



Risk Identification and Management Countermeasures for Psychological Fatigue Among Higher Vocational Students under Industry-Education Integration

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Abstract. Using students from a higher vocational college in the context of industry–education integration as the research subjects, this study employed the revised Maslach Burnout Inventory–Student Survey (MBI-SS) to assess the status and risk factors of psychological fatigue. SPSS 22.0, Origin 25.0, and Excel 19.0 were used to conduct difference tests and correlation analyses with demographic variables incorporated. The results showed that psychological fatigue was prevalent among higher vocational students, with mild and moderate fatigue accounting for the largest proportion, whereas severe fatigue was relatively rare. Significant differences were identified in academic performance, physical health status, and grade level; students with poorer academic performance and worse physical health exhibited higher levels of psychological fatigue. These findings indicate that psychological fatigue has become an important risk factor affecting learning adaptation and practical training under industry–education integration. Accordingly, higher vocational colleges should strengthen psychological fatigue risk identification, improve early warning and intervention mechanisms, and establish safety-oriented student management and support systems.

Keywords: Industry-education integration; Higher vocational students; Psychological fatigue; MBI-SS; Safety Management

1 Introduction

Against the backdrop of the continuous development of China’s vocational education system and the implementation of industry–education integration policies^[1], higher vocational students are increasingly required to balance academic learning, practical training, and enterprise-based internships, exposing them to substantial task demands and psychological pressure^[2]. During the transition from campus to workplace, they must also adapt quickly to professional skill requirements, workplace norms, and interpersonal interactions, which may lead to attentional depletion, emotional exhaustion, and reduced psychological energy^[3]. Previous studies have shown that psychological fatigue can weaken learning engagement and skill acquisition, thereby affecting professional identity and talent cultivation quality^[4].

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Psychological fatigue refers to a sustained state of cognitive-emotional resource depletion in the educational practice context, grounded in the Conservation of Resources theory^[5], which identifies resource loss as the core mechanism of stress and burnout. Emotional exhaustion is considered the core dimension of burnout^[6], and high levels of it can impair cognitive resources and performance^[7]. Thus, psychological fatigue in this study is understood as a prodromal state or core manifestation of burnout, reflecting sustained resource depletion. Although attention to the mental health, academic stress, and burnout of higher vocational students is growing, systematic research on psychological fatigue remains limited, particularly in the context of industry-education integration. With the expansion of enterprise-based practice and task-oriented teaching, psychological fatigue has become increasingly multidimensional, shaped by academic demands, internship uncertainty, vocational skill pressure, and role-transition costs. Therefore, this study employs the questionnaire to examine psychological fatigue and its variations across student background, internship experience, and learning workload, aiming to inform targeted support and improve school – enterprise collaboration.

2 Participants and Instruments

2.1 Participants

This study recruited students participating in an industry – education integration program at a vocational school. Of the 344 questionnaires distributed, all were returned. After excluding 9 questionnaires with completion times below 100 ms and 2 invalid questionnaires due to careless responses, 333 valid questionnaires were retained, yielding an effective rate of 96.8%. (The sample in this study was mainly drawn from pre-school education, tourism, and nursing programs, in which female students account for a relatively high proportion; therefore, its gender distribution was influenced to some extent by the disciplinary structure. Accordingly, the findings may be more applicable to these professional groups, while their generalizability to samples with more diverse gender compositions still requires further verification.)

2.2 Instruments

(1) Demographic Information Question -naire

The demographic information collected included gender, age, grade, whether the student had served as a student leader during school, major, academic performance during school, internship organization, internship position, internship duration, only-child status, family economic background, individual physical health status, political status, and the place where the participant spent most of their childhood.

(2) Questionnaire on Psychological Fatigue.

Referring to the Maslach Burnout Inventory–Student Survey (MBI-SS) developed by Schaufeli et al.^[8], this study made appropriate adaptations to the scale in light of the learning and internship contexts of higher vocational students to measure their level of

psychological fatigue. The scale consists of three dimensions-emotional exhaustion, cynicism, and learning efficacy-with a total of 15 items.

