, it was established that a model with three
 196 latent classes provided the greatest match. A class represents different categorisation
 197 methods, such as a class 1 for a single subgroup, a class 2 for two heterogeneous
 198 subgroups, and so forth. Table 1 provides the results. While the AIC and BIC in class
 199 4 were lower in class 4 than in class 3, the entropy was greater; nonetheless, the lowest
 200 category probability in class 4 was 1.4%, which is unsatisfactory. As a consequence,
 201 we decided that the best-fitting model is class 3. Using a three-class model, Figure 1
 202 illustrates the mean scores for each category within the NPPBQ's dimensions. The
 203 percentages increase from class 1 to class 3 as follows: 11.8% (155 nurses), 57.1% (747
 204 nurses), and 31.1% (407 nurses). For the sake of brevity, based on the profile scores,
 205 we named class 1 as the low perceived professional benefits, class 2 as the moderate
 206 perceived professional benefits, and class 3 as the high perceived professional benefits.

207 **Table 1** Potential profile analysis indicators ($N=1309$)

Model	LL ^a	AIC ^b	BIC ^c	aBIC ^d	Entrop y	LMR ^e p-value	BLRT ^f p-value	Category probability
Class 1	- 14709.353	29438.706	29490.476	29458.711	-	-	-	-
Class 2	- 13420.425	26872.850	26955.682	26904.857	0.905	< 0.001	< 0.001	0.654/0.346
Class 3	- 12583.629	25211.257	25325.152	25255.268	0.936	0.007	< 0.001	0.118/0.571/0.311
Class 4	- 12307.807	24671.613	24816.570	24727.627	0.940	0.036	< 0.001	0.151/0.014/0.530/0.306

208

209 a Log likelihood, b Akaike information criterion, c Bayesian information criterion, d Adjusted
 210 bayesian information criterion, e Lo-Mendell-Rubin Likelihood Ratio Test, f Bootstrapped
 211 Likelihood Ratio Test

212

213 **The scale and dimension scores of different profiles**

214 The findings of a one-way ANOVA indicated statistically significant differences in the
 215 scale and dimension scores of different profiles (both $p < 0.001$). The results were shown
 216 in Figure 2 demonstrates the outcomes.

217

218 **Demographic and related characteristics of each profile**

219 The ANOVA and chi-square tests indicated statistically significant differences
 220 between the three profiles differed statistically in terms of age, marital status, children,
 221 professional title, leadership role, working years, and number of night shifts per month.
 222 Table 2 is a summary of the results.

223 **Table 2** Demographic and characteristics by latent profile ($N=1309$)

Variables	Class 1	Class 2	Class 3	χ^2/F	p
Age (SD)	30.94 (5.37)	31.76 (5.91)	33.64 (6.71)	16.545	< 0.001
Gender				0.600	0.741
Male	6 (3.9)	25 (3.3)	11 (2.7)		
Female	149 (96.1)	722 (96.7)	396 (97.3)		
Highest Degree				1.602	0.449
Junior college and below	29 (18.7)	111 (14.9)	60 (14.7)		
Bachelor's and above	126 (81.3)	636 (85.1)	347 (85.3)		
Marital status				25.768	< 0.001
Single/divorced/widowed	62 (40.0)	218 (29.2)	80 (19.7)		
Married	93 (60.0)	529 (70.8)	327 (80.3)		
Children				26.943	< 0.001
Yes	87 (56.1)	481 (64.4)	311 (76.4)		
No	68 (43.9)	266 (35.6)	96 (23.6)		
Professional title				23.589	< 0.001
Junior Level	102 (65.8)	448 (60.0)	207 (50.9)		
Intermediate level	50 (32.3)	280 (37.5)	172 (42.3)		
Senior level	3 (1.9)	19 (2.5)	28 (6.9)		
Leadership role				17.086	< 0.001
Yes	18 (11.6)	86 (11.5)	82 (20.1)		

No	137 (88.4)	661 (88.5)	325 (79.9)		
Working years (years)				32.903	< 0.001
≤5	52 (33.5)	217 (29.0)	79 (19.4)		
6–15	91 (58.7)	438 (58.6)	241 (59.2)		
≥16	12 (7.7)	92 (12.3)	87 (21.4)		
Average monthly income (yuan)*				7.990	0.239
≤3000	23 (14.8)	75 (10.0)	43 (10.6)		
3001~6000	93 (60.0)	415 (55.6)	217 (53.3)		
6001~9000	27 (17.4)	179 (24.0)	105 (25.8)		
≥9001	12 (7.7)	78 (10.4)	42 (10.3)		
Number of night shifts per month				17.797	0.001
0	42 (27.1)	233 (31.2)	164 (40.3)		
1–4	22 (14.2)	143 (19.1)	73 (17.9)		
≥5	91 (58.7)	371 (49.7)	170 (41.8)		

224

225 * 1 USD equals 7.31 Chinese Yuan, exchange rate on September 29, 2023

226

227 A multivariate logistic regression model was constructed using the variables with
 228 statistically significant differences as determined by ANOVA and chi-square tests. Of
 229 the three profiles, the class 3 was chosen as a reference to find the predictors linked
 230 with NPPBQ. As shown in Table 3, nurses who were single/divorced/widowed were
 231 more likely to belonged to low perceived professional benefits (*OR*: 1.984,
 232 95%*CI*:1.028-3.828). The number of night shifts worked per month was associated with
 233 low perceived professional benefits (*OR*: 0.633, 95% *CI*: 0.405-0.988), compared to
 234 those with more than five night shifts, those without night shifts tended to fall into the
 235 high perceived professional benefits. Nurses without a leadership role were more likely
 236 to be in the moderate perceived professional benefits (*OR*: 1.489, 95% *CI*: 1.028-2.157).

237 Other variables were not statistically significant in the multivariate logistic regression.

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Table 3 Predictors of latent profile membership

Variables	Class 1 VS Class 3			Class 2 VS Class 3		
	β	OR	95%CI	β	OR	95%CI
Age (SD)	0.004	1.004	0.941-1.070	-0.005	0.995	0.957-1.034
Marital status						
Single/divorced/widowed	0.685	1.984*	1.028-3.828	0.115	1.122	0.716-1.760
Married (Ref)						
Children						
No	0.177	1.194	0.622-2.293	0.240	1.272	0.822-1.967
Yes (Ref)						
Professional title						
Junior level	0.368	1.444	0.334-6.241	0.359	1.433	0.661-3.105
Intermediate level	0.378	1.460	0.370-5.766	0.429	1.535	0.764-3.085
Senior level (Ref)						
Leadership role						
No	0.139	1.984	1.028-3.828	0.398	1.489*	1.028-2.157
Yes (Ref)						
Working years (years)						
≤ 5	0.781	2.184	0.666-7.161	0.411	1.508	0.748-3.042
6–15	0.721	2.057	0.847-5.000	0.228	1.256	0.773-2.039
≥ 16 (Ref)						
Number of night shifts per month						
0	-0.458	0.633*	0.405-0.988	-0.223	0.800	0.601-1.064
1–4	-0.354	0.702	0.400-1.231	0.089	1.094	0.768-1.558

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4 ≥ 5 (Ref)
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6 243 * $p < 0.05$; *OR*, Odds ratio; 95% *CI*, 95% Confidence Interval; Ref, Reference.
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For peer review only

244 **DISCUSSION**

245 The purpose of this research was to identify distinct profiles of nurses' perceived
246 professional benefits. Furthermore, the current study employed multinomial logistic
247 regression to investigate predictors of these profiles.

248 In this study, we investigated 1309 nurses who validly completed the questionnaire.
249 As a result, three latent profiles were identified: low perceived professional benefits,
250 moderate perceived professional benefits, and high perceived professional benefits. Our
251 research revealed that the majority of nurses had a moderate or higher levels of
252 perceived professional benefits, with just 11.8% of nurses belonging to the category of
253 nurses with low perceived professional benefits. Most studies reported nurses had an
254 upper-moderate level of perceived professional benefits [28, 29], and our findings are
255 consistent with those of previous studies. Most importantly, our study clarified the
256 heterogeneous subgroups of nurses' perceived professional benefits and their specific
257 distribution.

258 In the last three years, nurses have been a key part of the fight against the COVID-
259 19 outbreak. Despite heavy job pressure, nurses have had a feeling of professional
260 calling and value [30], which has effectively enhanced their sense of professional
261 benefit [1]. At the same time, the critical role of nurses in defending people's lives and
262 health has earned the society's respect and recognition, as well as a positive social image
263 [31, 32], which can further enhance nurses' sense of professional benefit. Our survey
264 was conducted during the COVID-19 epidemic, and nurses' perceptions of professional
265 benefit may be elevated.

266 Another finding of our study revealed that the membership of profiles can be
267 predicted by some characteristics such as the number of night shifts, leadership role,
268 and marriage status. Nursing is a continuous, 24-hour profession, and nurse's work
269 normally takes the form of night shifts. It is widely proven that night shifts negatively
270 impact the physical and emotional health of nurses [33-36]. Nurses working rotating
271 night shifts were normally younger, and they had the lower scores of job satisfaction,
272 quality of sleep, and quantity of sleep [37], these factors resulted in a low perceived
273 professional benefits. Consistent with past research, our findings indicate that the

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4 274 greater the frequency of night shifts, the lower the perceived professional benefit [29].

5 275 According to our results, 57.1% of nurses perceived professional benefits as
6
7 276 moderate. The majority of nurses in the moderate perceived professional benefits
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9 277 group lacked a work title, while the majority of nurses in the highly perceived
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11 278 professional benefits group held a leadership role. This has been validated by other
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13 279 research, and our work provides more support for this notion [29]. Holding a
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15 280 managerial position at a hospital is a means of advancing one's career, and nurses
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17 281 highly value this opportunity.

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19 282 Our study found that nurses who were single/divorced/widowed were more likely
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21 283 to belong to low perceived professional benefits, which is consistent with earlier
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23 284 findings [29]. This may be because, unlike single/divorced/widowed nurses, married
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25 285 nurses receive more social support from their spouses and other family members.

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27 286 We hypothesized that job fulfillment and social support are important influencing
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29 287 mechanisms that affect nurses' perceived professional benefits. The number of night
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31 288 shifts, leadership roles are important indicators of nurses' job fulfillment. Marital status
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33 289 is an important factor in social support. Each of these factors can have varying degrees
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35 290 of impact on the actual benefit or spiritual benefit [4]. Considering that nurses perceive
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37 291 professional benefits as a result of personal, organizational, environmental, and social
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39 292 factors, a well-developed theoretical framework is required to explain this phenomenon.

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41 293 Unfortunately, our research failed to demonstrate that the profiles can be predicted
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43 294 by other factors in the model variables. Our findings in the univariate analysis results
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45 295 were consistent with earlier research. Nevertheless, because the bulk of prior research
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47 296 did not employ multi-factor models, it was impossible to compare our findings could
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49 297 not be compared to those of others. In addition, certain putative contributing elements
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51 298 were not adequately proven, and further research is required to confirm them in the
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53 299 future.

54 300 Our research has theoretical and practical implications for the future study of
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56 301 nurses' perceived professional benefits. First, the number of night shifts, leadership
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58 302 role, and marriage status are the most significant factors affecting nurses' perceived
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60 303 professional benefits, and in the future, we should focus on the degree of influence of

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4 304 these three factors and explore the mechanisms from the theoretical level. Second,
5 305 managers should pay active attention to the perceived professional benefits of clinical
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7 306 nurses, create a favorable working environment and professional growth atmosphere,
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9 307 and promote the professional success of nurses. Given that 11.8% of nurses still have
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11 308 a low perceived sense of career benefit, more tailored intervention programs are still
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13 309 needed in the future.

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16 17 311 **Strengths and limitations**

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19 312 To the best of our knowledge, this is the first study to use the LPA approach to explore
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21 313 heterogeneous subgroups of nurses' perceived professional benefit with a large sample
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23 314 size, and we presented a unique perspective and a basis for future research on the
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25 315 perceived career benefits of nurses. The research was limited in some ways. First, this
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27 316 was a web-based survey, and the sample process and self-reporting strategy may have
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29 317 resulted in some bias. Second, we only polled nurses in mainland China, and our sample
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31 318 only reflected the current situation in a single nation. Lastly, the constraints of the
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33 319 study's design prohibited an in-depth assessment of the psychological factors behind
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35 320 nurses' perceptions of their professional benefit. As a result, more rigorously designed
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37 321 studies will be required in the future to investigate this issue in depth.

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40 41 323 **CONCLUSION**

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43 324 Our study identified three professional benefits profiles among nurses. The results of
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45 325 our study indicated that nurses enjoy a high level of professional benefits.

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47 326 Notwithstanding the study's limitations of the study and the present condition of
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49 327 nursing, it is vital that we engage on several levels to encourage a stable nursing
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51 328 workforce, including policy, organisation, financial income, and career development,
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53 329 so that nurses experience a sense of professional gain.

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4 331 **Acknowledgements**

5 332 None.

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7 333 **AUTHOR CONTRIBUTIONS**

8
9 334 Jiang Hu and Sun Changli were responsible for the conception and study design. Yao

10 335 Qiangfang, Wang Xianwei and Liu Hanmei performed the data collection. Yao

11 336 Qiangfang, Wang Xianwei and Wen Xueke contributed to the analysis of the data.

12 337 Sun Changli and Jiang Hu were involved in drafting the manuscript and revising it.

13 338 All authors have read and approved the final manuscript.

14 339 **FUNDING**

15 340 This study was funded by the the Science and Technology Joint Funds of Zunyi

16 341 Science and Technology Bureau (2023-73).

17 342 **CONFLICT OF INTEREST**

18 343 The authors have no conflicts of interest to declare.

19 344 **Ethics approval**

20 345 This study involves human participants and was approved by the Ethics Committee of
21 346 the First People's Hospital of Zunyi (2022-016). Participants gave informed consent to
22 347 participate in the study before taking part.

