A Study of the Effects of Job Stress on the Psychosocial Safety Behavior of Construction Workers: The Mediating Role of Psychological Resilience

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Abstract: A large number of studies have been conducted to demonstrate that job stress negatively affects construction workers’ physiological safety behaviors, but there is a lack of research on the impact of psychosocial safety behaviors on construction workers, which is an important component of overall workplace safety. This study modeled the effects between three job stressors (the job itself, job insecurity, and family-work conflict) and psychosocial safety behavior sub-dimensions (psychosocial safety compliance and psychosocial safety participation), using psychological resilience as a mediating variable. Data were obtained from 304 construction workers in China. The results showed that there were positive and negative effects between the three job stressors, psychosocial safety behavior sub-dimensions, and psychological resilience. Psychological resilience was mediated differently across the three job stressors and psychosocial safety behavior sub-dimensions. This study reveals the mechanisms by which job stress affects the psychosocial safety behaviors of construction workers and provides more empirical evidence to unravel the relationships between various job stressors and psychosocial safety behavior sub-dimensions. In addition, this paper discusses measures to improve psychosocial safety behaviors based on the perspectives of job stressors and psychological resilience.

Keywords: job stress; psychosocial safety behavior; psychological resilience; construction industry

1. Introduction

Construction workers are an important part of the construction industry, and their work is critical to the quality and safety of construction. Construction is a high-risk industry, and accidents occur from time to time. According to the domino model proposed by Heinrich [1], unsafe human behavior is the direct cause of safety accidents. Construction accident investigation studies have found that most accidents are caused by human factors [2–4]. Therefore, many studies have proposed the safety behaviors of construction workers as a prior indicator of the occurrence of safety accidents and combined psychological and behavioral sciences to explore the formation mechanism of construction workers’ unsafe behaviors, aiming to improve the safety of construction workplaces and reduce the occurrence of safety accidents [5–11]. However, workplace safety in the construction industry includes not only physiological safety but also psychological safety. Compared with physiological safety and physical behaviors, psychosocial safety and psychological behaviors are often neglected [12]. Studies have found that work-related psychological injuries have a tendency to outweigh physical injuries related to musculoskeletal injuries [12].

Long-term exposure to job stress can cause workers to develop negative emotions such as anxiety, stress, and depression [13]. According to the Job Demands-Resources (JD-R) model proposed by Demerouti et al. [14], job stress can reinforce employees’ feelings of exhaustion and negatively affect physical health, thus contributing to unsafe behaviors. There have been numerous studies that have confirmed the negative impact of stress on workers’ safety behaviors [5,15–17]. However, these studies focused on physiological safety
behaviors. Psychosocial hazards arise when job stress is not effectively managed [18,19]. Bronkhorst [20] extended the JD-R model by introducing the concept of psychosocial safety behaviors based on physiological safety behaviors. The introduction of psychosocial safety behaviors provides a new research direction for improving psychosocial safety outcomes [21]. Psychosocial safety behavior can be considered a prior indicator to assess the psychosocial safety of construction workers. In the construction industry, there is a lack of research on the relationship between the effects of workplace stress and the psychosocial safety behavior of workers.

According to JD-R theory, job resources buffer the process of stress that damages health [22]. Initially, job resources referred to resources provided by the organization, including job control, leadership support, and salary and benefits [23], and as research progressed, personal resources were found to play an important role in buffering the negative effects of stress. Thus, the role of personal resources needs to be considered when studying the impact of job stress on the psychosocial safety behaviors of construction workers. Psychological resilience, an important component of positive psychology, has been shown by research to be effective in combating psychological stress [24]. Thus, psychological resilience can be viewed as a personal resource that can reduce the negative effects of job stress. In this paper, the role of workers’ psychological resilience will be considered when examining the effects of job stress on psychosocial safety behaviors.

Previous studies have focused on the safety behaviors of construction workers at the physiological level, ignoring the importance of psychosocial safety behaviors for overall safety in the workplace. Maintaining positive mental health is as important as maintaining physical health. Therefore, based on the above analysis, this paper focuses on the impact of construction workers’ job stress on individuals’ psychosocial safety behaviors and considers the role of individual psychological resilience from the perspective of personal resources. Examining the relationship between them can help implement different interventions to reduce the impact of work stress on psychosocial safety behaviors. Compared with the results of existing studies, it expands the theoretical study of construction workers’ safety behaviors and provides a theoretical basis for future research on psychosocial safety behaviors in various industries.

2. Theoretical Basis and Research Hypothesis

2.1. Job Stress

Human stress arises from interactions between humans and their environment that strain or exceed their ability to adapt and threaten their health [25]. Job stress is a specific result of the work environment [17]. The construction industry is a highly competitive industry [26], and construction workers work in harsh, demanding, and dangerous environments. The work itself is characterized by heavy workloads, tight schedules, heavy responsibilities, and poor safety [27,28]. As a result, there are many factors that contribute to job stress among construction workers. According to previous studies, they include the job itself, role ambiguity, role conflict, role overload, job insecurity, job characteristics, employee competencies, interpersonal safety conflicts, safety constraints, and family-work conflicts [6,17]. These factors are known as job stressors and are also referred to as psychosocial risk factors [29]. Job stressors can have an impact on workers’ mental health, causing a range of psychological, physical, and behavioral responses.