3 Statistical Analysis

3.1 Analysis of Demographic Variables

The data were analyzed using Origin 2025, SPSS 25.0, and Excel 19.0. A total of 333 valid samples were obtained. Among the participants, 45 were male (13.5%) and 288 were female (86.5%). In terms of age, 6.6% were 18 years old, 45.34% were 19, 30.93% were 20, 14.71% were 21, and 2.4% were 22 years or older. Regarding grade level, 54.95% were second-year students and 45.05% were third-year students. In addition, 23.42% had served as student leaders, whereas 76.58% had not. By major, 33.93% studied nursing, 12.31% tourism management, and 53.75% preschool education. In terms of job type, 61.86% were in technical positions, 24.92% in service or support positions, 0.90% in administrative positions, and 15.31% in other positions. Regarding hometown, 61.36% came from rural areas, 32.13% from county-level areas, and 4.2% from provincial-level cities. Only children accounted for 18.61%, while 81.38% were non-only children. In terms of family economic status, 0.3% came from affluent families, 4.2% from middle-class families, 25.52% from moderately well-off families, 61.26% from families with a basic living standard, and 0.87% from poor families.

Overall, the sample was concentrated among 19-20-year-old second- and third-year students, with a predominance of females. Most participants were non-student leaders, engaged in technical positions, and came from rural or county-level areas. In addition, the majority were from non-only-child families and reported middle-to-lower family economic status. These characteristics provide an important demographic basis for further analysis of psychological fatigue and learning pressure.

3.2 Psychological Fatigue Questionnaire Analysis

The data were processed according to the weighted scoring scheme proposed by Kalimo[9] et al. Emotional exhaustion and cynicism were scored positively, whereas the dimension of low learning efficacy was reverse-coded^[10]. The total psychological fatigue score was calculated as the weighted sum of the three dimensions, namely, $M = 0.40E + 0.30D + 0.30L$. A higher score indicates a higher level of psychological fatigue^[11].

(1) Descriptive Analysis of Psychological Fatigue

A total of 333 valid participants were included in the study, and their overall psychological fatigue scores ranged from 1 to 7. According to the psychological fatigue classification criteria proposed by Kalimo^[10], the participants were categorized as follows: 86 participants showed no psychological fatigue (25.83%), 148 showed mild psychological fatigue (44.44%), 80 showed moderate psychological fatigue (24.32%), and 18 showed severe psychological fatigue (5.41%), as shown in Figure 1. Figure 1 indicates that more than 70% of the participants experienced mild, moderate, or severe psychological fatigue, suggesting that under the current learning and practice context, the

student group as a whole is facing a relatively prominent problem of psychological fatigue. This distribution pattern is consistent with recent findings on psychological fatigue and academic burnout among higher vocational and college students [12].

(2) Correlation Analysis Among the Dimensions of Psychological Fatigue

Bivariate correlation analysis was conducted to examine the relationships among the dimensions of psychological fatigue, and the results are presented in Table 1. As shown in the table, emotional exhaustion was positively correlated with cynicism, and the correlation was highly significant ($r = 0.748, p < 0.001$). Low learning efficacy was positively correlated with emotional exhaustion, but this relationship did not reach statistical significance ($r = 0.049, p = 0.375$). In contrast, low learning efficacy showed a significant positive correlation with cynicism, with a relatively high correlation coefficient ($r = 0.224, p < 0.001$).