23 348 **Data availability statement**

24 349 Data are available upon reasonable request. Data are available from the corresponding
25 350 author and the first author on reasonable request.

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4 461 **Figure 1** Latent profiles of NPPBQ

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7 463 **Figure 2** The scale and dimension scores of different profiles

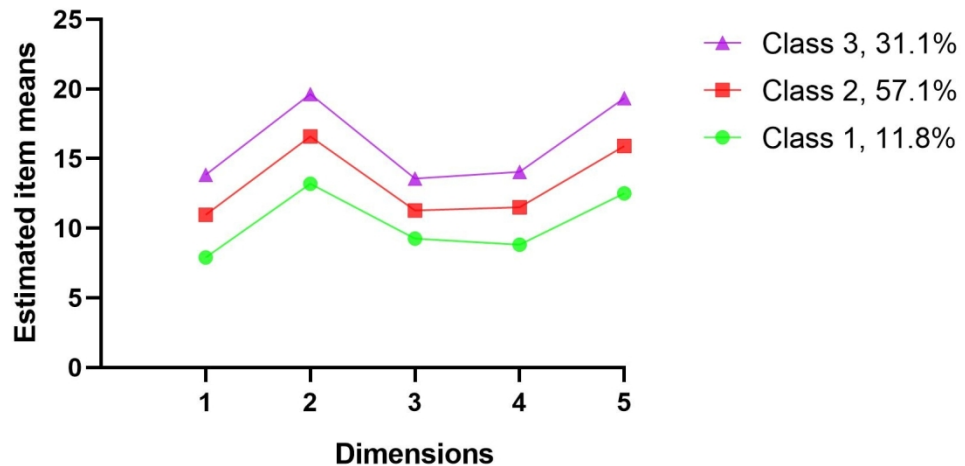
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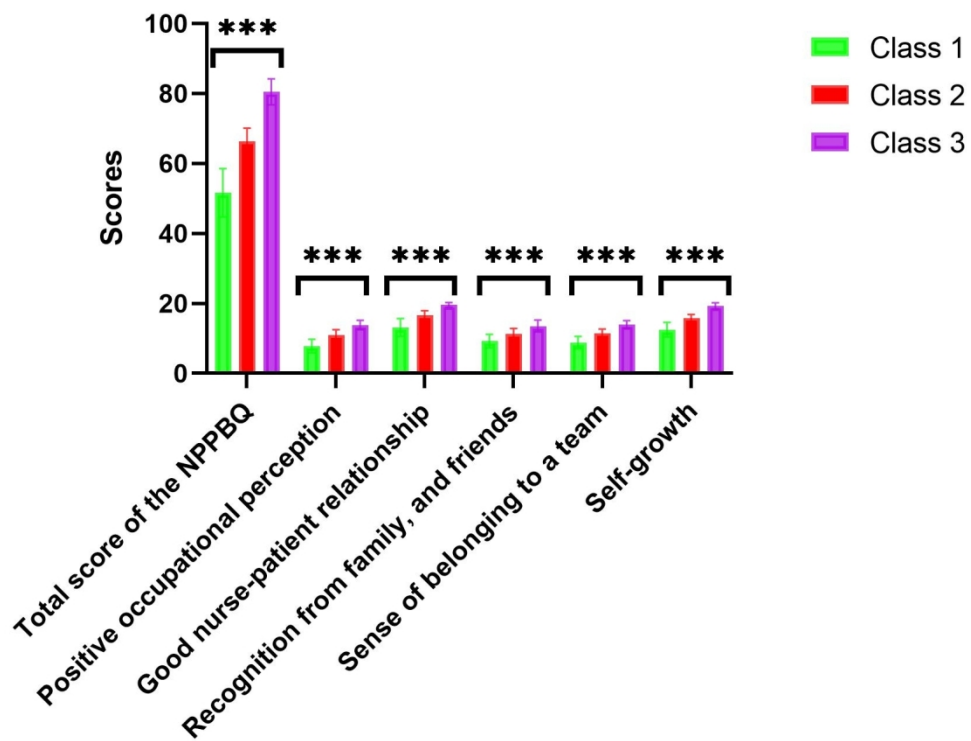
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Latent profiles of NPPBQ
145x76mm (300 x 300 DPI)



The scale and dimension scores of different profiles

145x114mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Latent profile analysis of nurses' perceived professional benefits in China: a cross-sectional study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-078051.R2
Article Type:	Original research
Date Submitted by the Author:	12-Oct-2023
Complete List of Authors:	Sun, Changli; Third Affiliated Hospital of Zunyi Medical University Jiang, Hu; Third Affiliated Hospital of Zunyi Medical University Yao, Qingfang; The Third Affiliated Hospital of Zunyi Medical University Wang, Xianwei; The Third Affiliated Hospital of Zunyi Medical University Wen, Xueke; Third Affiliated Hospital of Zunyi Medical University Liu, Hanmei; Zunyi Medical University
Primary Subject Heading:	Occupational and environmental medicine
Secondary Subject Heading:	Nursing, Occupational and environmental medicine
Keywords:	Burnout, Professional, Burnout, China

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4 **1 Latent profile analysis of nurses' perceived professional benefits in**
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6 **2 China: a cross-sectional study**
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9 **3 Running Head: LPA of nurses' perceived professional benefits**
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14 5 Changli Sun¹, Hu Jiang^{1*}, Qingfang Yao², Xianwei Wang², Xueke Wen¹ and Hanmei
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4 14 **Latent profile analysis of nurses' perceived professional benefits in**
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7 15 **China: a cross-sectional study**

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9 16 **ABSTRACT**

10 17 **Objective:** To identify profiles of nurses' perceived professional benefits as well as
11
12
13 18 their predictors.

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15 19 **Design:** Cross-sectional study.

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17 20 **Setting:** The study was carried out online in China.

18
19 21 **Methods:** From July 6 and July 27, 2022, a total of 1,309 registered nurses participated
20
21
22 22 in the survey by convenient sampling. We collected the Nurses' Perceived Professional
23
24 23 Benefits Questionnaire (NPPBQ) and demographic data. Using latent profile analysis
24
25 24 (LPA), subgroups of nurses' perceived professional benefits were identified. Moreover,
26
27 25 univariate and multinomial logistic regression analysis were conducted to find the
28
29 26 factors that were linked with the profiles.

30
31 27 **Results:** The survey was validly completed by 1309 nurses, with a 92.9% effective
32
33 28 return rate. The findings of the LPA demonstrated three unique profiles: low perceived
34
35 29 professional benefits (11.8%), moderate perceived professional benefits (57.1%), and
36
37 30 high perceived professional benefits (31.1%). There was a correlation between marital
38
39 31 status, the number of night shifts per month, and leadership role.

40
41 32 **Conclusions:** According to our research, registered nurses have three unique
42
43 33 professional benefit profiles. In order to sustain the nursing workforce, despite the fact
44
45 34 that nurses get a high level of professional benefits, interventions are necessary to
46
47 35 increase nurses' perception of their professional value.

48
49
50 37 **Keywords:** nurse, perceived professional benefits, latent profile analysis, cross-
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52 38 sectional study

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55 40 **Strengths and limitations of this study:**

- 56
57 41 ● This is the first study to use the LPA approach to explore heterogeneous subgroups
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4 42 of nurses' perceived professional benefit with a large sample size.
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6 43 ● This study identified three unique professional benefit profiles among Chinese
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8 44 nurses.
9
10 45 ● Only three influencing factors related to professional benefit profiles were found.
11
12 46 ● This study was limited by the web-based cross-sectional design and convenient
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14 47 sampling method.
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49 INTRODUCTION

50 Despite the fact that nursing is a high-risk, high-stress profession, nurses are able
51 to achieve benefit findings [1-3]. In recent years, the concept of nurses' perceived
52 professional benefits arises naturally, and has gradually attracted the attention of
53 researchers. Nurses' perceived professional benefits (NPPB) refer to nurses'
54 perceptions of the gains and benefits they receive in their profession during the hiring
55 process, as well as their belief that working in nursing can promote their overall
56 growth and development [4, 5]. Essentially, perceived professional benefits can be
57 classified as an emotional experience and cognitive evaluation, which has two
58 aspects: actual benefits and spiritual benefits [4]. However, there is a lack of in-depth
59 research on the group heterogeneity of perceived professional benefits among nurse
60 populations.

61 Background

62 It is estimated that 69% of the global health workforce consists of nurses [6].
63 Yet, the present physical and mental health of nurses is not encouraging, as they
64 confront high levels of stress, burnout, turnover, and their own ageing [7-9]. Nursing
65 is no longer a desirable and appealing profession [10], which makes nurse shortages a
66 widespread worldwide concern [11]. These issues have a direct bearing on the
67 sustainability and continued growth of the nursing workforce. In recent years, nursing
68 in China has experienced remarkable growth, and the most recent statistics indicate
69 that China has more than 5 million registered nurses [12]. Chinese nurses are
70 extremely susceptible to burnout, and a high desire to leave is a serious concern [13,
71 14]. However, there is a dearth of comprehensive study and viable remedies.

72 The mental health of nurses is receiving increasing attention from managers and
73 researchers in the context of positive psychology. It is beginning to be recognized that
74 nurses' own positive psychology promotes job satisfaction and professional identity,
75 lessens burnout, and hence reduces turnover rates [15, 16].

76 The profession of nursing can be beneficial to nurses in a number of ways.
77 Previous studies [17, 18] reported that nursing preceptorship offers many benefits,

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4 78 and nurses may find themselves being more committed to the position as a result. A
5
6 79 qualitative study [19] found that nurses who were involved in caring for dying
7
8 80 patients got a great lot of experience and benefited considerably; they can create a
9
10 81 personal philosophy on death and life, in addition to professional growth. Nurses who
11
12 82 served as advanced practice nurse roles perceived numerous benefits, including
13
14 83 improved patient care quality and safety, professionalism, personal development,
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16 84 career development, intrinsic satisfaction with the role, and impact on other
17
18 85 professional groups [20]. A person's perception of professional benefit is an
19
20 86 endogenous motivation for his or her development and has a positive effect on that
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22 87 person's career. According to prior studies, improving the perceived professional
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24 88 benefit of nurses reduces burnout reduction and enables nurses to approach their work
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26 89 with a good attitude and obtain more favorable comments [21, 22].

27
28 90 Measures created by researchers to evaluate the perceived professional benefits
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30 91 of nurses were still in little supply. The Preceptor's Perspective of Benefits and
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32 92 Rewards (PPBR) measure was designed by Dibert, et al. [23] to evaluate the
33
34 93 perceived benefits of clinical preceptor nurses, however, it is not relevant to general
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36 94 clinical nurses. A questionnaire entitled Nurses' Perceived Professional Benefits
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38 95 Questionnaire (NPPBQ) was developed to assess how Chinese nurses perceive the
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40 96 gains and benefits of their employment [5, 24]. This questionnaire has been utilized in
41
42 97 a lot of research to date. While we now have a better grasp of nurses' perceptions of
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44 98 professional benefits, but the heterogeneity of the population is still lack, screening
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46 99 strategies for future precision interventions cannot be developed for identifying low-
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48 100 benefit populations.

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50 101 To our knowledge, it has not been shown that sufficient evidence exists to
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52 102 answer the questions of whether nurses' perceived professional benefits differ in
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54 103 groups and what factors contribute to these differences. The current study was created
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56 104 to bridge that gap. This study's objective was to examine the characteristics and
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58 105 determinants of nurses' perceived professional benefits as well as the predictors of
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60 106 these latent profiles.

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4 1075 108 **MATERIALS AND METHODS**7 109 **Study design**

9 110 An online survey with convenient sampling was used in this study to conduct a cross-
11 111 sectional analysis. This study was designed and reported in accordance with the
13 112 guidelines for Strengthening the Reporting of Observational Studies in Epidemiology
15 113 (STROBE)[25].

17 114

19 115 **Sample size estimation**

21 116 An examination of the latent profiles of perceived professional benefits among
23 117 nurses was conducted in this study. LPA needs a sample size larger than 500 [26, 27],
25 118 therefore, the minimum sample size for this study was 500.

27 119

29 120 **Participants**

31 121 Participants in this study required to meet the inclusion criteria and be registered
33 122 nurses. To be considered, candidates had to satisfy the following criteria to be
35 123 considered: (1) having worked as a nurse in a medical facility, and (2) being willing to
37 124 participate in this study. The following were the exclusion criteria: logical errors or
39 125 missing information in questionnaire answers.

41 126

43 127 **Measurements**45 128 **Demographic**

47 129 This study gathered and evaluated demographic data including age, gender, greatest
49 130 degree of education, marital status, and other participant characteristics.