Different job stressors affect workers to different degrees. Wu et al. [17] found that the job itself, career development, and family-work conflict were the main job stressors. Construction workers often work at heights and are required to use a variety of dangerous machines and equipment. Therefore, the job itself is an important source of stress for construction workers. Construction workers are required to take on a lot of responsibilities and workload, and the stress and challenges brought by the job itself may have adverse effects on workers’ mental health. Construction workers are always engaged in short-term tasks, and their jobs are unstable [5,15]. Especially in the post-epidemic era, when the COVID-19 Pandemic has triggered economic contraction and construction workers are vulnerable to
unemployment and financial difficulties [30], the job instability of construction workers is highlighted [31]. Construction workers face challenges to their career development, leading to increased job insecurity, which can be detrimental to their physical health and cause adverse psychological, behavioral, and emotional feelings [32]. At the same time, construction workers are prone to family-work conflicts due to their long-term jobs and income instability. High levels of family-work conflicts can negatively affect work behaviors and affect employees’ energy, commitment, and other resources, causing psychological distress. Therefore, this paper focuses on analyzing the effects of three job stressors—the job itself, job insecurity, and family-work conflict—on workers’ psychosocial safety and behavioral aspects.

2.2. Job Stress and Psychosocial Safety Behaviors

Safety behaviors are safety-related behaviors performed by individuals in organizations [7]. Physiological and psychosocial safety behaviors are employee activities in the workplace to maintain physical and mental safety or to create an environment that supports physical and mental safety [20]. Griffin and Neal [21] proposed to distinguish between two types of physiological safety behaviors. Bronkhorst [20] built on this by dividing psychosocial safety behaviors into psychosocial safety compliance and psychosocial safety participation. Psychosocial safety compliance is the activity that an individual must perform to maintain psychosocial safety; psychosocial safety participation is the activity that an individual performs that does not directly enhance psychosocial safety but contributes to a positive psychosocial safety environment. Psychosocial behavioral research can address workplace mental health issues, mitigate psychosocial risks, foster good attitudes toward psychosocial safety behaviors, and reduce overall psychological harm rates [33].

Psychological demands such as job stress are usually associated with mental health outcomes such as emotional exhaustion [18]. A large body of prior research has demonstrated that job stress has a negative impact on physiological safety behavior. In the post-epidemic era, there has been a significant increase in psychological problems such as anxiety, stress, isolation, anxiety, stigma, and discrimination [34,35]. According to JD-R theory, job demands have a direct impact on occupational mental health, and job stress is an important component of job demands. In a study of job demands and psychosocial safety behaviors, Bronkhorst [20] found that workload was significantly and negatively related to psychosocial safety behaviors. Yaris [33] proposed the physical and psychosocial workplace safety (PPWS) model, suggesting that job stress negatively affects an individual’s physical and psychological well-being. Zhang et al. [36] found that job role demands significantly and negatively affected psychosocial safety behaviors. Previous studies have proposed different mechanisms by which job stress affects physiological safety compliance and physiological safety participation [6,37]. For psychosocial safety behavior, construction workers may protect their own psychosocial safety as much as possible under job stress rather than devote more energy to maintaining the development of a supportive psychosocial safety environment. Therefore, this study explores the effects of three job stressors on two sub-dimensions of psychosocial safety behaviors and proposes the following hypotheses:

**H1.** Job stress has a significant negative effect on psychosocial safety compliance.

**H1a.** The job itself has a significant negative effect on psychosocial safety compliance.

**H1b.** Job insecurity has a significant negative effect on psychosocial safety compliance.

**H1c.** Family-work conflict has a significant negative effect on psychosocial safety compliance.

**H2.** Job stress has a significant negative effect on psychosocial safety participation.

**H2a.** The job itself has a significant negative effect on psychosocial safety participation.

**H2b.** Job insecurity has a significant negative effect on psychosocial safety participation.

**H2c.** Family-work conflict has a significant negative effect on psychosocial safety participation.
2.3. The Mediating Role of Psychological Resilience

The degree to which job stress affects individuals varies, and how individuals perceive job stress is more important than what they perceive it to be. According to Social Cognitive Theory (SCT), both environment and psychological perception affect individual behavior, and differences in individual characteristics affect the effect of psychological perception [38]. Psychological resilience is an important protective factor against stress [39–41]. Psychological resilience is activated when an individual encounters stress, prompting the individual to deal with it effectively [42]. Howard [43] defines psychological resilience as an individual’s capability to adapt and adjust to negative situations like stress, difficulty, and danger. It supports individuals in coping with adversity and encourages them to adjust and develop positively in challenging environments [44].