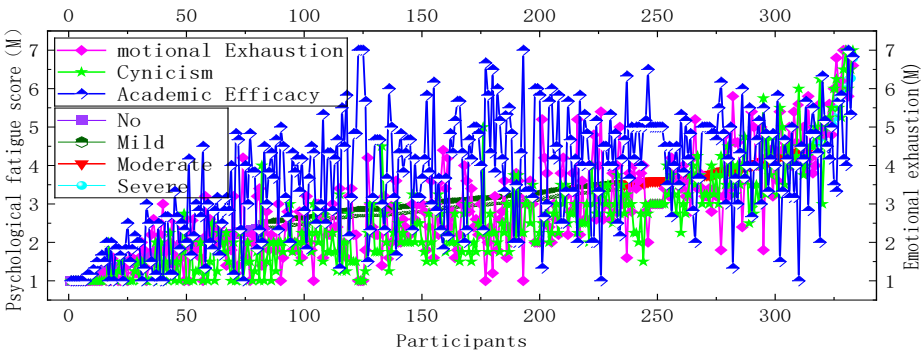


Fig. 1. Distribution of Psychological Fatigue Scores

In addition, the total psychological fatigue score was significantly and positively correlated with emotional exhaustion ($r = 0.821, p < 0.001$), indicating that the higher the level of emotional exhaustion, the more severe the psychological fatigue. Psychological fatigue was also significantly and positively correlated with cynicism ($r = 0.864, p < 0.001$), suggesting that participants with higher levels of psychological fatigue were more likely to exhibit behavioral tendencies such as indifference, detachment, and negative coping. At the same time, psychological fatigue was significantly and positively associated with low learning efficacy ($r = 0.558, p < 0.001$), indicating that the lower the participants' evaluation of their own learning ability and task performance, the higher their level of psychological fatigue.

Psychological fatigue was significantly and positively correlated with emotional exhaustion, cynicism, and low learning efficacy. Sustained learning and internship demands may continuously consume psychological and emotional resources, thereby increasing emotional exhaustion, cynicism, and psychological fatigue. Reduced learning efficacy further lowers the perceived return on resource investment and intensifies the “resource loss spiral”. These findings support limited resource theory and highlight the need to strengthen prevention and intervention in daily teaching and management.

Table 1. Correlations Among the Dimensions of Psychological Fatigue

Variable	Motional Exhaustion	Cynicism	Academic Efficacy
Motional Exhaustion			
Cynicism	0.748***		
Academic Efficacy	0.049	0.224***	
Total Burnout Score	0.821***	0.864***	0.558***

Note: ***represents $p < 0.001$

(3) Correlations Between Psychological Fatigue and Demographic Variables

Bivariate correlation analysis was conducted to explore the relationships between psychological fatigue scores and demographic variables among higher vocational students. The results are shown in Table 2. As indicated in Table 2, psychological fatigue was negatively correlated with physical health status, and the correlation was statistically significant ($r = -0.114$, $p = 0.037 < 0.05$). This indicates that the poorer the physical health status, the higher the psychological fatigue score. This finding suggests that physical health may exert a fundamental influence on psychological fatigue by affecting individuals' energy reserves, ability to sustain attention, and emotional regulation capacity. Students with physical discomfort or poor health are more likely to experience psychological exhaustion under continuous learning and practice demands.

Psychological fatigue was also negatively correlated with political status, and the correlation was statistically significant ($r = -0.143$, $p = 0.009 < 0.05$). This indicates that students with lower political status tended to report higher levels of psychological fatigue. This may be related to differences in sense of role responsibility, normative constraints, and resource support implied by different political statuses. Students with higher political status may show greater stability in learning engagement, organizational participation, and self-discipline, and may also receive more social support and recognition, which can buffer the development of psychological fatigue to some extent.

By contrast, psychological fatigue was not significantly correlated, or only weakly correlated, with demographic variables such as gender, age, hometown, and only-child status. This suggests that among higher vocational students, psychological fatigue is not determined primarily by basic demographic characteristics, but is more likely to be jointly influenced by factors such as learning context, practice burden, and individual resource conditions.

Table 2. Correlations Between Psychological Fatigue and Demographic Variables

Variable	1	2	3	4	5	6	7
1							
2	-0.179**						
3	-0.023	-0.048					
4	-0.031	0.032	-0.074				
5	-0.067	-0.044	0.313***	0.025			
6	-0.1*	-0.029	-0.057	0.029	0.064		
7	-0.106*	-0.053	-0.011	0.059	0.038	0.098*	
8	-0.056	-0.058	-0.017	-0.009	-0.069	-0.114**	-0.143**

Note: *** represents $p < 0.001$; ** represents $p < 0.05$; * represents $0.05 < p < 0.1$; 1-Sex, 2-Age, 3-Hometown, 4-Only-child status, 5-Family economic status, 6-Physical health status, 7-Political status, 8-Total psychological fatigue score.