51 131

53 132 **Nurses' Perceived Professional Benefits Questionnaire (NPPBQ)**

55 133 The questionnaire was designed by Jing Hu, et al. [5] to investigate the gains and
57 134 benefits that nurses perceived from their jobs. The authors then reduced it to 17 items
59 135 by 2020 [24]. The questionnaire has five dimensions: personal growth, a good nurse-

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4 136 patient relationship, recognition from family and friends, a positive occupational
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6 137 perception, and team belonging. Items are scored on a 5-point Likert scale (1 =
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8 138 strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree).
9
10 139 Cronbach's alphas for the questionnaires were 0.94, and the NPPBQ
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12 140 subquestionnaires' alphas were 0.84, 0.83, 0.74, 0.79, and 0.85.
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15 142 **Data collection**

17 143 During the dates of July 6 and July 27, 2022, data was gathered. Wenjuanxing
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19 144 (www.wjx.cn) was used to develop a web-based questionnaire. Two researchers
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21 145 reviewed the online questionnaire for rigor and verified the feasibility of the
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23 146 questionnaire by completing it within the team. A poster was created to present the
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25 147 link and QR code. It was clearly shown on the poster who would be included and
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27 148 excluded from the survey. We distributed the questionnaire nationwide in China and
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29 149 did not limit the source and setting of nurses. The researcher contacted administrators
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31 150 or general nurses to disseminate the questionnaire. Wechat was used to send the
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33 151 poster and information letter. The survey can be completed by clicking on the link or
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35 152 scanning the QR code, completed questionnaires can be returned directly to the web.
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38 154 **Statistical analyses**

40 155 The use of latent profile analysis (LPA) is frequently used to determine the
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42 156 number of subpopulations in a given sample. LPA is a statistical method that use
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44 157 potential category variables to explain the link between exogenous continuous-type
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46 158 indicators, permitting the assessment of the correlation between exogenous indicators
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48 159 and the maintenance of local independence among exogenous indicators [27]. Latent
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50 160 profile analysis was conducted using Mplus 7.4 software. Log likelihood (LL),
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52 161 Akaike information criterion (AIC), Akaike Information Criterion (BIC), Adjusted
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54 162 Bayesian Information Criteria (aBIC), Entropy, Lo-Mendell-Rubin (LMR), and the
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56 163 Bootstrapped Likelihood Ratio Test (BLRT) were used to assess model fit and
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58 164 determine the appropriate number of categories. In order to decide which model best
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4 165 fit the data, the models from each category's fitting results were combined with the
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6 166 aforementioned indicators. The data was examined using the SPSS 26.0 statistical
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8 167 program. We utilized frequency and composition ratios for categorical data, whereas
9
10 168 mean and standard deviation were utilized for continuous variables. The chi-square
11
12 169 test was performed to compare category variables across groups. ANOVA was used
13
14 170 to compare continuous variables among multiple groups. A multivariate logistic
15
16 171 regression model was employed to analyze the variations in demographic variables. A
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18 172 statistically significant difference was indicated by $p < 0.05$.

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21 174 **Ethical considerations**

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23 175 The Ethics Committee of the First People's Hospital of Zunyi (2022-016) approved
24
25 176 the study, and participants gave permission for data collection. Prior to completing the
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27 177 survey, participants will be provided with information about the purpose of the study
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29 178 and the major substance of the research. They will then be able to provide their
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31 179 informed consent through a yes or no response. In addition, participants were also
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33 180 informed that the study's findings would be given in aggregate form and that no
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35 181 participant could be identified. If a person declined to complete the questionnaire, the
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37 182 collection was immediately ended.

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40 184 **Patient and public involvement**

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42 185 Patients and/or the public were not involved in the design, or conduct, or reporting, or
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44 186 dissemination plans of this research.

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47 188 **RESULTS**

48 189 **Participant characteristics**

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50 190 A total of 1409 nurses completed the questionnaire, while 58 nurses denied
51
52 191 participation, for a total number of 1351 questionnaires received. 42 surveys were
53
54 192 considered invalid due to insufficient or inaccurate information. 92.9 percent of the
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56 193 final 1309 surveys were correctly returned. The ages of the participants varied from 18
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194 to 59 years old, with a mean age of 32.25 (SD: 6.18) years old. The bulk of participants
195 were female (86.7%), whereas the minority were male (3.2%).

196

197 **Characteristics of the different classes**

198 On the basis of the NPPBQ's five dimensions, it was established that a model with three
199 latent classes provided the greatest match. A class represents different categorisation
200 methods, such as a class 1 for a single subgroup, a class 2 for two heterogeneous
201 subgroups, and so forth. Table 1 provides the results. While the AIC and BIC in class
202 4 were lower in class 4 than in class 3, the entropy was greater; nonetheless, the lowest
203 category probability in class 4 was 1.4%, which is unsatisfactory. As a consequence,
204 we decided that the best-fitting model is class 3. Using a three-class model, Figure 1
205 illustrates the mean scores for each category within the NPPBQ's dimensions. The
206 percentages increase from class 1 to class 3 as follows: 11.8% (155 nurses), 57.1% (747
207 nurses), and 31.1% (407 nurses). For the sake of brevity, based on the profile scores,
208 we named class 1 as the low perceived professional benefits, class 2 as the moderate
209 perceived professional benefits, and class 3 as the high perceived professional benefits.

210 **Table 1** Potential profile analysis indicators ($N=1309$)

Model	LL ^a	AIC ^b	BIC ^c	aBIC ^d	Entropy	LMR ^e <i>p</i> -value	BLRT ^f <i>p</i> -value	Category probability
Class 1	- 14709.353	29438.706	29490.476	29458.711	-	-	-	-
Class 2	- 13420.425	26872.850	26955.682	26904.857	0.905	< 0.001	< 0.001	0.654/0.346
Class 3	- 12583.629	25211.257	25325.152	25255.268	0.936	0.007	< 0.001	0.118/0.571/0.311
Class 4	- 12307.807	24671.613	24816.570	24727.627	0.940	0.036	< 0.001	0.151/0.014/0.530/0.306

211

212 a Log likelihood, b Akaike information criterion, c Bayesian information criterion, d Adjusted
213 bayesian information criterion, e Lo-Mendell-Rubin Likelihood Ratio Test, f Bootstrapped
214 Likelihood Ratio Test

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4 **216 The scale and dimension scores of different profiles**

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6 **217** The findings of a one-way ANOVA indicated statistically significant differences in the
7
8 **218** scale and dimension scores of different profiles (both $p < 0.001$). The results were shown
9
10 **219** in Figure 2 demonstrates the outcomes.

11
12 **220**

13
14 **221 Demographic and related characteristics of each profile**

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16 **222** The ANOVA and chi-square tests indicated statistically significant differences
17
18 **223** between the three profiles differed statistically in terms of age, marital status, children,
19
20 **224** professional title, leadership role, working years, and number of night shifts per month.
21
22 **225** Table 2 is a summary of the results.

23 **226 Table 2** Demographic and characteristics by latent profile ($N=1309$)

Variables	Class 1	Class 2	Class 3	χ^2/F	p
Age (SD)	30.94 (5.37)	31.76 (5.91)	33.64 (6.71)	16.545	< 0.001
Gender				0.600	0.741
Male	6 (3.9)	25 (3.3)	11 (2.7)		
Female	149 (96.1)	722 (96.7)	396 (97.3)		
Highest Degree				1.602	0.449
Junior college and below	29 (18.7)	111 (14.9)	60 (14.7)		
Bachelor's and above	126 (81.3)	636 (85.1)	347 (85.3)		
Marital status				25.768	< 0.001
Single/divorced/widowed	62 (40.0)	218 (29.2)	80 (19.7)		
Married	93 (60.0)	529 (70.8)	327 (80.3)		
Children				26.943	< 0.001
Yes	87 (56.1)	481 (64.4)	311 (76.4)		
No	68 (43.9)	266 (35.6)	96 (23.6)		
Professional title				23.589	< 0.001

Junior Level	102 (65.8)	448 (60.0)	207 (50.9)		
Intermediate level	50 (32.3)	280 (37.5)	172 (42.3)		
Senior level	3 (1.9)	19 (2.5)	28 (6.9)		
Leadership role				17.086	< 0.001
Yes	18 (11.6)	86 (11.5)	82 (20.1)		
No	137 (88.4)	661 (88.5)	325 (79.9)		
Working years (years)				32.903	< 0.001
≤5	52 (33.5)	217 (29.0)	79 (19.4)		
6–15	91 (58.7)	438 (58.6)	241 (59.2)		
≥16	12 (7.7)	92 (12.3)	87 (21.4)		
Average monthly income (yuan)*				7.990	0.239
≤3000	23 (14.8)	75 (10.0)	43 (10.6)		
3001~6000	93 (60.0)	415 (55.6)	217 (53.3)		
6001~9000	27 (17.4)	179 (24.0)	105 (25.8)		
≥9001	12 (7.7)	78 (10.4)	42 (10.3)		
Number of night shifts per month				17.797	0.001
0	42 (27.1)	233 (31.2)	164 (40.3)		
1–4	22 (14.2)	143 (19.1)	73 (17.9)		
≥5	91 (58.7)	371 (49.7)	170 (41.8)		

227

228 * 1 USD equals 7.31 Chinese Yuan, exchange rate on September 29, 2023

229

230 A multivariate logistic regression model was constructed using the variables with
 231 statistically significant differences as determined by ANOVA and chi-square tests. Of
 232 the three profiles, the class 3 was chosen as a reference to find the predictors linked
 233 with NPPBQ. As shown in Table 3, nurses who were single/divorced/widowed were

234 more likely to belonged to low perceived professional benefits (*OR*: 1.984,
 235 95%*CI*:1.028-3.828). The number of night shifts worked per month was associated with
 236 low perceived professional benefits (*OR*: 0.633, 95% *CI*: 0.405-0.988), compared to
 237 those with more than five night shifts, those without night shifts tended to fall into the
 238 high perceived professional benefits. Nurses without a leadership role were more likely
 239 to be in the moderate perceived professional benefits (*OR*: 1.489, 95% *CI*: 1.028-2.157).
 240 Other variables were not statistically significant in the multivariate logistic regression.

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Table 3 Predictors of latent profile membership

Variables	Class 1 VS Class 3			Class 2 VS Class 3		
	β	<i>OR</i>	95% <i>CI</i>	β	<i>OR</i>	95% <i>CI</i>
Age (SD)	0.004	1.004	0.941-1.070	-0.005	0.995	0.957-1.034
Marital status						
Single/divorced/widowed	0.685	1.984*	1.028-3.828	0.115	1.122	0.716-1.760
Married (Ref)						
Children						
No	0.177	1.194	0.622-2.293	0.240	1.272	0.822-1.967
Yes (Ref)						
Professional title						
Junior level	0.368	1.444	0.334-6.241	0.359	1.433	0.661-3.105
Intermediate level	0.378	1.460	0.370-5.766	0.429	1.535	0.764-3.085
Senior level (Ref)						
Leadership role						
No	0.139	1.984	1.028-3.828	0.398	1.489*	1.028-2.157
Yes (Ref)						
Working years (years)						

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3							
4	≤5	0.781	2.184	0.666-7.161	0.411	1.508	0.748-3.042
5							
6	6–15	0.721	2.057	0.847-5.000	0.228	1.256	0.773-2.039
7							
8	≥16 (Ref)						
9	Number of night shifts per						
10	month						
11							
12	0	-0.458	0.633*	0.405-0.988	-0.223	0.800	0.601-1.064
13							
14	1–4	-0.354	0.702	0.400-1.231	0.089	1.094	0.768-1.558
15							
16	≥5 (Ref)						

246 * $p < 0.05$; OR, Odds ratio; 95% CI, 95% Confidence Interval; Ref, Reference.

247 **DISCUSSION**

248 The purpose of this research was to identify distinct profiles of nurses' perceived
249 professional benefits. Furthermore, the current study employed multinomial logistic
250 regression to investigate predictors of these profiles.

251 In this study, we investigated 1309 nurses who validly completed the questionnaire.
252 As a result, three latent profiles were identified: low perceived professional benefits,
253 moderate perceived professional benefits, and high perceived professional benefits. Our
254 research revealed that the majority of nurses had a moderate or higher levels of
255 perceived professional benefits, with just 11.8% of nurses belonging to the category of
256 nurses with low perceived professional benefits. Most studies reported nurses had an
257 upper-moderate level of perceived professional benefits [28, 29], and our findings are
258 consistent with those of previous studies. Most importantly, our study clarified the
259 heterogeneous subgroups of nurses' perceived professional benefits and their specific
260 distribution.

261 In the last three years, nurses have been a key part of the fight against the COVID-
262 19 outbreak. Despite heavy job pressure, nurses have had a feeling of professional
263 calling and value [30], which has effectively enhanced their sense of professional
264 benefit [1]. At the same time, the critical role of nurses in defending people's lives and
265 health has earned the society's respect and recognition, as well as a positive social image
266 [31, 32], which can further enhance nurses' sense of professional benefit. Our survey
267 was conducted during the COVID-19 epidemic, and nurses' perceptions of professional
268 benefit may be elevated.

269 Another finding of our study revealed that the membership of profiles can be
270 predicted by some characteristics such as the number of night shifts, leadership role,
271 and marriage status. Nursing is a continuous, 24-hour profession, and nurse's work
272 normally takes the form of night shifts. It is widely proven that night shifts negatively
273 impact the physical and emotional health of nurses [33-36]. Nurses working rotating
274 night shifts were normally younger, and they had the lower scores of job satisfaction,
275 quality of sleep, and quantity of sleep [37], these factors resulted in a low perceived

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4 276 professional benefits. Consistent with past research, our findings indicate that the
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6 277 greater the frequency of night shifts, the lower the perceived professional benefit [29].
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8 278 According to our results, 57.1% of nurses perceived professional benefits as
9
10 279 moderate. The majority of nurses in the moderate perceived professional benefits
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12 280 group lacked a work title, while the majority of nurses in the highly perceived
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14 281 professional benefits group held a leadership role. This has been validated by other
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16 282 research, and our work provides more support for this notion [29]. Holding a
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18 283 managerial position at a hospital is a means of advancing one's career, and nurses
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20 284 highly value this opportunity.

21 285 Our study found that nurses who were single/divorced/widowed were more likely
22
23 286 to belong to low perceived professional benefits, which is consistent with earlier
24
25 287 findings [29]. This may be because, unlike single/divorced/widowed nurses, married
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27 288 nurses receive more social support from their spouses and other family members.

28
29 289 We hypothesized that job fulfillment and social support are important influencing
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31 290 mechanisms that affect nurses' perceived professional benefits. The number of night
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33 291 shifts, leadership roles are important indicators of nurses' job fulfillment. Marital status
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35 292 is an important factor in social support. Each of these factors can have varying degrees
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37 293 of impact on the actual benefit or spiritual benefit [4]. Considering that nurses perceive
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39 294 professional benefits as a result of personal, organizational, environmental, and social
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41 295 factors, a well-developed theoretical framework is required to explain this phenomenon.