Those who have more resources under the influence of job stress will be less vulnerable to the loss of resources [45]. Previous research has found that organizational resources have a positive impact on psychosocial safety behaviors [46,47]. Psychological resilience acts as an internal resource [48]. It mobilizes positive emotions to deal with stressful events and counteract the negative effects of stressors [49,50]. Bakker [51] suggested that the higher an employee’s personal resources are, the more they are able to protect themselves from the demands of the job. The higher the psychological resilience, the higher the level of mental health, and the more stress-reducing the person is [52,53]. Gao et al. [54] found that psychological resilience mediates the relationship between COVID-19-related stressors and psychological well-being in expatriate employees in the international construction industry. Psychological resilience can have an impact on an individual’s risky decision-making, and lower psychological resilience may trigger poor decision-making behavior [55]. It can be inferred that when construction workers face job stress, those with higher levels of psychological resilience are more likely to face the situation positively and avoid psychosocially insecure behaviors. Therefore, this study proposes the following hypothesis:

**H3.** Job stress has a significant negative effect on psychological resilience.

**H3a.** The job itself has a significant negative effect on psychological resilience.

**H3b.** Job insecurity has a significant negative effect on psychological resilience.

**H3c.** Family-work conflict has a significant negative effect on psychological resilience.

**H4.** Psychological resilience has a significant positive effect on psychosocial safety compliance.

**H5.** Psychological resilience has a significant positive effect on psychosocial safety participation.

**H6.** Psychological resilience plays a mediating role in the relationship between job stress and psychosocial safety compliance.

**H6a.** Psychological resilience mediates the relationship between the job itself and psychosocial safety compliance.

**H6b.** Psychological resilience mediates the relationship between job insecurity and psychosocial safety compliance.

**H6c.** Psychological resilience mediates the relationship between family-work conflict and psychosocial safety compliance.

**H7.** Psychological resilience mediates the relationship between job stress and psychosocial safety participation.

**H7a.** Psychological resilience mediates the relationship between the job itself and psychosocial safety participation.

**H7b.** Psychological resilience mediates the relationship between job insecurity and psychosocial safety participation.
H7c. Psychological resilience mediates the relationship between family-work conflict and psychosocial safety participation.

A conceptual model between the variables was developed based on the six hypotheses and 15 sub-hypotheses proposed above, as shown in Figure 1.

Figure 1. Conceptual model.

3. Materials and Methods
3.1. Participants and Processes

Prior to the formal survey, a preliminary questionnaire was sent to 20 workers at a construction site in Changsha, Hunan Province, China, in November 2022 for pretesting in this study. Based on the feedback from these 20 workers, the questionnaire questions were modified to make them easier to understand and to facilitate the formal survey.

The formal survey was conducted in March 2023 in the Chinese construction industry. The participants in this study were construction workers, and a combination of online and paper questionnaires was used to distribute 243 online questionnaires and 150 paper questionnaires asking them to assess their job stress, psychosocial safety behaviors, and psychological resilience. Ultimately, 243 web-based questionnaires and 131 paper-based questionnaires were returned in this study. We excluded 51 web-based questionnaires with a too-short response time and non-construction workers filling them out and 19 paper-based questionnaires with many missing values. The final sample consisted of 304 valid questionnaires, with a valid response rate of 77.35%. The questionnaires are shown in Appendix A.

The demographics of the workers included age, gender, education level, work experience, marital status, fertility, and type of work (Table 1). The age of workers was mostly distributed at 50 years and below (80.26%, n = 244), and a few (19.74%, n = 60) workers were above 50 years of age. The workers were mostly male (82.24%, n = 250), and the rest were female. In terms of educational attainment, the majority (77.63%, n = 236) had a low-level school diploma, and only 22.37% (n = 68) had a college diploma or higher. Furthermore, 76.97% of the workers had worked for more than 5 years (n = 234), while 23.03% had worked for less than 5 years. Moreover, 75.99% of the workers were married (n = 231), and the rest were unmarried. Other trades (odd jobs, small jobs, etc.), special equipment (elevators, tower cranes, lifts, etc.), and carpentry were the top three trades (36.51%, 18.75%, and 16.78%, respectively).
Table 1. Demographic characteristics of construction workers (N = 304).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Items</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>≤30</td>
<td>68</td>
<td>22.37</td>
</tr>
<tr>
<td></td>
<td>31–40</td>
<td>96</td>
<td>31.58</td>
</tr>
<tr>
<td></td>
<td>41–50</td>
<td>80</td>
<td>26.32</td>
</tr>
<tr>
<td></td>
<td>≥51</td>
<td>60</td>
<td>19.74</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>250</td>
<td>82.24</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>54</td>
<td>17.76</td>
</tr>
<tr>
<td>Educational level</td>
<td>Primary school and below</td>
<td>34</td>
<td>11.18</td>
</tr>
<tr>
<td></td>
<td>Junior high school</td>
<td>135</td>
<td>44.41</td>
</tr>
<tr>
<td></td>
<td>High school, junior college, technical school</td>
<td>67</td>
<td>22.04</td>
</tr>
<tr>
<td></td>
<td>College and above</td>
<td>68</td>
<td>22.37</td>
</tr>
<tr>
<td>Work experience</td>
<td>≤5</td>
<td>70</td>
<td>23.03</td>
</tr>
<tr>
<td></td>
<td>6–15</td>
<td>132</td>
<td>43.42</td>
</tr>
<tr>
<td></td>
<td>16–25</td>
<td>53</td>
<td>17.43</td>
</tr>
<tr>
<td></td>
<td>≥26</td>
<td>49</td>
<td>16.12</td>
</tr>
<tr>
<td>Marital status</td>
<td>Unmarried</td>
<td>73</td>
<td>24.01</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>231</td>
<td>75.99</td>
</tr>
<tr>
<td>Fertility</td>
<td>Only child</td>
<td>82</td>
<td>26.97</td>
</tr>
<tr>
<td></td>
<td>Many children</td>
<td>147</td>
<td>48.36</td>
</tr>
<tr>
<td></td>
<td>Carpenter</td>
<td>51</td>
<td>16.78</td>
</tr>
<tr>
<td></td>
<td>Steelworker</td>
<td>44</td>
<td>14.47</td>
</tr>
<tr>
<td>Type of work</td>
<td>Bricklayer</td>
<td>27</td>
<td>8.88</td>
</tr>
<tr>
<td></td>
<td>Erector</td>
<td>14</td>
<td>4.61</td>
</tr>
<tr>
<td></td>
<td>Special equipment (elevator, tower crane, hoist, etc.)</td>
<td>57</td>
<td>18.75</td>
</tr>
<tr>
<td></td>
<td>Other types of work (odd jobs, small jobs, etc.)</td>
<td>111</td>
<td>36.51</td>
</tr>
</tbody>
</table>