(4) Correlations Between Psychological Fatigue and Learning/Internship Context Variables

To examine the associations between psychological fatigue and learning- and internship-related factors among higher vocational students, a bivariate correlation analysis was conducted, and the results are shown in Table 3. Psychological fatigue was significantly negatively correlated with grade level ($r = -0.132, p = 0.016 < 0.05$), indicating that fatigue decreased as grade level increased. It was also significantly negatively correlated with academic performance ($r = -0.252, p = 0.000 < 0.001$), suggesting that poorer academic performance was associated with higher psychological fatigue. To some extent, academic performance reflects students’ learning efficacy and sense of academic control. Poorer performance may place students in a state of high input and low return, accelerating psychological resource depletion and increasing fatigue, whereas better performance is often associated with stronger learning strategies and self-regulation, which help improve efficiency and reduce fatigue accumulation. This finding supports the learning efficacy–resource depletion mechanism. By contrast, major, job type, internship duration, and student leadership status showed no significant or only weak correlations with psychological fatigue, suggesting that their effects may be limited within a relatively consistent training framework and may be overshadowed by individual differences. In addition, the effects of internship duration and student leadership status may depend more on coping style, support resources, and role identification.

Table 3. Correlations Between Psychological Fatigue and Learning/Internship Context Variables

Variable	1	2	3	4	5	6
1						
2	-0.908***					
3	0.07	-.149**				
4	0.081	-0.076	-0.06			
5	0.824***	-0.898***	0.145**	0.132*		
6	-0.027	0.004	0.069	-0.305***	-0.044	
7	-0.132**	0.081	-0.015	-0.252***	-0.062	0.08

Note: *** represents $p < 0.001$; ** represents $p < 0.05$; * represents $0.05 < p < 0.1$. 1,2,3,4,5,6,7 same as above.

4 Characteristics of Psychological Fatigue Among Higher Vocational Students

4.1 The Relationship Between Grade Level and Psychological Fatigue

As shown in Table 3, grade level was significantly correlated with psychological fatigue. The relationship between grade level and psychological fatigue across different grades is presented in Figure.2, where Group 1 represents second-year students and Group 2 represents third-year students.

Figure 2 shows that psychological fatigue differed significantly across grade levels and generally decreased with increasing grade level. A one-way analysis of variance revealed a significant main effect of grade level ($F(1, 331) = 5.868, p = 0.016$), indicating that psychological fatigue is closely related to learning adaptation and role transition.

Lower-grade students, who are still adapting to the higher vocational model of industry - education and theory - practice integration, are more likely to experience psychological burden and fatigue under intensified coursework, increased practical tasks, and changing assessment methods. By contrast, higher-grade students tend to develop more stable learning strategies and coping styles through accumulated study and internship experience, thereby showing stronger adaptability and lower psychological fatigue.

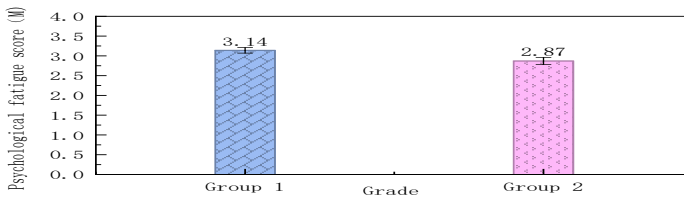


Fig. 2. Psychological Fatigue Across Grade Levels

4.2 The Relationship Between Age and Psychological Fatigue

The relationship between age and psychological fatigue is shown in Figure. 3. As shown in Figure. 3, psychological fatigue scores exhibited a trend of first increasing and then decreasing with age. The 19-year-old group showed the highest level of psychological fatigue, whereas the level was significantly lower among students aged 21 and above. This may be because, with increasing age, higher vocational students gradually develop stronger adaptability and psychological regulation abilities in learning and practical training contexts, which helps buffer the occurrence of psychological fatigue. A one-way ANOVA was conducted to compare the levels of psychological fatigue among participants of different age groups. The results showed that the main effect between groups was not significant ($F(5, 327) = 1.336, p = 0.249$). In other words, although psychological fatigue showed a trend of first increasing and then decreasing with age, the difference did not reach statistical significance.