42 296 Unfortunately, our research failed to demonstrate that the profiles can be predicted
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44 297 by other factors in the model variables. Our findings in the univariate analysis results
45
46 298 were consistent with earlier research. Nevertheless, because the bulk of prior research
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48 299 did not employ multi-factor models, it was impossible to compare our findings could
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50 300 not be compared to those of others. In addition, certain putative contributing elements
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52 301 were not adequately proven, and further research is required to confirm them in the
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54 302 future.

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56 303 Our research has theoretical and practical implications for the future study of
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58 304 nurses' perceived professional benefits. First, the number of night shifts, leadership
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4 305 role, and marriage status are the most significant factors affecting nurses' perceived
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6 306 professional benefits, and in the future, we should focus on the degree of influence of
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8 307 these three factors and explore the mechanisms from the theoretical level. Second,
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10 308 managers should pay active attention to the perceived professional benefits of clinical
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12 309 nurses, create a favorable working environment and professional growth atmosphere,
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14 310 and promote the professional success of nurses. Given that 11.8% of nurses still have
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16 311 a low perceived sense of career benefit, more tailored intervention programs are still
17
18 312 needed in the future.

19 313

20 314 **Strengths and limitations**

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22
23 315 To the best of our knowledge, this is the first study to use the LPA approach to explore
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25 316 heterogeneous subgroups of nurses' perceived professional benefit with a large sample
26
27 317 size, and we presented a unique perspective and a basis for future research on the
28
29 318 perceived career benefits of nurses. The research was limited in some ways. First, this
30
31 319 was a web-based survey, and the sample process and self-reporting strategy may have
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33 320 resulted in some bias. Second, we only polled nurses in mainland China, and our sample
34
35 321 only reflected the current situation in a single nation. Lastly, the constraints of the
36
37 322 study's design prohibited an in-depth assessment of the psychological factors behind
38
39 323 nurses' perceptions of their professional benefit. As a result, more rigorously designed
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41 324 studies will be required in the future to investigate this issue in depth.

42 325

43 326 **CONCLUSION**

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45
46 327 Our study identified three professional benefits profiles among nurses. The results of
47
48 328 our study indicated that nurses enjoy a high level of professional benefits.

49
50 329 Notwithstanding the study's limitations of the study and the present condition of
51
52 330 nursing, it is vital that we engage on several levels to encourage a stable nursing
53
54 331 workforce, including policy, organisation, financial income, and career development,
55
56 332 so that nurses experience a sense of professional gain.

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4 334 **Acknowledgements**

5 335 None.

6
7 336 **AUTHOR CONTRIBUTIONS**

8
9 337 Jiang Hu and Sun Changli were responsible for the conception and study design. Yao

10
11 338 Qiangfang, Wang Xianwei and Liu Hanmei performed the data collection. Yao

12
13 339 Qiangfang, Wang Xianwei and Wen Xueke contributed to the analysis of the data.

14
15 340 Sun Changli and Jiang Hu were involved in drafting the manuscript and revising it.

16
17 341 All authors have read and approved the final manuscript.

18
19 342 **FUNDING**

20
21 343 This study was funded by the Science and Technology Joint Funds of Zunyi Science

22
23 344 and Technology Bureau (2023-73).

24
25 345 **CONFLICT OF INTEREST**

26
27 346 The authors have no conflicts of interest to declare.

28
29 347 **Ethics approval**

30
31 348 This study involves human participants and was approved by the Ethics Committee of

32
33 349 the First People's Hospital of Zunyi (2022-016). Participants gave informed consent to

34
35 350 participate in the study before taking part.

36
37 351 **Data availability statement**

38
39 352 Data are available upon reasonable request. Data are available from the corresponding

40
41 353 author and the first author on reasonable request.

42
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4 464 **Figure 1** Latent profiles of NPPBQ

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7 466 **Figure 2** The scale and dimension scores of different profiles

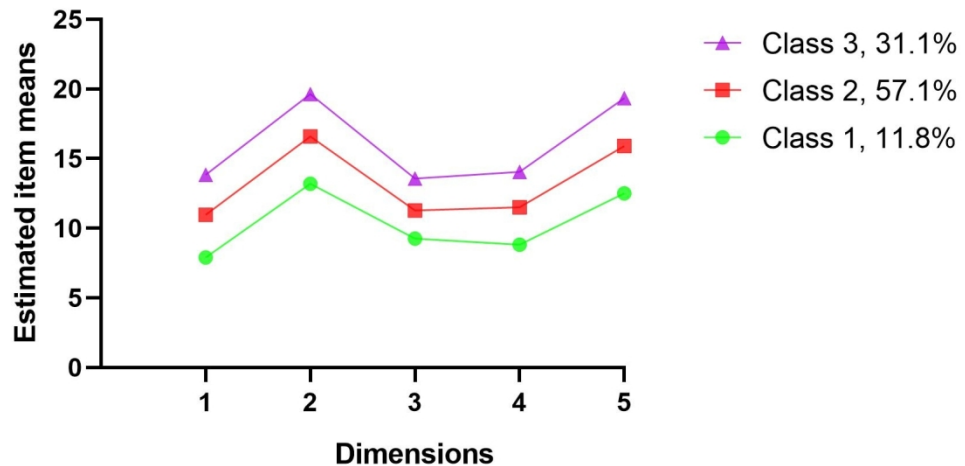
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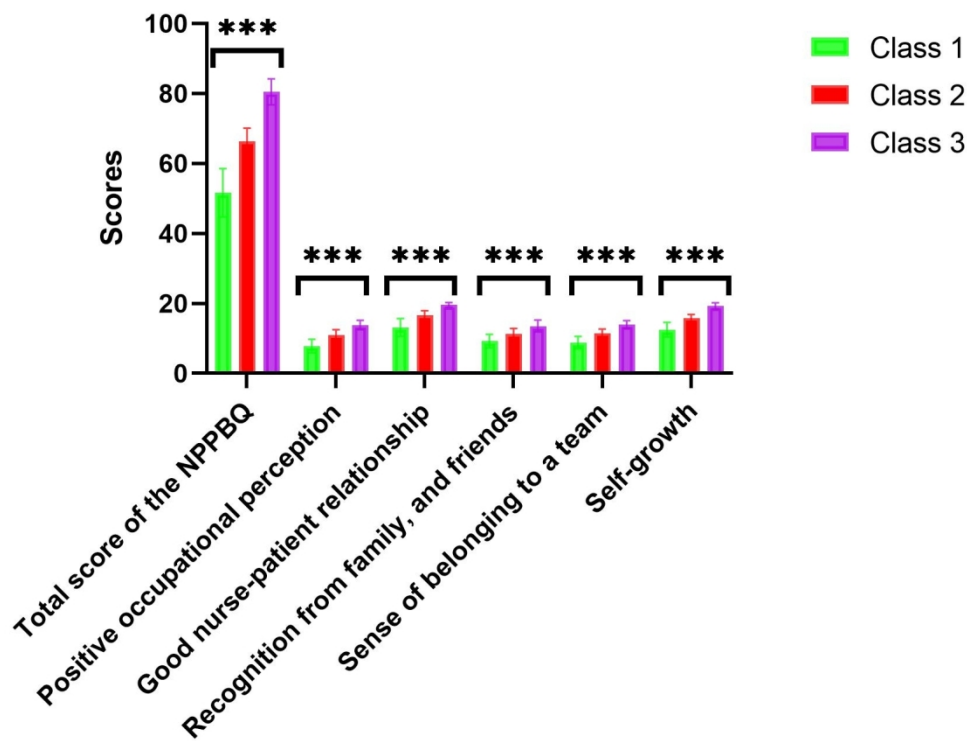
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Latent profiles of NPPBQ
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The scale and dimension scores of different profiles

145x114mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Latent profile analysis of nurses' perceived professional benefits in China: a cross-sectional study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-078051.R3
Article Type:	Original research
Date Submitted by the Author:	16-Oct-2023
Complete List of Authors:	Sun, Changli; Third Affiliated Hospital of Zunyi Medical University Jiang, Hu; Third Affiliated Hospital of Zunyi Medical University Yao, Qingfang; The Third Affiliated Hospital of Zunyi Medical University Wang, Xianwei; The Third Affiliated Hospital of Zunyi Medical University Wen, Xueke; Third Affiliated Hospital of Zunyi Medical University Liu, Hanmei; Zunyi Medical University
Primary Subject Heading:	Occupational and environmental medicine
Secondary Subject Heading:	Nursing, Occupational and environmental medicine
Keywords:	Burnout, Professional, Burnout, China

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4 **1 Latent profile analysis of nurses' perceived professional benefits in**
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6 **2 China: a cross-sectional study**
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9 **3 Running Head: LPA of nurses' perceived professional benefits**
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4 14 **Latent profile analysis of nurses' perceived professional benefits in**
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7 15 **China: a cross-sectional study**

8
9 16 **ABSTRACT**

10 17 **Objective:** To identify profiles of nurses' perceived professional benefits as well as
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12
13 18 their predictors.

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15 19 **Design:** Cross-sectional study.

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17 20 **Setting:** The study was carried out online in China.

18
19 21 **Methods:** From July 6 and July 27, 2022, a total of 1,309 registered nurses participated
20
21 22 in the survey by convenient sampling. We collected the Nurses' Perceived Professional
22
23 23 Benefits Questionnaire (NPPBQ) and demographic data. Using latent profile analysis
24
25 24 (LPA), subgroups of nurses' perceived professional benefits were identified. Moreover,
26
27 25 univariate and multinomial logistic regression analysis were conducted to find the
28
29 26 factors that were linked with the profiles.

30
31 27 **Results:** The survey was validly completed by 1309 nurses, with a 92.9% effective
32
33 28 return rate. The findings of the LPA demonstrated three unique profiles: low perceived
34
35 29 professional benefits (11.8%), moderate perceived professional benefits (57.1%), and
36
37 30 high perceived professional benefits (31.1%). There was a correlation between marital
38
39 31 status, the number of night shifts per month, and leadership role.

40
41 32 **Conclusions:** According to our research, registered nurses have three unique
42
43 33 professional benefit profiles. In order to sustain the nursing workforce, despite the fact
44
45 34 that nurses get a high level of professional benefits, interventions are necessary to
46
47 35 increase nurses' perception of their professional value.

48
49
50 37 **Keywords:** nurse, perceived professional benefits, latent profile analysis, cross-
51
52 38 sectional study

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55 40 **Strengths and limitations of this study:**

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57 41 ● The LPA approach was utilized in this study to investigate heterogeneous
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4 42 subgroups of nurses' perceived professional benefit.
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6 43 ● This study identified three unique professional benefit profiles among Chinese
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8 44 nurses.
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10 45 ● Multivariate logistic regression analysis revealed only three contributing factors
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12 46 associated to professional benefit profiles.
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14 47 ● This study was limited by the web-based cross-sectional design and convenient
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16 48 sampling method.
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18 49

For peer review only

50 INTRODUCTION

51 Despite the fact that nursing is a high-risk, high-stress profession, nurses are able
52 to achieve benefit findings [1-3]. In recent years, the concept of nurses' perceived
53 professional benefits arises naturally, and has gradually attracted the attention of
54 researchers. Nurses' perceived professional benefits (NPPB) refer to nurses'
55 perceptions of the gains and benefits they receive in their profession during the hiring
56 process, as well as their belief that working in nursing can promote their overall
57 growth and development [4, 5]. Essentially, perceived professional benefits can be
58 classified as an emotional experience and cognitive evaluation, which has two
59 aspects: actual benefits and spiritual benefits [4]. However, there is a lack of in-depth
60 research on the group heterogeneity of perceived professional benefits among nurse
61 populations.

62 Background

63 It is estimated that 69% of the global health workforce consists of nurses [6].
64 Yet, the present physical and mental health of nurses is not encouraging, as they
65 confront high levels of stress, burnout, turnover, and their own ageing [7-9]. Nursing
66 is no longer a desirable and appealing profession [10], which makes nurse shortages a
67 widespread worldwide concern [11]. These issues have a direct bearing on the
68 sustainability and continued growth of the nursing workforce. In recent years, nursing
69 in China has experienced remarkable growth, and the most recent statistics indicate
70 that China has more than 5 million registered nurses [12]. Chinese nurses are
71 extremely susceptible to burnout, and a high desire to leave is a serious concern [13,
72 14]. However, there is a dearth of comprehensive study and viable remedies.

73 The mental health of nurses is receiving increasing attention from managers and
74 researchers in the context of positive psychology. It is beginning to be recognized that
75 nurses' own positive psychology promotes job satisfaction and professional identity,
76 lessens burnout, and hence reduces turnover rates [15, 16].

77 The profession of nursing can be beneficial to nurses in a number of ways.
78 Previous studies [17, 18] reported that nursing preceptorship offers many benefits,

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4 79 and nurses may find themselves being more committed to the position as a result. A
5
6 80 qualitative study [19] found that nurses who were involved in caring for dying
7
8 81 patients got a great lot of experience and benefited considerably; they can create a
9
10 82 personal philosophy on death and life, in addition to professional growth. Nurses who
11
12 83 served as advanced practice nurse roles perceived numerous benefits, including
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14 84 improved patient care quality and safety, professionalism, personal development,
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16 85 career development, intrinsic satisfaction with the role, and impact on other
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18 86 professional groups [20]. A person's perception of professional benefit is an
19
20 87 endogenous motivation for his or her development and has a positive effect on that
21
22 88 person's career. According to prior studies, improving the perceived professional
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24 89 benefit of nurses reduces burnout reduction and enables nurses to approach their work
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26 90 with a good attitude and obtain more favorable comments [21, 22].