3.2. Questionnaire Development and Measurement

The questionnaire of this study contains three parts: the first is the basic information of the questionnaire, including the introduction of the purpose and use of the questionnaire so that the respondents have a preliminary understanding of the questionnaire, and the second is the demographic characteristics of the respondents, including age, gender, education level, work experience, marital status, fertility, and type of work. The third part was a questionnaire on three variables, job stress, psychosocial safety behaviors, and psychological resilience, developed by referring to relevant established scales; Table 2 lists the variables. All measures were scored on a five-point Likert scale.

Table 2. Variables, measures of the studied variables, number of items, and supporting literature.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dimensions</th>
<th>Items</th>
<th>Supporting Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job stress</td>
<td>Job itself</td>
<td>4</td>
<td>Wu et al. [17]</td>
</tr>
<tr>
<td></td>
<td>Job insecurity</td>
<td>4</td>
<td>Vander et al. [56]</td>
</tr>
<tr>
<td></td>
<td>Family-work conflict</td>
<td>3</td>
<td>Wu et al. [17]</td>
</tr>
<tr>
<td>Psychosocial safety behavior</td>
<td>Psychosocial safety compliance</td>
<td>3</td>
<td>Bronkhorst [20]</td>
</tr>
<tr>
<td></td>
<td>Psychosocial safety participation</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Psychological resilience</td>
<td>Psychological resilience</td>
<td>10</td>
<td>Campbell-Sills and Stein [57]</td>
</tr>
</tbody>
</table>

3.2.1. Job Stress

This study analyzes three job stressors: the job itself, job insecurity, and family-work conflict. The measures of these stressors are referred to the scales developed by Wu et al. [17] and Vander et al. [56], respectively, and the scales are translated and modified. Among those, four items were used to measure the job itself, four items to assess job insecurity, and three items to assess family-work conflict. For example, “My job is simple and has a low workload.” (job itself); “I could be without this job at any time.” (job insecurity); and
“I have been away from my family for a long time and do not take care of them much.” (family-work conflict).

3.2.2. Psychosocial Safety Behavior

In this paper, the measures of psychosocial safety behaviors are referred to the scales developed by Bronkhorst [20], and the scale is translated and modified. The scale includes two dimensions: psychosocial safety compliance and psychosocial safety participation. Each dimension is measured by three items. For example, “I use measures to prevent or minimize psychological strain in my job.” (psychosocial safety compliance) and “I promote the psychological safety program within the organization.” (psychosocial safety participation).

3.2.3. Psychological Resilience

In this paper, we refer to Campbell-Sills and Stein’s [57] modified Connor-Davidson Resilience Scale to measure the psychological resilience of construction workers with 10 questions. For example, “I can adapt to change”.

3.3. Analysis Strategy

To test the hypotheses proposed in this paper, the data were analyzed using SPSS 26.0 and AMOS 24.0 software. First, descriptive analysis, reliability tests, and correlation analyses were performed on the variables using SPSS 26.0. Second, Confirmatory Factor Analysis (CFA) was conducted on the sample data using AMOS 24.0 to test the practicability and veracity of the construct validity of the questionnaire. Finally, path analysis and mediating effects tests were conducted on the sample data using AMOS 24.0 to analyze the direct effects between the variables and the mediating effects of psychological resilience, and the theoretical hypotheses were tested.

4. Results

4.1. Descriptive Analysis, Reliability Test, and Correlation Analysis

In Table 3, the descriptive statistics, Cronbach’s alphas, and Pearson correlation coefficients between the variables of the sample data are presented. Cronbach’s alpha is a standard measure commonly used for reliability testing, and it must be higher than 0.7 in order to obtain good reliability [58]. The closer it is to 1, the better the reliability and stability of the questionnaire [59]. The Cronbach’s alphas for the six variables of job itself, job insecurity, family-work conflict, psychosocial safety compliance, psychosocial safety participation, and psychological resilience were all above 0.7, showing good reliability. In addition, the Cronbach’s alpha coefficients of each second-order variable were also above the critical values, and the Cronbach’s alpha values of job stress and psychosocial safety behavior were 0.865 and 0.879, respectively. Based on this, all variables had good reliability.