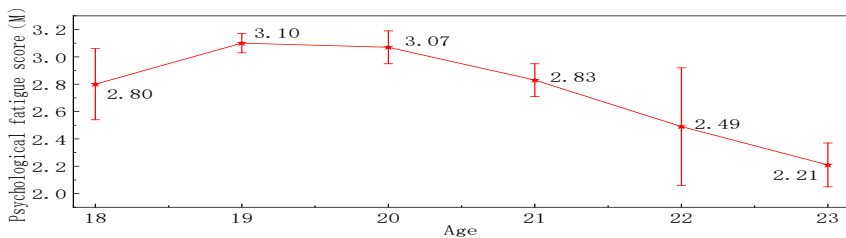


Fig. 3. Psychological Fatigue Across Age Groups

4.3 Academic Performance, Physical Health Status, and Psychological Fatigue

The relationships of academic performance and physical health status with psychological fatigue are shown in Fig4. As shown in Fig. 4, psychological fatigue increased with the decline in academic performance and the worsening of physical health status. Students with poorer academic performance may experience greater academic frustration and psychological burden due to difficulties in learning tasks, practical training, and time management. Under the industry - education integration model, insufficient learning strategies and weak psychological energy regulation may further aggravate the accumulation of psychological fatigue. Meanwhile, poorer physical health may reduce stress tolerance and recovery capacity, thereby increasing the risk of cumulative psychological fatigue. One-way ANOVA showed that academic performance had a significant effect on psychological fatigue ($F(2, 330) = 7.66, p < 0.001$), whereas the effect of physical health status was not significant ($F(2, 330) = 1.553, p = 0.201$).

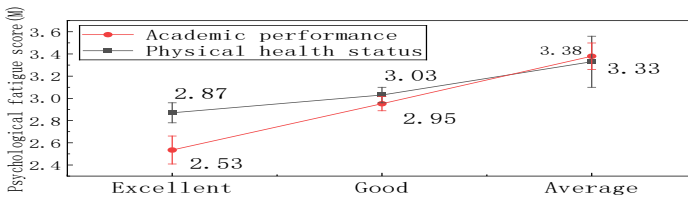


Fig. 4. Psychological Fatigue Across Academic Performance and Physical Health Status

4.4 The Relationship Between Political Status and Psychological Fatigue

The relationship between political status and psychological fatigue is shown in Figure 5. As shown in Figure 5, psychological fatigue scores differed across political status groups among higher vocational students. Party members showed the lowest level of psychological fatigue, whereas the masses showed the highest level. Psychological fatigue tended to decrease as political status increased. A one-way ANOVA revealed a significant main effect among groups ($F(2, 330) = 3.453, p = 0.033$), indicating that psychological fatigue gradually decreased with the improvement of political status, and the between-group differences were statistically significant.

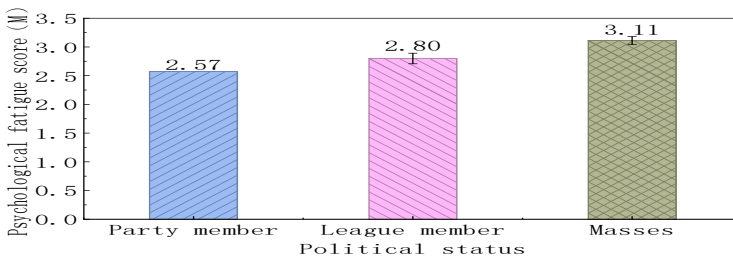


Fig. 5. Relationship Between Political Status and Psychological Fatigue

5 Discussion

5.1 Why the MBI-SS Is Appropriate.

This study confirms that the MBI-SS can serve as a context-sensitive indicator of psychological fatigue among students. Its applicability lies in the fact that the present study focuses on the risk of persistent psychological fatigue arising from educational demands, rather than acute task fatigue. The three dimensions of the MBI-SS correspond closely to the operational definition adopted in this study, and validation of the Chinese version supports its use among heterogeneous student populations, including vocational and nursing samples ^[13].