27
28
29 91 Measures created by researchers to evaluate the perceived professional benefits
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31 92 of nurses were still in little supply. The Preceptor's Perspective of Benefits and
32
33 93 Rewards (PPBR) measure was designed by Dibert, et al. [23] to evaluate the
34
35 94 perceived benefits of clinical preceptor nurses, however, it is not relevant to general
36
37 95 clinical nurses. A questionnaire entitled Nurses' Perceived Professional Benefits
38
39 96 Questionnaire (NPPBQ) was developed to assess how Chinese nurses perceive the
40
41 97 gains and benefits of their employment [5, 24]. This questionnaire has been utilized in
42
43 98 a lot of research to date. While we now have a better grasp of nurses' perceptions of
44
45 99 professional benefits, but the heterogeneity of the population is still lack, screening
46
47 100 strategies for future precision interventions cannot be developed for identifying low-
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49 101 benefit populations.

50
51 102 To our knowledge, it has not been shown that sufficient evidence exists to
52
53 103 answer the questions of whether nurses' perceived professional benefits differ in
54
55 104 groups and what factors contribute to these differences. The current study was created
56
57 105 to bridge that gap. This study's objective was to examine the characteristics and
58
59 106 determinants of nurses' perceived professional benefits as well as the predictors of
60
107 these latent profiles.

108

109 **MATERIALS AND METHODS**

110 **Study design**

111 An online survey with convenient sampling was used in this study to conduct a cross-
112 sectional analysis. This study was designed and reported in accordance with the
113 guidelines for Strengthening the Reporting of Observational Studies in Epidemiology
114 (STROBE)[25].

115

116 **Sample size estimation**

117 An examination of the latent profiles of perceived professional benefits among
118 nurses was conducted in this study. LPA needs a sample size larger than 500 [26, 27],
119 therefore, the minimum sample size for this study was 500.

120

121 **Participants**

122 Participants in this study required to meet the inclusion criteria and be registered
123 nurses. To be considered, candidates had to satisfy the following criteria to be
124 considered: (1) having worked as a nurse in a medical facility, and (2) being willing to
125 participate in this study. The following were the exclusion criteria: logical errors or
126 missing information in questionnaire answers.

127

128 **Measurements**

129 **Demographic**

130 This study gathered and evaluated demographic data including age, gender, greatest
131 degree of education, marital status, and other participant characteristics.

132

133 **Nurses' Perceived Professional Benefits Questionnaire (NPPBQ)**

134 The questionnaire was designed by Jing Hu, et al. [5] to investigate the gains and
135 benefits that nurses perceived from their jobs. The authors then reduced it to 17 items
136 by 2020 [24]. The questionnaire has five dimensions: personal growth, a good nurse-

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4 137 patient relationship, recognition from family and friends, a positive occupational
5 138 perception, and team belonging. Items are scored on a 5-point Likert scale (1 =
6
7 139 strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree).
8
9 140 Cronbach's alphas for the questionnaires were 0.94, and the NPPBQ
10
11 141 subquestionnaires' alphas were 0.84, 0.83, 0.74, 0.79, and 0.85.
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15 143 **Data collection**

16
17 144 During the dates of July 6 and July 27, 2022, data was gathered. Wenjuanxing
18
19 145 (www.wjx.cn) was used to develop a web-based questionnaire. Two researchers
20
21 146 reviewed the online questionnaire for rigor and verified the feasibility of the
22
23 147 questionnaire by completing it within the team. A poster was created to present the
24
25 148 link and QR code. It was clearly shown on the poster who would be included and
26
27 149 excluded from the survey. We distributed the questionnaire nationwide in China and
28
29 150 did not limit the source and setting of nurses. The researcher contacted administrators
30
31 151 or general nurses to disseminate the questionnaire. Wechat was used to send the
32
33 152 poster and information letter. The survey can be completed by clicking on the link or
34
35 153 scanning the QR code, completed questionnaires can be returned directly to the web.
36
37

38 155 **Statistical analyses**

39
40 156 The use of latent profile analysis (LPA) is frequently used to determine the
41
42 157 number of subpopulations in a given sample. LPA is a statistical method that use
43
44 158 potential category variables to explain the link between exogenous continuous-type
45
46 159 indicators, permitting the assessment of the correlation between exogenous indicators
47
48 160 and the maintenance of local independence among exogenous indicators [27]. Latent
49
50 161 profile analysis was conducted using Mplus 7.4 software. Log likelihood (LL),
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52 162 Akaike information criterion (AIC), Akaike Information Criterion (BIC), Adjusted
53
54 163 Bayesian Information Criteria (aBIC), Entropy, Lo-Mendell-Rubin (LMR), and the
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56 164 Bootstrapped Likelihood Ratio Test (BLRT) were used to assess model fit and
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58 165 determine the appropriate number of categories. In order to decide which model best
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4 166 fit the data, the models from each category's fitting results were combined with the
5
6 167 aforementioned indicators. The data was examined using the SPSS 26.0 statistical
7
8 168 program. We utilized frequency and composition ratios for categorical data, whereas
9
10 169 mean and standard deviation were utilized for continuous variables. The chi-square
11
12 170 test was performed to compare category variables across groups. ANOVA was used
13
14 171 to compare continuous variables among multiple groups. A multivariate logistic
15
16 172 regression model was employed to analyze the variations in demographic variables. A
17
18 173 statistically significant difference was indicated by $p < 0.05$.

174

175 **Ethical considerations**

176 The Ethics Committee of the First People's Hospital of Zunyi (2022-016) approved
177 the study, and participants gave permission for data collection. Prior to completing the
178 survey, participants will be provided with information about the purpose of the study
179 and the major substance of the research. They will then be able to provide their
180 informed consent through a yes or no response. In addition, participants were also
181 informed that the study's findings would be given in aggregate form and that no
182 participant could be identified. If a person declined to complete the questionnaire, the
183 collection was immediately ended.

184

185 **Patient and public involvement**

186 Patients and/or the public were not involved in the design, or conduct, or reporting, or
187 dissemination plans of this research.

188

189 **RESULTS**

190 **Participant characteristics**

191 A total of 1409 nurses completed the questionnaire, while 58 nurses denied
192 participation, for a total number of 1351 questionnaires received. 42 surveys were
193 considered invalid due to insufficient or inaccurate information. 92.9 percent of the
194 final 1309 surveys were correctly returned. The ages of the participants varied from 18

195 to 59 years old, with a mean age of 32.25 (SD: 6.18) years old. The bulk of participants
196 were female (86.7%), whereas the minority were male (3.2%).

197

198 **Characteristics of the different classes**

199 On the basis of the NPPBQ's five dimensions, it was established that a model with three
200 latent classes provided the greatest match. A class represents different categorisation
201 methods, such as a class 1 for a single subgroup, a class 2 for two heterogeneous
202 subgroups, and so forth. Table 1 provides the results. While the AIC and BIC in class
203 4 were lower in class 4 than in class 3, the entropy was greater; nonetheless, the lowest
204 category probability in class 4 was 1.4%, which is unsatisfactory. As a consequence,
205 we decided that the best-fitting model is class 3. Using a three-class model, Figure 1
206 illustrates the mean scores for each category within the NPPBQ's dimensions. The
207 percentages increase from class 1 to class 3 as follows: 11.8% (155 nurses), 57.1% (747
208 nurses), and 31.1% (407 nurses). For the sake of brevity, based on the profile scores,
209 we named class 1 as the low perceived professional benefits, class 2 as the moderate
210 perceived professional benefits, and class 3 as the high perceived professional benefits.

211 **Table 1** Potential profile analysis indicators ($N=1309$)

Model	LL ^a	AIC ^b	BIC ^c	aBIC ^d	Entropy	LMR ^e <i>p</i> -value	BLRT ^f <i>p</i> -value	Category probability
Class 1	- 14709.353	29438.706	29490.476	29458.711	-	-	-	-
Class 2	- 13420.425	26872.850	26955.682	26904.857	0.905	< 0.001	< 0.001	0.654/0.346
Class 3	- 12583.629	25211.257	25325.152	25255.268	0.936	0.007	< 0.001	0.118/0.571/0.311
Class 4	- 12307.807	24671.613	24816.570	24727.627	0.940	0.036	< 0.001	0.151/0.014/0.530/0.306

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213 a Log likelihood, b Akaike information criterion, c Bayesian information criterion, d Adjusted
214 bayesian information criterion, e Lo-Mendell-Rubin Likelihood Ratio Test, f Bootstrapped
215 Likelihood Ratio Test

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4 217 **The scale and dimension scores of different profiles**

5 218 The findings of a one-way ANOVA indicated statistically significant differences in the
6
7 219 scale and dimension scores of different profiles (both $p < 0.001$). The results were shown
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9 220 in Figure 2 demonstrates the outcomes.
10

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13 222 **Demographic and related characteristics of each profile**

14
15 223 The ANOVA and chi-square tests indicated statistically significant differences
16
17 224 between the three profiles differed statistically in terms of age, marital status, children,
18
19 225 professional title, leadership role, working years, and number of night shifts per month.
20

21 226 Table 2 is a summary of the results.
22

23 227 **Table 2** Demographic and characteristics by latent profile ($N=1309$)

Variables	Class 1	Class 2	Class 3	χ^2/F	p
Age (SD)	30.94 (5.37)	31.76 (5.91)	33.64 (6.71)	16.545	< 0.001
Gender				0.600	0.741
Male	6 (3.9)	25 (3.3)	11 (2.7)		
Female	149 (96.1)	722 (96.7)	396 (97.3)		
Highest Degree				1.602	0.449
Junior college and below	29 (18.7)	111 (14.9)	60 (14.7)		
Bachelor's and above	126 (81.3)	636 (85.1)	347 (85.3)		
Marital status				25.768	< 0.001
Single/divorced/widowed	62 (40.0)	218 (29.2)	80 (19.7)		
Married	93 (60.0)	529 (70.8)	327 (80.3)		
Children				26.943	< 0.001
Yes	87 (56.1)	481 (64.4)	311 (76.4)		
No	68 (43.9)	266 (35.6)	96 (23.6)		
Professional title				23.589	< 0.001

Junior Level	102 (65.8)	448 (60.0)	207 (50.9)		
Intermediate level	50 (32.3)	280 (37.5)	172 (42.3)		
Senior level	3 (1.9)	19 (2.5)	28 (6.9)		
Leadership role				17.086	< 0.001
Yes	18 (11.6)	86 (11.5)	82 (20.1)		
No	137 (88.4)	661 (88.5)	325 (79.9)		
Working years (years)				32.903	< 0.001
≤5	52 (33.5)	217 (29.0)	79 (19.4)		
6–15	91 (58.7)	438 (58.6)	241 (59.2)		
≥16	12 (7.7)	92 (12.3)	87 (21.4)		
Average monthly income (yuan)*				7.990	0.239
≤3000	23 (14.8)	75 (10.0)	43 (10.6)		
3001~6000	93 (60.0)	415 (55.6)	217 (53.3)		
6001~9000	27 (17.4)	179 (24.0)	105 (25.8)		
≥9001	12 (7.7)	78 (10.4)	42 (10.3)		
Number of night shifts per month				17.797	0.001
0	42 (27.1)	233 (31.2)	164 (40.3)		
1–4	22 (14.2)	143 (19.1)	73 (17.9)		
≥5	91 (58.7)	371 (49.7)	170 (41.8)		

228

229 * 1 USD equals 7.31 Chinese Yuan, exchange rate on September 29, 2023

230

231 A multivariate logistic regression model was constructed using the variables with
 232 statistically significant differences as determined by ANOVA and chi-square tests. Of
 233 the three profiles, the class 3 was chosen as a reference to find the predictors linked
 234 with NPPBQ. As shown in Table 3, nurses who were single/divorced/widowed were

235 more likely to belonged to low perceived professional benefits (*OR*: 1.984,
 236 95%*CI*:1.028-3.828). The number of night shifts worked per month was associated with
 237 low perceived professional benefits (*OR*: 0.633, 95% *CI*: 0.405-0.988), compared to
 238 those with more than five night shifts, those without night shifts tended to fall into the
 239 high perceived professional benefits. Nurses without a leadership role were more likely
 240 to be in the moderate perceived professional benefits (*OR*: 1.489, 95% *CI*: 1.028-2.157).
 241 Other variables were not statistically significant in the multivariate logistic regression.

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Table 3 Predictors of latent profile membership

Variables	Class 1 VS Class 3			Class 2 VS Class 3		
	β	<i>OR</i>	95% <i>CI</i>	β	<i>OR</i>	95% <i>CI</i>
Age (SD)	0.004	1.004	0.941-1.070	-0.005	0.995	0.957-1.034
Marital status						
Single/divorced/widowed	0.685	1.984*	1.028-3.828	0.115	1.122	0.716-1.760
Married (Ref)						
Children						
No	0.177	1.194	0.622-2.293	0.240	1.272	0.822-1.967
Yes (Ref)						
Professional title						
Junior level	0.368	1.444	0.334-6.241	0.359	1.433	0.661-3.105
Intermediate level	0.378	1.460	0.370-5.766	0.429	1.535	0.764-3.085
Senior level (Ref)						
Leadership role						
No	0.139	1.984	1.028-3.828	0.398	1.489*	1.028-2.157
Yes (Ref)						
Working years (years)						

1							
2							
3							
4	≤5	0.781	2.184	0.666-7.161	0.411	1.508	0.748-3.042
5							
6	6-15	0.721	2.057	0.847-5.000	0.228	1.256	0.773-2.039
7							
8	≥16 (Ref)						
9	Number of night shifts per						
10	month						
11							
12	0	-0.458	0.633*	0.405-0.988	-0.223	0.800	0.601-1.064
13							
14	1-4	-0.354	0.702	0.400-1.231	0.089	1.094	0.768-1.558
15							
16	≥5 (Ref)						

247 * $p < 0.05$; OR, Odds ratio; 95% CI, 95% Confidence Interval; Ref, Reference.

248 **DISCUSSION**

249 The purpose of this research was to identify distinct profiles of nurses' perceived
250 professional benefits. Furthermore, the current study employed multinomial logistic
251 regression to investigate predictors of these profiles.