Table 3. Descriptive statistics, Cronbach’s alpha values, and Pearson’s correlation coefficients among variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The job itself</td>
<td>3.220</td>
<td>0.866</td>
<td>(0.812)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Job insecurity</td>
<td>3.036</td>
<td>0.821</td>
<td>0.425 **</td>
<td>(0.835)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Family-work conflict</td>
<td>3.249</td>
<td>0.923</td>
<td>0.432 **</td>
<td>0.488 **</td>
<td>(0.808)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Psychosocial safety Compliance</td>
<td>3.235</td>
<td>0.862</td>
<td>-0.534 **</td>
<td>-0.428 **</td>
<td>-0.296 **</td>
<td>(0.826)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Psychosocial safety participation</td>
<td>3.070</td>
<td>0.826</td>
<td>-0.535 **</td>
<td>-0.481 **</td>
<td>-0.369 **</td>
<td>0.711 **</td>
<td>(0.801)</td>
<td></td>
</tr>
<tr>
<td>6. Psychological resilience</td>
<td>3.336</td>
<td>0.808</td>
<td>-0.506 **</td>
<td>-0.533 **</td>
<td>-0.403 **</td>
<td>0.632 **</td>
<td>0.637 **</td>
<td>(0.956)</td>
</tr>
</tbody>
</table>

Notes: ** \( p < 0.01 \); SD = standard deviation; Cronbach’s alpha values are reported in the brackets.

According to Pearson’s correlation coefficient, all three job stressors (the job itself, job insecurity, and family-work conflict) were negatively correlated with psychosocial safety
compliance and negatively correlated with psychosocial safety participation. Psychological resilience was negatively related to all three job stressors and positively related to psychosocial safety compliance and psychosocial safety participation.

4.2. Validity Testing

In this study, using AMOS 24.0, CFA analysis was conducted on the job stress measurement model, psychosocial safety behavior measurement model, and psychological resilience measurement model. The model fit was verified against professional indicators, and the general better fit criteria were: chi-square / degrees of freedom ($\chi^2 / df \leq 5$ [60]), root-mean-square error of approximation (RMSEA) < 0.1, incremental fit index (IFI) > 0.9, Tucker-Lewis index (TLI) > 0.9 [61], comparative fit index (CFI) $\geq 0.9$, standardized root mean square residual (SRMR) $\leq 0.08$ [62]. According to the test results, all three measurement models have a good fit.

Hair et al. [63] proposed to verify convergent validity using standardized factor loadings (SFL), construct reliability (CR), and average variance extracted (AVE). When these three metrics satisfy SFL > 0.5 [63], CR > 0.6, and AVE > 0.5 [64], it indicates good convergent validity. Table 4 shows the results of the convergent validity of the variables. For the job itself (psychosocial safety compliance, etc.), the SFLs range (0.533–0.899) is higher than the critical value of 0.5, The CRs range (0.802–0.956) is higher than the critical value of 0.6, and the AVEs range (0.522–0.685) is higher than the critical value of 0.5. Therefore, the measures all met the convergent validity requirement.

Table 4. Results of convergent validity for variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Item</th>
<th>SFL</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The job itself</td>
<td>1</td>
<td>0.698</td>
<td>0.813</td>
<td>0.522</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.741</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.740</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.788</td>
<td>0.839</td>
<td>0.572</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.533</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job insecurity</td>
<td>3</td>
<td>0.809</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.853</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.899</td>
<td>0.815</td>
<td>0.599</td>
</tr>
<tr>
<td>Family-work conflict</td>
<td>2</td>
<td>0.670</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.734</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.746</td>
<td>0.828</td>
<td>0.616</td>
</tr>
<tr>
<td>Psychosocial safety compliance</td>
<td>2</td>
<td>0.819</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.774</td>
<td>0.802</td>
<td>0.575</td>
</tr>
<tr>
<td>Psychosocial safety participation</td>
<td>2</td>
<td>0.725</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.804</td>
<td>0.956</td>
<td>0.685</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.811</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.802</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.773</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological resilience</td>
<td>5</td>
<td>0.846</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.844</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0.842</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0.825</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0.850</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.872</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: SFL = standard deviation; CR = construct reliability; AVE = average variance extracted.

If the square root of the AVE of a variable is greater than its correlation coefficient, it indicates good discriminant validity [48]. In Table 5, the results of discriminant validity calculations for the six variables are shown. For example, the square root of AVE for the job itself is 0.723, which is higher than the correlation coefficients associated with it, indicating
good discriminant validity. The other five variables had the same results, indicating good discriminant validity for all.

Table 5. Results of discriminant validity.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The job itself</td>
<td>(0.723)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Job insecurity</td>
<td>0.425</td>
<td>(0.756)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Family-work conflict</td>
<td>0.432</td>
<td>0.488</td>
<td>(0.775)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Psychosocial Safety Compliance</td>
<td>−0.534</td>
<td>−0.428</td>
<td>−0.296</td>
<td>(0.785)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Psychosocial Safety participation</td>
<td>−0.535</td>
<td>−0.481</td>
<td>−0.369</td>
<td>0.711</td>
<td>(0.758)</td>
<td></td>
</tr>
<tr>
<td>6. Psychological resilience</td>
<td>−0.506</td>
<td>−0.533</td>
<td>−0.403</td>
<td>0.632</td>
<td>0.637</td>
<td>(0.828)</td>
</tr>
</tbody>
</table>

Notes: The square roots of AVEs are reported in brackets.