5.2 Academic Performance, Grade Level, and Physical Health as Overlapping Risk Factors.

Exploratory control analyses further clarified the findings. After controlling for grade level, academic performance remained the stronger learning-related predictor, suggesting that poorer performance may reflect repeated failure, low perceived control, and weak self-regulation, which in turn intensify emotional exhaustion and disengagement, consistent with meta-analytic evidence. Grade level, by contrast, may reduce fatigue risk indirectly through cumulative adaptation, as senior students tend to develop more stable learning strategies and more realistic expectations. Physical health was also relevant, but its effect was weaker. Although significantly associated with fatigue at the bivariate level, its effect diminished in the joint model with political status, indicating that subjective health may overlap with other resource-related conditions. This suggests that health screening should be integrated with academic and organizational support, and that at-risk students require comprehensive rather than isolated interventions.

5.3 Understanding Political Status.

The findings show that Party members report the lowest level of psychological fatigue, whereas the general public group reports the highest. This may be attributed to: ① greater organizational embeddedness, which provides more peer support, mentor guidance, role clarity, institutional recognition, and self-regulatory reinforcement, all buffering against psychological fatigue; and ② pre-existing characteristics of Party members, such as stronger academic performance, self-discipline, organizational participation, and teacher attention, which may inherently lower fatigue risk.

5.4 Safety Management Recommendations.

(1) Routine Monitoring Rather than One-Time Screening. Psychological fatigue screening should be conducted at key stages, including the beginning of each semester, the pre-internship period, weeks 4 - 6 of the internship, and monthly thereafter for students in high-demand posts. The MBI-SS can be used as the primary tool, supplemented

by brief weekly self-checks reviewed by school or enterprise mentors, so that fatigue management becomes routine risk monitoring rather than a passive response.

(2) **Workload Limits and Rest Protection.** During internships, schools and enterprise partners should limit excessive working hours, ensure adequate rest between shifts, and provide regular rest days for students in high-intensity positions. For attention-demanding posts, such requirements should be clearly included in internship agreements to reduce fatigue-related errors and protect student well-being.

(3) **Tiered Intervention for Different Risk Levels.** A three-level intervention mechanism should be established. Mild fatigue requires guidance and supportive follow-up; moderate fatigue calls for reduced internship intensity, counseling, and workload adjustment; severe fatigue requires immediate removal from high-risk tasks, joint school-enterprise intervention, and return only after professional evaluation confirms readiness.

(4) **Joint School–Enterprise Governance.** Since psychological fatigue may result from both academic and internship demands, schools and enterprises should share responsibility for prevention and management. Through designated mentors and regular communication, both sides can identify warning signs early and incorporate psychological fatigue into the overall safety management system.

6 Conclusion

(1) **Psychological Fatigue Among Higher Vocational Students.** Approximately 70% of higher vocational students experienced psychological fatigue, predominantly at mild to moderate levels, while severe fatigue was relatively rare.

(2) **Relationship Between Psychological Fatigue and Demographic Variables.** Psychological fatigue was significantly associated with physical health status and political affiliation, but showed weak or non-significant relationships with gender, age, hometown, only-child status, and family economic status.

(3) **Relationship Between Psychological Fatigue and Learning/Internship-Related Variables.** Psychological fatigue was significantly associated with grade level and academic performance, but showed weak or non-significant relationships with major, job position, internship duration, and student cadre status.

(4) **Safety Management Implications.** Higher vocational colleges should establish a whole-process management mechanism of “identification–early warning–intervention–support” for key groups, while strengthening learning support, health promotion, psychological counseling, and practical adaptation guidance.

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