252 In this study, we investigated 1309 nurses who validly completed the questionnaire.
253 As a result, three latent profiles were identified: low perceived professional benefits,
254 moderate perceived professional benefits, and high perceived professional benefits. Our
255 research revealed that the majority of nurses had a moderate or higher levels of
256 perceived professional benefits, with just 11.8% of nurses belonging to the category of
257 nurses with low perceived professional benefits. Most studies reported nurses had an
258 upper-moderate level of perceived professional benefits [28, 29], and our findings are
259 consistent with those of previous studies. Most importantly, our study clarified the
260 heterogeneous subgroups of nurses' perceived professional benefits and their specific
261 distribution.

262 In the last three years, nurses have been a key part of the fight against the COVID-
263 19 outbreak. Despite heavy job pressure, nurses have had a feeling of professional
264 calling and value [30], which has effectively enhanced their sense of professional
265 benefit [1]. At the same time, the critical role of nurses in defending people's lives and
266 health has earned the society's respect and recognition, as well as a positive social image
267 [31, 32], which can further enhance nurses' sense of professional benefit. Our survey
268 was conducted during the COVID-19 epidemic, and nurses' perceptions of professional
269 benefit may be elevated.

270 Another finding of our study revealed that the membership of profiles can be
271 predicted by some characteristics such as the number of night shifts, leadership role,
272 and marriage status. Nursing is a continuous, 24-hour profession, and nurse's work
273 normally takes the form of night shifts. It is widely proven that night shifts negatively
274 impact the physical and emotional health of nurses [33-36]. Nurses working rotating
275 night shifts were normally younger, and they had the lower scores of job satisfaction,
276 quality of sleep, and quantity of sleep [37], these factors resulted in a low perceived

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4 277 professional benefits. Consistent with past research, our findings indicate that the
5
6 278 greater the frequency of night shifts, the lower the perceived professional benefit [29].

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8 279 According to our results, 57.1% of nurses perceived professional benefits as
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10 280 moderate. The majority of nurses in the moderate perceived professional benefits
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12 281 group lacked a work title, while the majority of nurses in the highly perceived
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14 282 professional benefits group held a leadership role. This has been validated by other
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16 283 research, and our work provides more support for this notion [29]. Holding a
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18 284 managerial position at a hospital is a means of advancing one's career, and nurses
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20 285 highly value this opportunity.

21 286 Our study found that nurses who were single/divorced/widowed were more likely
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23 287 to belong to low perceived professional benefits, which is consistent with earlier
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25 288 findings [29]. This may be because, unlike single/divorced/widowed nurses, married
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27 289 nurses receive more social support from their spouses and other family members.

28
29 290 We hypothesized that job fulfillment and social support are important influencing
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31 291 mechanisms that affect nurses' perceived professional benefits. The number of night
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33 292 shifts, leadership roles are important indicators of nurses' job fulfillment. Marital status
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35 293 is an important factor in social support. Each of these factors can have varying degrees
36
37 294 of impact on the actual benefit or spiritual benefit [4]. Considering that nurses perceive
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39 295 professional benefits as a result of personal, organizational, environmental, and social
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41 296 factors, a well-developed theoretical framework is required to explain this phenomenon.

42
43 297 Unfortunately, our research failed to demonstrate that the profiles can be predicted
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45 298 by other factors in the model variables. Our findings in the univariate analysis results
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47 299 were consistent with earlier research. Nevertheless, because the bulk of prior research
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49 300 did not employ multi-factor models, it was impossible to compare our findings could
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51 301 not be compared to those of others. In addition, certain putative contributing elements
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53 302 were not adequately proven, and further research is required to confirm them in the
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55 303 future.

56 304 Our research has theoretical and practical implications for the future study of
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58 305 nurses' perceived professional benefits. First, the number of night shifts, leadership

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4 306 role, and marriage status are the most significant factors affecting nurses' perceived
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6 307 professional benefits, and in the future, we should focus on the degree of influence of
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8 308 these three factors and explore the mechanisms from the theoretical level. Second,
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10 309 managers should pay active attention to the perceived professional benefits of clinical
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12 310 nurses, create a favorable working environment and professional growth atmosphere,
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14 311 and promote the professional success of nurses. Given that 11.8% of nurses still have
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16 312 a low perceived sense of career benefit, more tailored intervention programs are still
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18 313 needed in the future.

19 314

20 315 **Strengths and limitations**

21 316 To the best of our knowledge, this is the first study to use the LPA approach to explore
22
23 317 heterogeneous subgroups of nurses' perceived professional benefit with a large sample
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25 318 size, and we presented a unique perspective and a basis for future research on the
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27 319 perceived career benefits of nurses. The research was limited in some ways. First, this
28
29 320 was a web-based survey, and the sample process and self-reporting strategy may have
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31 321 resulted in some bias. Second, we only polled nurses in mainland China, and our sample
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33 322 only reflected the current situation in a single nation. Lastly, the constraints of the
34
35 323 study's design prohibited an in-depth assessment of the psychological factors behind
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37 324 nurses' perceptions of their professional benefit. As a result, more rigorously designed
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39 325 studies will be required in the future to investigate this issue in depth.

40 326

41 327 **CONCLUSION**

42 328 Our study identified three professional benefits profiles among nurses. The results of
43
44 329 our study indicated that nurses enjoy a high level of professional benefits.

45 330 Notwithstanding the study's limitations of the study and the present condition of
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47 331 nursing, it is vital that we engage on several levels to encourage a stable nursing
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49 332 workforce, including policy, organisation, financial income, and career development,
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51 333 so that nurses experience a sense of professional gain.

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4 335 **Acknowledgements**

5 336 None.

6
7 337 **AUTHOR CONTRIBUTIONS**

8
9 338 Jiang Hu and Sun Changli were responsible for the conception and study design. Yao

10 339 Qiangfang, Wang Xianwei and Liu Hanmei performed the data collection. Yao

11 340 Qiangfang, Wang Xianwei and Wen Xueke contributed to the analysis of the data.

12 341 Sun Changli and Jiang Hu were involved in drafting the manuscript and revising it.

13 342 All authors have read and approved the final manuscript.

14 343 **FUNDING**

15 344 This study was funded by the Science and Technology Joint Funds of Zunyi Science

16 345 and Technology Bureau (2023-73).

17 346 **CONFLICT OF INTEREST**

18 347 The authors have no conflicts of interest to declare.

19 348 **Ethics approval**

20 349 This study involves human participants and was approved by the Ethics Committee of

21 350 the First People's Hospital of Zunyi (2022-016). Participants gave informed consent to

22 351 participate in the study before taking part.

23 352 **Data availability statement**

24 353 Data are available upon reasonable request. Data are available from the corresponding

25 354 author and the first author on reasonable request.

26 355

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4 465 **Figure 1** Latent profiles of NPPBQ

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7 467 **Figure 2** The scale and dimension scores of different profiles

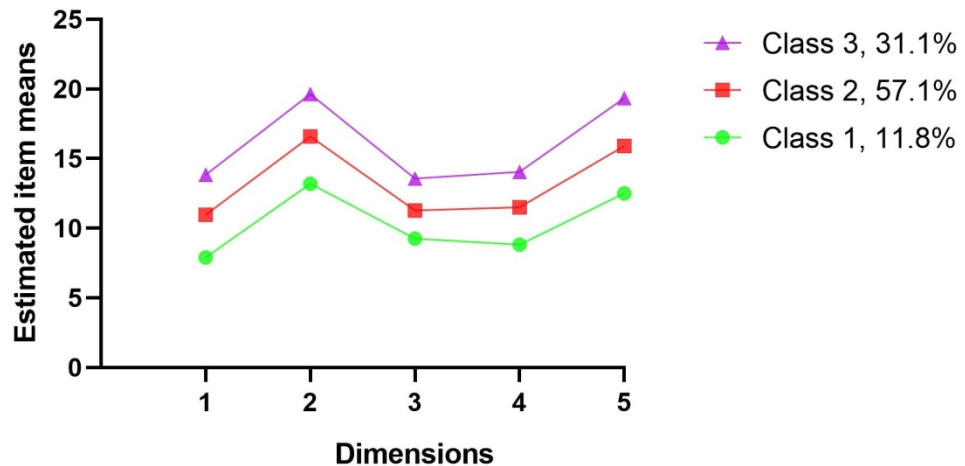
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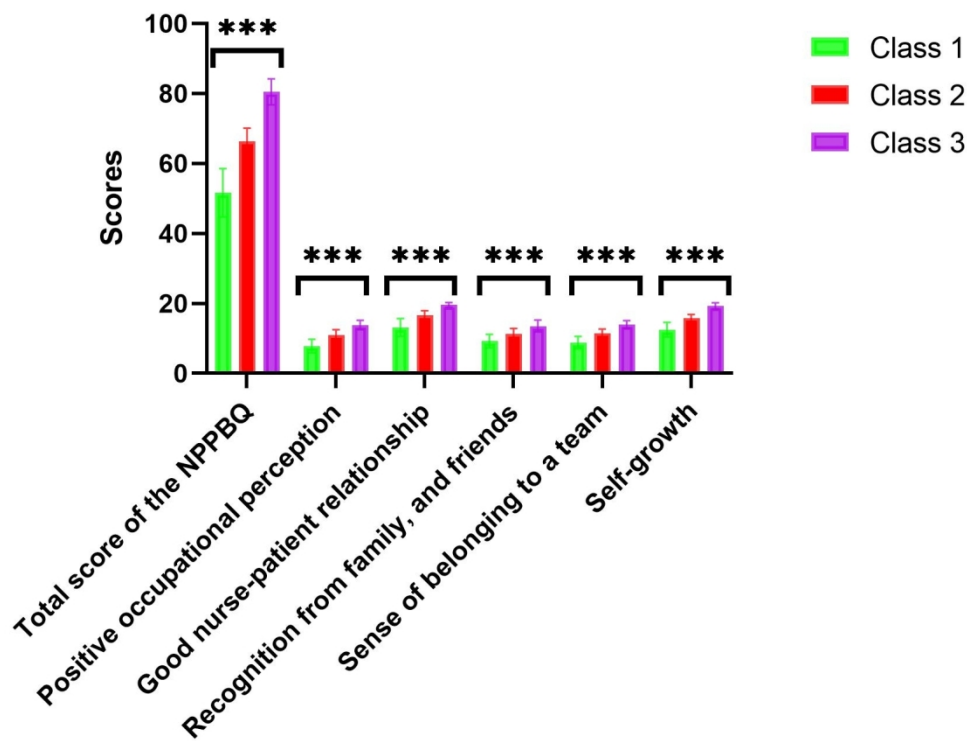
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Latent profiles of NPPBQ
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The scale and dimension scores of different profiles

145x114mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Latent profile analysis of nurses' perceived professional benefits in China: a cross-sectional study

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-078051.R4
Article Type:	Original research
Date Submitted by the Author:	17-Oct-2023
Complete List of Authors:	Sun, Changli; Third Affiliated Hospital of Zunyi Medical University Jiang, Hu; Third Affiliated Hospital of Zunyi Medical University Yao, Qingfang; The Third Affiliated Hospital of Zunyi Medical University Wang, Xianwei; The Third Affiliated Hospital of Zunyi Medical University Wen, Xueke; Third Affiliated Hospital of Zunyi Medical University Liu, Hanmei; Zunyi Medical University
Primary Subject Heading:	Occupational and environmental medicine
Secondary Subject Heading:	Nursing, Occupational and environmental medicine
Keywords:	Burnout, Professional, Burnout, China

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14 5 Changli Sun¹, Hu Jiang^{1*}, Qingfang Yao², Xianwei Wang², Xueke Wen¹ and Hanmei
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4 14 **Latent profile analysis of nurses' perceived professional benefits in**
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8
9 16 **ABSTRACT**

10 17 **Objective:** To identify profiles of nurses' perceived professional benefits as well as
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13 18 their predictors.

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15 19 **Design:** Cross-sectional study.

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17 20 **Setting:** The study was carried out online in China.

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19 21 **Methods:** From July 6 and July 27, 2022, a total of 1,309 registered nurses participated
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21 22 in the survey by convenient sampling. We collected the Nurses' Perceived Professional
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23 23 Benefits Questionnaire (NPPBQ) and demographic data. Using latent profile analysis
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25 24 (LPA), subgroups of nurses' perceived professional benefits were identified. Moreover,
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27 25 univariate and multinomial logistic regression analysis were conducted to find the
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29 26 factors that were linked with the profiles.

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31 27 **Results:** The survey was validly completed by 1309 nurses, with a 92.9% effective
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33 28 return rate. The findings of the LPA demonstrated three unique profiles: low perceived
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35 29 professional benefits (11.8%), moderate perceived professional benefits (57.1%), and
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37 30 high perceived professional benefits (31.1%). There was a correlation between marital
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39 31 status, the number of night shifts per month, and leadership role.

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41 32 **Conclusions:** According to our research, registered nurses have three unique
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43 33 professional benefit profiles. In order to sustain the nursing workforce, despite the fact
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45 34 that nurses get a high level of professional benefits, interventions are necessary to
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47 35 increase nurses' perception of their professional value.

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50 37 **Keywords:** nurse, perceived professional benefits, latent profile analysis, cross-
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52 38 sectional study

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55 40 **Strengths and limitations of this study:**

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57 41 ● This is a national survey data regarding perceived professional benefit among
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4 42 Chinese nurses.

5 43 ● The LPA approach was utilized in this study to investigate heterogeneous
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7 44 subgroups of nurses' perceived professional benefit.

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9 45 ● This study was limited by the web-based cross-sectional design and convenient
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11 46 sampling method.