4.3. Hypotheses Testing

The Structural Equation Model (SEM) technique was used to test the fit of the sample data to the hypothetical measurement model, and the fit indices of the hypothetical model were: $\chi^2/df = 1.766$ ($p = 0.000$), RMSEA = 0.050, IFI = 0.956, TLI = 0.949, CFI = 0.955, SRMR = 0.042. The fit indices were all within the acceptable range.

The hypothesis was supported by judging the p-value to be less than 0.05 and the estimate sign to be positive or negative in line with the hypothesized positive or negative relationship. For hypotheses with multiple sub-hypotheses (H1, H2, H3, H6, and H7), the hypothesis was considered partially supported if some sub-hypotheses were supported [7]. Figure 2 shows the results of the path analysis, including the structural model and the standard path coefficients labeled on each path. In addition, links with significant hypothesis test results are indicated by solid lines, and links with insignificant hypothesis tests are indicated by dashed lines. Table 6 shows the path coefficients of the structural model.

![Figure 2. Structural model with standard path coefficients. Note: * $p < 0.05$; *** $p < 0.001$.](image-url)
Table 6. Path coefficients of the model.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>The job itself → Psychosocial safety compliance</td>
<td>−0.458</td>
<td>0.083</td>
<td>−5.596</td>
<td>***</td>
</tr>
<tr>
<td>Job insecurity → Psychosocial safety compliance</td>
<td>−0.099</td>
<td>0.065</td>
<td>−1.344</td>
<td>0.179</td>
</tr>
<tr>
<td>Family-work conflict → Psychosocial safety compliance</td>
<td>0.176</td>
<td>0.066</td>
<td>2.502</td>
<td></td>
</tr>
<tr>
<td>Job itself → Psychological resilience</td>
<td>−0.416</td>
<td>0.082</td>
<td>−5.353</td>
<td>***</td>
</tr>
<tr>
<td>Job insecurity → Psychological resilience</td>
<td>−0.126</td>
<td>0.066</td>
<td>−1.735</td>
<td>0.083</td>
</tr>
<tr>
<td>Family-work conflict → Psychological resilience</td>
<td>0.037</td>
<td>0.066</td>
<td>0.550</td>
<td>0.582</td>
</tr>
<tr>
<td>The job itself → Psychological resilience</td>
<td>−0.346</td>
<td>0.072</td>
<td>−4.679</td>
<td>***</td>
</tr>
<tr>
<td>Job insecurity → Psychological resilience</td>
<td>−0.398</td>
<td>0.061</td>
<td>−5.327</td>
<td>***</td>
</tr>
<tr>
<td>Family-work conflict → Psychological resilience</td>
<td>−0.032</td>
<td>0.063</td>
<td>−0.457</td>
<td>0.648</td>
</tr>
<tr>
<td>Psychological resilience → Psychosocial safety compliance</td>
<td>0.472</td>
<td>0.077</td>
<td>6.423</td>
<td>***</td>
</tr>
<tr>
<td>Psychological resilience → Psychosocial safety participation</td>
<td>0.442</td>
<td>0.076</td>
<td>6.300</td>
<td>***</td>
</tr>
</tbody>
</table>

Notes: * p < 0.05, *** p < 0.001; Estimate = standardized regression coefficients; S.E. = standardized error; C.R. = critical ratio.

The results of the hypothesis tests showed that H1a was supported, H1b was rejected, and H1c, although also rejected, yielded the opposite conclusion of the hypothesis, that family-work conflict has a significant positive effect on psychosocial safety compliance. Therefore, H1 was partially supported. H2a was supported, H2b was rejected, and H2c was rejected. Therefore, H2 was partially supported. H3a and H3b were supported, and H3c was rejected, where job insecurity had a stronger effect on psychological resilience than the job itself. Therefore, H3 was partially supported. H4 and H5 were both supported, and the effect of psychological resilience on psychosocial safety compliance was slightly higher than its effect on psychosocial safety engagement.

This study used SEM to assess the mediating mediation effects, which allows for the inclusion of measurement error compared to multiple regression models [65,66]. In this paper, we use Bootstrap for mediating effects testing, with 5000 draws on the original sample size (N = 304). The results are shown in Table 7. H6a and H6b were partially supported, and psychological resilience partially mediated the effect of the job itself on construction workers’ psychosocial safety compliance and psychosocial safety participation, with mediating effects of 26.232% and 26.923%, respectively. H6b and H7b were supported. Psychological resilience fully mediates the effect of job insecurity on psychosocial safety compliance and participation. H6c and H7c were rejected.

Table 7. Results of the mediation effect test.

<table>
<thead>
<tr>
<th>Path</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>The job itself → Psychological resilience → Psychosocial safety compliance</td>
<td>−0.464 ***</td>
<td>−0.165 **</td>
<td>−0.629 ***</td>
</tr>
<tr>
<td>Job insecurity → Psychological resilience → Psychosocial safety compliance</td>
<td>−0.087</td>
<td>−0.166 **</td>
<td>−0.253 *</td>
</tr>
<tr>
<td>Family-work conflict → Psychological resilience → Psychosocial safety compliance</td>
<td>0.166 *</td>
<td>−0.014</td>
<td>0.151</td>
</tr>
<tr>
<td>The job itself → Psychological resilience → Psychosocial safety participation</td>
<td>−0.437 ***</td>
<td>−0.161 **</td>
<td>−0.596 ***</td>
</tr>
<tr>
<td>Job insecurity → Psychological resilience → Psychosocial safety participation</td>
<td>−0.115</td>
<td>−0.161 **</td>
<td>−0.276 *</td>
</tr>
<tr>
<td>Family-work conflict → Psychological resilience → Psychosocial safety participation</td>
<td>0.036</td>
<td>−0.014</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Notes: * p < 0.05, ** p < 0.01, *** p < 0.001.