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13 47 ● The cross-sectional design of the study makes it impossible to identify causal
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15 48 relationships between latent profiles and influencing factors.
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For peer review only

49 INTRODUCTION

50 Despite the fact that nursing is a high-risk, high-stress profession, nurses are able
51 to achieve benefit findings [1-3]. In recent years, the concept of nurses' perceived
52 professional benefits arises naturally, and has gradually attracted the attention of
53 researchers. Nurses' perceived professional benefits (NPPB) refer to nurses'
54 perceptions of the gains and benefits they receive in their profession during the hiring
55 process, as well as their belief that working in nursing can promote their overall
56 growth and development [4, 5]. Essentially, perceived professional benefits can be
57 classified as an emotional experience and cognitive evaluation, which has two
58 aspects: actual benefits and spiritual benefits [4]. However, there is a lack of in-depth
59 research on the group heterogeneity of perceived professional benefits among nurse
60 populations.

61 Background

62 It is estimated that 69% of the global health workforce consists of nurses [6].
63 Yet, the present physical and mental health of nurses is not encouraging, as they
64 confront high levels of stress, burnout, turnover, and their own ageing [7-9]. Nursing
65 is no longer a desirable and appealing profession [10], which makes nurse shortages a
66 widespread worldwide concern [11]. These issues have a direct bearing on the
67 sustainability and continued growth of the nursing workforce. In recent years, nursing
68 in China has experienced remarkable growth, and the most recent statistics indicate
69 that China has more than 5 million registered nurses [12]. Chinese nurses are
70 extremely susceptible to burnout, and a high desire to leave is a serious concern [13,
71 14]. However, there is a dearth of comprehensive study and viable remedies.

72 The mental health of nurses is receiving increasing attention from managers and
73 researchers in the context of positive psychology. It is beginning to be recognized that
74 nurses' own positive psychology promotes job satisfaction and professional identity,
75 lessens burnout, and hence reduces turnover rates [15, 16].

76 The profession of nursing can be beneficial to nurses in a number of ways.
77 Previous studies [17, 18] reported that nursing preceptorship offers many benefits,

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4 78 and nurses may find themselves being more committed to the position as a result. A
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6 79 qualitative study [19] found that nurses who were involved in caring for dying
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8 80 patients got a great lot of experience and benefited considerably; they can create a
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10 81 personal philosophy on death and life, in addition to professional growth. Nurses who
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12 82 served as advanced practice nurse roles perceived numerous benefits, including
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14 83 improved patient care quality and safety, professionalism, personal development,
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16 84 career development, intrinsic satisfaction with the role, and impact on other
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18 85 professional groups [20]. A person's perception of professional benefit is an
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20 86 endogenous motivation for his or her development and has a positive effect on that
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22 87 person's career. According to prior studies, improving the perceived professional
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24 88 benefit of nurses reduces burnout reduction and enables nurses to approach their work
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26 89 with a good attitude and obtain more favorable comments [21, 22].

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28 90 Measures created by researchers to evaluate the perceived professional benefits
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30 91 of nurses were still in little supply. The Preceptor's Perspective of Benefits and
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32 92 Rewards (PPBR) measure was designed by Dibert, et al. [23] to evaluate the
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34 93 perceived benefits of clinical preceptor nurses, however, it is not relevant to general
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36 94 clinical nurses. A questionnaire entitled Nurses' Perceived Professional Benefits
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38 95 Questionnaire (NPPBQ) was developed to assess how Chinese nurses perceive the
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40 96 gains and benefits of their employment [5, 24]. This questionnaire has been utilized in
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42 97 a lot of research to date. While we now have a better grasp of nurses' perceptions of
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44 98 professional benefits, but the heterogeneity of the population is still lack, screening
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46 99 strategies for future precision interventions cannot be developed for identifying low-
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48 100 benefit populations.

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50 101 To our knowledge, it has not been shown that sufficient evidence exists to
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52 102 answer the questions of whether nurses' perceived professional benefits differ in
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54 103 groups and what factors contribute to these differences. The current study was created
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56 104 to bridge that gap. This study's objective was to examine the characteristics and
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58 105 determinants of nurses' perceived professional benefits as well as the predictors of
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60 106 these latent profiles.

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4 1075 108 **MATERIALS AND METHODS**7 109 **Study design**

9 110 An online survey with convenient sampling was used in this study to conduct a cross-
11 111 sectional analysis. This study was designed and reported in accordance with the
13 112 guidelines for Strengthening the Reporting of Observational Studies in Epidemiology
15 113 (STROBE)[25].

17 114

19 115 **Sample size estimation**

21 116 An examination of the latent profiles of perceived professional benefits among
23 117 nurses was conducted in this study. LPA needs a sample size larger than 500 [26, 27],
25 118 therefore, the minimum sample size for this study was 500.

27 119

29 120 **Participants**

31 121 Participants in this study required to meet the inclusion criteria and be registered
33 122 nurses. To be considered, candidates had to satisfy the following criteria to be
35 123 considered: (1) having worked as a nurse in a medical facility, and (2) being willing to
37 124 participate in this study. The following were the exclusion criteria: logical errors or
39 125 missing information in questionnaire answers.

41 126

43 127 **Measurements**45 128 **Demographic**

47 129 This study gathered and evaluated demographic data including age, gender, greatest
49 130 degree of education, marital status, and other participant characteristics.

51 131

53 132 **Nurses' Perceived Professional Benefits Questionnaire (NPPBQ)**

55 133 The questionnaire was designed by Jing Hu, et al. [5] to investigate the gains and
57 134 benefits that nurses perceived from their jobs. The authors then reduced it to 17 items
59 135 by 2020 [24]. The questionnaire has five dimensions: personal growth, a good nurse-

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4 136 patient relationship, recognition from family and friends, a positive occupational
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6 137 perception, and team belonging. Items are scored on a 5-point Likert scale (1 =
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8 138 strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree).
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10 139 Cronbach's alphas for the questionnaires were 0.94, and the NPPBQ
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12 140 subquestionnaires' alphas were 0.84, 0.83, 0.74, 0.79, and 0.85.
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15 142 **Data collection**

17 143 During the dates of July 6 and July 27, 2022, data was gathered. Wenjuanxing
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19 144 (www.wjx.cn) was used to develop a web-based questionnaire. Two researchers
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21 145 reviewed the online questionnaire for rigor and verified the feasibility of the
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23 146 questionnaire by completing it within the team. A poster was created to present the
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25 147 link and QR code. It was clearly shown on the poster who would be included and
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27 148 excluded from the survey. We distributed the questionnaire nationwide in China and
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29 149 did not limit the source and setting of nurses. The researcher contacted administrators
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31 150 or general nurses to disseminate the questionnaire. Wechat was used to send the
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33 151 poster and information letter. The survey can be completed by clicking on the link or
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35 152 scanning the QR code, completed questionnaires can be returned directly to the web.
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38 154 **Statistical analyses**

40 155 The use of latent profile analysis (LPA) is frequently used to determine the
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42 156 number of subpopulations in a given sample. LPA is a statistical method that use
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44 157 potential category variables to explain the link between exogenous continuous-type
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46 158 indicators, permitting the assessment of the correlation between exogenous indicators
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48 159 and the maintenance of local independence among exogenous indicators [27]. Latent
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50 160 profile analysis was conducted using Mplus 7.4 software. Log likelihood (LL),
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52 161 Akaike information criterion (AIC), Akaike Information Criterion (BIC), Adjusted
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54 162 Bayesian Information Criteria (aBIC), Entropy, Lo-Mendell-Rubin (LMR), and the
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56 163 Bootstrapped Likelihood Ratio Test (BLRT) were used to assess model fit and
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58 164 determine the appropriate number of categories. In order to decide which model best
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4 165 fit the data, the models from each category's fitting results were combined with the
5
6 166 aforementioned indicators. The data was examined using the SPSS 26.0 statistical
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8 167 program. We utilized frequency and composition ratios for categorical data, whereas
9
10 168 mean and standard deviation were utilized for continuous variables. The chi-square
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12 169 test was performed to compare category variables across groups. ANOVA was used
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14 170 to compare continuous variables among multiple groups. A multivariate logistic
15
16 171 regression model was employed to analyze the variations in demographic variables. A
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18 172 statistically significant difference was indicated by $p < 0.05$.

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21 174 **Ethical considerations**

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23 175 The Ethics Committee of the First People's Hospital of Zunyi (2022-016) approved
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25 176 the study, and participants gave permission for data collection. Prior to completing the
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27 177 survey, participants will be provided with information about the purpose of the study
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29 178 and the major substance of the research. They will then be able to provide their
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31 179 informed consent through a yes or no response. In addition, participants were also
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33 180 informed that the study's findings would be given in aggregate form and that no
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35 181 participant could be identified. If a person declined to complete the questionnaire, the
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37 182 collection was immediately ended.

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40 184 **Patient and public involvement**

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42 185 Patients and/or the public were not involved in the design, or conduct, or reporting, or
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44 186 dissemination plans of this research.

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47 188 **RESULTS**

48 189 **Participant characteristics**

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50 190 A total of 1409 nurses completed the questionnaire, while 58 nurses denied
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52 191 participation, for a total number of 1351 questionnaires received. 42 surveys were
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54 192 considered invalid due to insufficient or inaccurate information. 92.9 percent of the
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56 193 final 1309 surveys were correctly returned. The ages of the participants varied from 18

194 to 59 years old, with a mean age of 32.25 (SD: 6.18) years old. The bulk of participants
195 were female (86.7%), whereas the minority were male (3.2%).

196

197 **Characteristics of the different classes**

198 On the basis of the NPPBQ's five dimensions, it was established that a model with three
199 latent classes provided the greatest match. A class represents different categorisation
200 methods, such as a class 1 for a single subgroup, a class 2 for two heterogeneous
201 subgroups, and so forth. Table 1 provides the results. While the AIC and BIC in class
202 4 were lower in class 4 than in class 3, the entropy was greater; nonetheless, the lowest
203 category probability in class 4 was 1.4%, which is unsatisfactory. As a consequence,
204 we decided that the best-fitting model is class 3. Using a three-class model, Figure 1
205 illustrates the mean scores for each category within the NPPBQ's dimensions. The
206 percentages increase from class 1 to class 3 as follows: 11.8% (155 nurses), 57.1% (747
207 nurses), and 31.1% (407 nurses). For the sake of brevity, based on the profile scores,
208 we named class 1 as the low perceived professional benefits, class 2 as the moderate
209 perceived professional benefits, and class 3 as the high perceived professional benefits.

210 **Table 1** Potential profile analysis indicators ($N=1309$)

Model	LL ^a	AIC ^b	BIC ^c	aBIC ^d	Entropy	LMR ^e <i>p</i> -value	BLRT ^f <i>p</i> -value	Category probability
Class 1	- 14709.353	29438.706	29490.476	29458.711	-	-	-	-
Class 2	- 13420.425	26872.850	26955.682	26904.857	0.905	< 0.001	< 0.001	0.654/0.346
Class 3	- 12583.629	25211.257	25325.152	25255.268	0.936	0.007	< 0.001	0.118/0.571/0.311
Class 4	- 12307.807	24671.613	24816.570	24727.627	0.940	0.036	< 0.001	0.151/0.014/0.530/0.306

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212 a Log likelihood, b Akaike information criterion, c Bayesian information criterion, d Adjusted
213 bayesian information criterion, e Lo-Mendell-Rubin Likelihood Ratio Test, f Bootstrapped
214 Likelihood Ratio Test

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216 **The scale and dimension scores of different profiles**

217 The findings of a one-way ANOVA indicated statistically significant differences in the
 218 scale and dimension scores of different profiles (both $p < 0.001$). The results were shown
 219 in Figure 2 demonstrates the outcomes.

221 **Demographic and related characteristics of each profile**

222 The ANOVA and chi-square tests indicated statistically significant differences
 223 between the three profiles differed statistically in terms of age, marital status, children,
 224 professional title, leadership role, working years, and number of night shifts per month.
 225 Table 2 is a summary of the results.

226 **Table 2** Demographic and characteristics by latent profile ($N=1309$)

Variables	Class 1	Class 2	Class 3	χ^2/F	p
Age (SD)	30.94 (5.37)	31.76 (5.91)	33.64 (6.71)	16.545	< 0.001
Gender				0.600	0.741
Male	6 (3.9)	25 (3.3)	11 (2.7)		
Female	149 (96.1)	722 (96.7)	396 (97.3)		
Highest Degree				1.602	0.449
Junior college and below	29 (18.7)	111 (14.9)	60 (14.7)		
Bachelor's and above	126 (81.3)	636 (85.1)	347 (85.3)		
Marital status				25.768	< 0.001
Single/divorced/widowed	62 (40.0)	218 (29.2)	80 (19.7)		
Married	93 (60.0)	529 (70.8)	327 (80.3)		
Children				26.943	< 0.001
Yes	87 (56.1)	481 (64.4)	311 (76.4)		
No	68 (43.9)	266 (35.6)	96 (23.6)		
Professional title				23.589	< 0.001

Junior Level	102 (65.8)	448 (60.0)	207 (50.9)		
Intermediate level	50 (32.3)	280 (37.5)	172 (42.3)		
Senior level	3 (1.9)	19 (2.5)	28 (6.9)		
Leadership role				17.086	< 0.001
Yes	18 (11.6)	86 (11.5)	82 (20.1)		
No	137 (88.4)	661 (88.5)	325 (79.9)		
Working years (years)				32.903	< 0.001
≤5	52 (33.5)	217 (29.0)	79 (19.4)		
6–15	91 (58.7)	438 (58.6)	241 (59.2)		
≥16	12 (7.7)	92 (12.3)	87 (21.4)		
Average monthly income (yuan)*				7.990	0.239
≤3000	23 (14.8)	75 (10.0)	43 (10.6)		
3001~6000	93 (60.0)	415 (55.6)	217 (53.3)		
6001~9000	27 (17.4)	179 (24.0)	105 (25.8)		
≥9001	12 (7.7)	78 (10.4)	42 (10.3)		
Number of night shifts per month				17.797	0.001
0	42 (27.1)	233 (31.2)	164 (40.3)		
1–4	22 (14.2)	143 (19.1)	73 (17.9)		
≥5	91 (58.7)	371 (49.7)	170 (41.8)		

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228 * 1 USD equals 7.31 Chinese Yuan, exchange rate on September 29, 2023

229

230 A multivariate logistic regression model was constructed using the variables with
 231 statistically significant differences as determined by ANOVA and chi-square tests. Of
 232 the three profiles, the class 3 was chosen as a reference to find the predictors linked
 233 with NPPBQ. As shown in Table 3, nurses who were single/divorced/widowed were

234 more likely to belonged to low perceived professional benefits (*OR*: 1.984,
 235 95%*CI*:1.028-3.828). The number of night shifts worked per month was associated with
 236 low perceived professional benefits (*OR*: 0.633, 95% *CI*: 0.405-0.988), compared to
 237 those with more than five night shifts, those without night shifts tended to fall into the
 238 high perceived professional benefits. Nurses without a leadership role were more likely
 239 to be in the moderate perceived professional benefits (*OR*: 1.489, 95% *CI*: 1.028-2.157).
 240 Other variables were not statistically significant in the multivariate logistic regression.

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Table 3 Predictors of latent profile membership

Variables	Class 1 VS Class 3			Class 2 VS Class 3		
	β	<i>OR</i>	95% <i>CI</i>	β	<i>OR</i>	95% <i>CI</i>
Age (SD)	0.004	1.004	0.941-1.070	-0.005	0.995	0.957-1.034
Marital status						
Single/divorced/widowed	0.685	1.984*	1.028-3.828	0.115	1.122	0.716-1.760
Married (Ref)						
Children						
No	0.177	1.194	0.622-2.293	0.240	1.272	0.822-1.967
Yes (Ref)						
Professional title						
Junior level	0.368	1.444	0.334-6.241	0.359	1.433	0.661-3.105
Intermediate level	0.378	1.460	0.370-5.766	0.429	1.535	0.764-3.085
Senior level (Ref)						
Leadership role						
No	0.139	1.984	1.028-3.828	0.398	1.489*	1.028-2.157
Yes (Ref)						
Working years (years)						

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4	≤5	0.781	2.184	0.666-7.161	0.411	1.508	0.748-3.042
5							
6	6–15	0.721	2.057	0.847-5.000	0.228	1.256	0.773-2.039
7							
8	≥16 (Ref)						
9	Number of night shifts per						
10	month						
11							
12	0	-0.458	0.633*	0.405-0.988	-0.223	0.800	0.601-1.064
13							
14	1–4	-0.354	0.702	0.400-1.231	0.089	1.094	0.768-1.558
15							
16	≥5 (Ref)						
17							

246 * $p < 0.05$; *OR*, Odds ratio; 95% *CI*, 95% Confidence Interval; Ref, Reference.

247 **DISCUSSION**

248 The purpose of this research was to identify distinct profiles of nurses' perceived
249 professional benefits. Furthermore, the current study employed multinomial logistic
250 regression to investigate predictors of these profiles.

251 In this study, we investigated 1309 nurses who validly completed the questionnaire.
252 As a result, three latent profiles were identified: low perceived professional benefits,
253 moderate perceived professional benefits, and high perceived professional benefits. Our
254 research revealed that the majority of nurses had a moderate or higher levels of
255 perceived professional benefits, with just 11.8% of nurses belonging to the category of
256 nurses with low perceived professional benefits. Most studies reported nurses had an
257 upper-moderate level of perceived professional benefits [28, 29], and our findings are
258 consistent with those of previous studies. Most importantly, our study clarified the
259 heterogeneous subgroups of nurses' perceived professional benefits and their specific
260 distribution.

261 In the last three years, nurses have been a key part of the fight against the COVID-
262 19 outbreak. Despite heavy job pressure, nurses have had a feeling of professional
263 calling and value [30], which has effectively enhanced their sense of professional
264 benefit [1]. At the same time, the critical role of nurses in defending people's lives and
265 health has earned the society's respect and recognition, as well as a positive social image
266 [31, 32], which can further enhance nurses' sense of professional benefit. Our survey
267 was conducted during the COVID-19 epidemic, and nurses' perceptions of professional
268 benefit may be elevated.

269 Another finding of our study revealed that the membership of profiles can be
270 predicted by some characteristics such as the number of night shifts, leadership role,
271 and marriage status. Nursing is a continuous, 24-hour profession, and nurse's work
272 normally takes the form of night shifts. It is widely proven that night shifts negatively
273 impact the physical and emotional health of nurses [33-36]. Nurses working rotating
274 night shifts were normally younger, and they had the lower scores of job satisfaction,
275 quality of sleep, and quantity of sleep [37], these factors resulted in a low perceived

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4 276 professional benefits. Consistent with past research, our findings indicate that the
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6 277 greater the frequency of night shifts, the lower the perceived professional benefit [29].

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8 278 According to our results, 57.1% of nurses perceived professional benefits as
9
10 279 moderate. The majority of nurses in the moderate perceived professional benefits
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12 280 group lacked a work title, while the majority of nurses in the highly perceived
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14 281 professional benefits group held a leadership role. This has been validated by other
15
16 282 research, and our work provides more support for this notion [29]. Holding a
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18 283 managerial position at a hospital is a means of advancing one's career, and nurses
19
20 284 highly value this opportunity.

21 285 Our study found that nurses who were single/divorced/widowed were more likely
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23 286 to belong to low perceived professional benefits, which is consistent with earlier
24
25 287 findings [29]. This may be because, unlike single/divorced/widowed nurses, married
26
27 288 nurses receive more social support from their spouses and other family members.

28
29 289 We hypothesized that job fulfillment and social support are important influencing
30
31 290 mechanisms that affect nurses' perceived professional benefits. The number of night
32
33 291 shifts, leadership roles are important indicators of nurses' job fulfillment. Marital status
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35 292 is an important factor in social support. Each of these factors can have varying degrees
36
37 293 of impact on the actual benefit or spiritual benefit [4]. Considering that nurses perceive
38
39 294 professional benefits as a result of personal, organizational, environmental, and social
40
41 295 factors, a well-developed theoretical framework is required to explain this phenomenon.

42 296 Unfortunately, our research failed to demonstrate that the profiles can be predicted
43
44 297 by other factors in the model variables. Our findings in the univariate analysis results
45
46 298 were consistent with earlier research. Nevertheless, because the bulk of prior research
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48 299 did not employ multi-factor models, it was impossible to compare our findings could
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50 300 not be compared to those of others. In addition, certain putative contributing elements
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52 301 were not adequately proven, and further research is required to confirm them in the
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54 302 future.

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56 303 Our research has theoretical and practical implications for the future study of
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58 304 nurses' perceived professional benefits. First, the number of night shifts, leadership

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4 305 role, and marriage status are the most significant factors affecting nurses' perceived
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6 306 professional benefits, and in the future, we should focus on the degree of influence of
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8 307 these three factors and explore the mechanisms from the theoretical level. Second,
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10 308 managers should pay active attention to the perceived professional benefits of clinical
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12 309 nurses, create a favorable working environment and professional growth atmosphere,
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14 310 and promote the professional success of nurses. Given that 11.8% of nurses still have
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16 311 a low perceived sense of career benefit, more tailored intervention programs are still
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18 312 needed in the future.

19 313

20 314 **Strengths and limitations**

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23 315 To the best of our knowledge, this is the first study to use the LPA approach to explore
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25 316 heterogeneous subgroups of nurses' perceived professional benefit with a large sample
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27 317 size, and we presented a unique perspective and a basis for future research on the
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29 318 perceived career benefits of nurses. The research was limited in some ways. First, this
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31 319 was a web-based survey, and the sample process and self-reporting strategy may have
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33 320 resulted in some bias. Second, we only polled nurses in mainland China, and our sample
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35 321 only reflected the current situation in a single nation. Lastly, the constraints of the
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37 322 study's design prohibited an in-depth assessment of the psychological factors behind
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39 323 nurses' perceptions of their professional benefit. As a result, more rigorously designed
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41 324 studies will be required in the future to investigate this issue in depth.

42 325

43 326 **CONCLUSION**

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46 327 Our study identified three professional benefits profiles among nurses. The results of
47
48 328 our study indicated that nurses enjoy a high level of professional benefits.

49
50 329 Notwithstanding the study's limitations of the study and the present condition of
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52 330 nursing, it is vital that we engage on several levels to encourage a stable nursing
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54 331 workforce, including policy, organisation, financial income, and career development,
55
56 332 so that nurses experience a sense of professional gain.

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4 334 **Acknowledgements**

5 335 None.

6
7 336 **AUTHOR CONTRIBUTIONS**

8
9 337 Jiang Hu and Sun Changli were responsible for the conception and study design. Yao

10
11 338 Qiangfang, Wang Xianwei and Liu Hanmei performed the data collection. Yao

12
13 339 Qiangfang, Wang Xianwei and Wen Xueke contributed to the analysis of the data.

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15 340 Sun Changli and Jiang Hu were involved in drafting the manuscript and revising it.

16
17 341 All authors have read and approved the final manuscript.

18
19 342 **FUNDING**

20
21 343 This study was funded by the Science and Technology Joint Funds of Zunyi Science

22
23 344 and Technology Bureau (2023-73).

24
25 345 **CONFLICT OF INTEREST**

26
27 346 The authors have no conflicts of interest to declare.

28
29 347 **Ethics approval**

30
31 348 This study involves human participants and was approved by the Ethics Committee of

32
33 349 the First People's Hospital of Zunyi (2022-016). Participants gave informed consent to

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35 350 participate in the study before taking part.

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37 351 **Data availability statement**

38
39 352 Data are available upon reasonable request. Data are available from the corresponding

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41 353 author and the first author on reasonable request.

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4 464 **Figure 1** Latent profiles of NPPBQ

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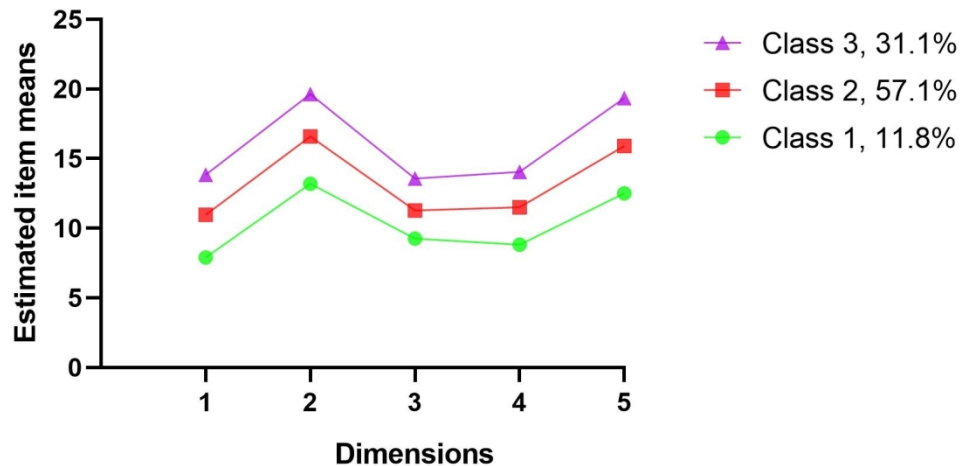
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8 466 **Figure 2** The scale and dimension scores of different profiles

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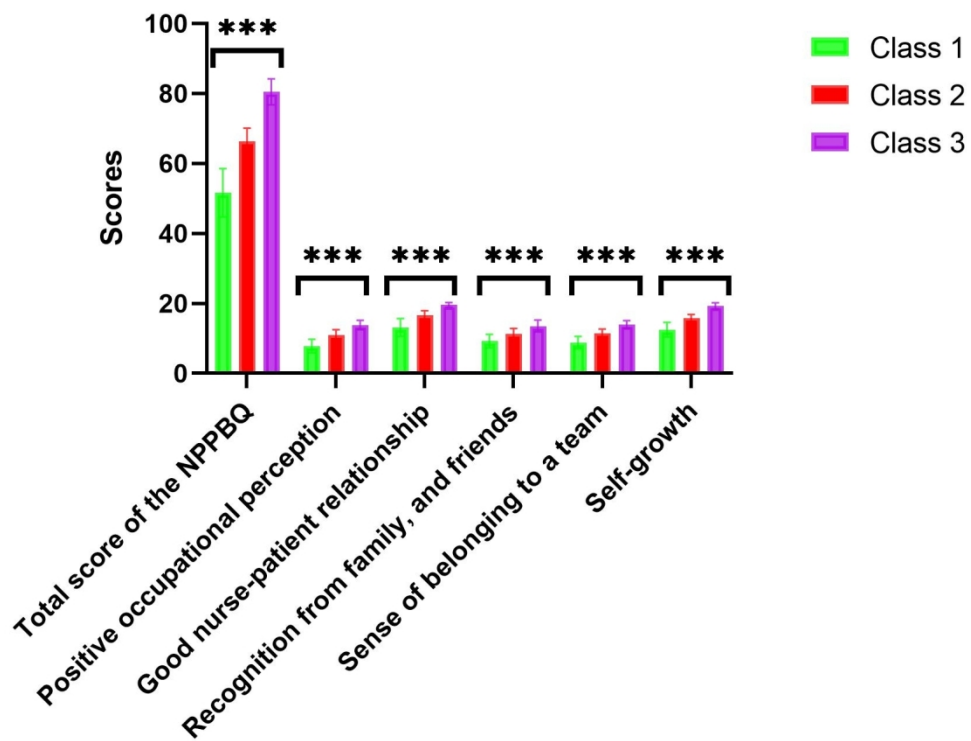
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Latent profiles of NPPBQ
145x76mm (300 x 300 DPI)

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The scale and dimension scores of different profiles

145x114mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4-5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.