5. Discussion

This study investigated the influence of job stressors (job itself, job insecurity, and family-work conflict) on construction workers’ psychosocial safety behaviors in terms of psychosocial safety compliance and psychosocial safety participation and considered the mediating role of psychological resilience. The results of the study showed that the three job stressors had different effects on psychosocial safety compliance and psychosocial safety participation, and it was found that: (1) The job itself had a negative effect on all psychosocial safety behavior sub-dimensions; job insecurity had no effect on all psychosocial safety behavior sub-dimensions; family-work conflict had a positive effect on psychosocial safety compliance; and there was no effect on psychosocial safety participation. (2) Psychological resilience had a positive effect on all psychosocial safety behavior sub-dimensions. (3) Psy-
chological resilience partially mediates the effect of both work itself and psychosocial safety behavior sub-dimensions; all play a fully mediating role in the effect of job insecurity on psychosocial safety behavior sub-dimensions; and none in the effect of family-work conflict on psychosocially safe behavior sub-dimensions.

5.1. Theoretical Implications

First, this study verifies the extended JD-R theoretical model proposed by Bronkhorst, and the results show that the application of the theoretical model in the construction industry has certain feasibility and validity. At present, there are many research results on physiological safety and less research on psychosocial safety. Psychosocial safety behavior provides a good framework for studying psychosocial safety [21]. Just as physiological safety behavior is a prior indicator for measuring physiological safety accidents, psychosocial safety behavior is a prior indicator for measuring psychosocial safety hazards. The results of this study suggest that the extended JD-R theoretical model provides an effective theoretical basis for the study of psychosocial safety issues in the construction industry and can help companies develop intervention strategies that can reduce the psychosocial risks arising from construction workers at work. Oil, gas, and mining are also high-risk industries, and their employees are also prone to psychosocial safety problems [36,67], and this study can provide a theoretical basis and methodology for the study of psychosocial safety behaviors in these industries. Therefore, this study can provide strong support for research on psychosocial safety behaviors in the construction industry and even other industries.

Second, this study found that different job stressors have different effects on psychosocial safety compliance and psychosocial safety participation. The job itself can negatively affect construction workers’ psychosocial safety compliance and psychosocial safety participation, which echoes Bronkhorst’s [20] study. The demands of high workload, poor security, and high responsibility for construction workers impose psychological costs that subsequently affect workers’ psychosocial safety behaviors. Job insecurity has no direct effect on psychosocial safety compliance and participation and differs from Bronkhorst’s [20] findings in that it can negatively affect psychosocial safety compliance and participation through psychological resilience. For many, continued employment is an essential source of income [68]. Job insecurity responds to the expectation that employees will lose their jobs [69], and this expectation can threaten psychological resources [70]. Construction workers’ psychological resilience is a psychological resource and is significantly and positively associated with psychosocial safety compliance and psychosocial safety participation. Interestingly, this study found a positive effect of family-work conflict on psychosocial safety compliance, which is the exact opposite of the results of the study on the effect of physical safety behaviors [17]. Zhu et al. [71] also obtained fat conclusions contrary to the hypothesis and found that psychosocial stress symptoms had a positive and significant effect on the sub-dimension of psychosocial safety behaviors among Ghanaian miners. In the course of research on the JD-R model, some scholars have suggested that stressors can be classified as hindering or challenging based on the nature of their effects [72,73]. Hindering stressors are detrimental to goal accomplishment, while challenging stressors promote goal accomplishment and personal development. A high level of workload may bring growth and benefits to individuals [23]. In China, construction workers are the primary source of income for their families, have significant family responsibilities, and play an important role in their families. In this context, appropriate family-work conflict stress is beneficial for construction workers to proactively maintain psychological safety and thus better manage family-work conflicts. By demonstrating the different effects of different job stressors on psychosocial safety compliance and psychosocial safety participation. This reveals the intrinsic mechanism by which construction workers’ job stress affects psychosocial safety behaviors and provides help for effective interventions to mitigate the effects of job stress on workers’ psychosocial safety. These findings are informative for further research on the factors influencing psychosocial safety behaviors.
Finally, this study contributes to psychosocial safety behavior research by considering the role of individual resources in a hypothetical model. Prior research has identified that job stress can have an impact on psychosocial safety behaviors; however, the role of considering individual resources in the impact mechanism is lacking. High levels of job stress among employees are largely objective and often uncontrollable [14,74]. The findings of this study provide an individual corrective perspective in which we demonstrate the positive effects of psychological resilience on psychosocial safety compliance and psychosocial safety participation, as well as the ability of psychological resilience to reduce the negative effects of job itself and job insecurity on psychosocial safety compliance and psychosocial safety participation. These findings can broaden our understanding of the mechanisms influencing psychosocial safety behaviors, which can lead to the better development and implementation of relevant measures to ensure the psychosocial safety of construction workers.

5.2. Practical Implications

First, this study is important for enhancing overall workplace safety. The psychosocial safety behaviors of workers in high-risk industries should be addressed. Construction projects can incorporate psychosocial safety behaviors into safety performance assessments. This will promote workers’ awareness of the importance of psychosocial safety, which in turn will lead to a greater focus on their own psychological health and safety at work, thus improving the safety level and performance of the entire project. At the same time, construction projects should also strengthen training and promotion for workers to improve their knowledge and understanding of psychosocial safety and promote full participation to improve overall safety in the workplace.

Second, this study found that three job stressors positively and negatively affect psychosocial safety compliance and participation. Therefore, only by clarifying the mechanisms of action between them can we better improve psychosocial safety. According to the research results, managers need to focus on the negative effects of the job itself and job insecurity. Managers need to reasonably arrange the workload and working hours of construction workers to avoid overload. It is also essential to ensure the safety of construction workers and to ensure that safety equipment is in good condition [75]. Construction managers need to promote the continued employment of construction workers. Construction workers have a low level of education and a single channel to obtain employment information. In this case, realistic job information can be provided to broaden their access to job information [69]. For family-work conflicts, managers can take steps to reward construction workers for good psychosocial safety behaviors. For example, monetary rewards, since money is the main reason why workers go to construction sites in China [76], are a way to create a positive cycle.

Finally, the results of this study suggest that interventions can be made at the individual level that can mitigate the negative effects of job stress on construction workers’ psychosocial safety behaviors. Project management teams can take steps to enhance the psychological resilience of construction workers. To improve workers’ stress tolerance and resilience, managers can consider implementing "psychological resilience education", such as sharing lessons learned from bad experiences [6]. Building the psychological resilience of construction workers at the organizational level, such as by providing training in psychological resilience-related knowledge and skills, is also an effective way to enhance their psychological resilience.

5.3. Limitations and Future Research

First, the present study is cross-sectional and cannot detect longitudinal relationships among job stress, psychological resilience, and psychosocial safety behaviors. Future research could examine potential relationships among them over time. Second, there are a variety of job demands and resources, and the present study considered only three job stressors and one personal resource. Therefore, future research could introduce more
job demands and job resources, such as interpersonal conflict and psychosocial safety climate. Furthermore, this study found that different job stressors have different effects on psychosocial safety behaviors, and future research can further investigate the mechanisms of action of challenging and hindering stressors. Finally, this study explored only the mechanisms that influence psychosocial safety behaviors, and the relationship between the impact of psychosocial safety and physiological safety was not clear. According to the PPWS model proposed by Yaris, psychosocial safety and physiological safety will interact with each other, and future studies can further explore the relationship between psychosocial safety behaviors and physiological safety behaviors.

6. Conclusions

Psychosocial safety is an important component of overall safety in the construction workplace. In this study, a hypothesized relationship between job stress, psychosocial safety behaviors, and mental toughness was proposed. The data comes from 304 construction workers in China, and the hypotheses were tested through SEM analysis. This study found that three job stressors have different effects on two dimensions of psychosocial safety behaviors through different pathways. The job itself had a direct negative impact on construction workers’ psychosocial safety compliance and psychosocial safety participation, with psychological resilience playing a partially mediating role. Job insecurity had a negative effect on construction workers’ psychosocial safety compliance and psychosocial safety participation through psychological resilience. Family-work conflict had a direct positive effect on construction workers’ psychosocial safety compliance but no direct effect on psychosocial safety participation. The study also found a direct positive effect of psychological resilience on psychosocial safety compliance and psychosocial safety participation among construction workers. The findings of this study are discussed to increase understanding of the interaction between job stress and psychosocial safety behaviors among construction workers. By revealing the mechanisms by which job stress triggers psychosocial safety behaviors, this study helps broaden the body of research on construction workers’ safety behaviors and has implications for the study of psychosocial safety behaviors in other high-risk occupations.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Construction Workers’ Job Stress, Psychosocial Safety Behavior, and Psychological Resilience Questionnaire

Dear Respondents:

Hello! I am a master’s student at Central South University. Thank you for taking the time out of your busy schedule to participate in this questionnaire. The purpose of this questionnaire is to understand construction workers’ job stress, psychosocial safety behaviors, and psychological resilience so as to propose intervention measures for the impact of construction workers’ job stress on mental health. This questionnaire is completely anonymous, and your answers will be treated with strict confidentiality, so please do not have any concerns. We assure you that the data obtained from this questionnaire will be used purely for academic research.
This questionnaire is not a test; there are no standard answers, no “right”, “wrong”, “good”, or “bad” answers to any question; they are all single-choice. What we want to know are your true state and feelings. Please fill out the actual situation according to your own truthfulness. Thank you for your support!

Part I: Personal Information (Please tick the options that match your situation.)
1. Your age: A. ≤30 years old; B. 31–40 years old; C. 41–50 years old; D. ≥51 years old
2. Your gender: A. Male; B. Female
3. Your education level: A. Primary school and below; B. Junior high school; C. High school, junior college, or technical school; D. College and above
4. Your work experience: A. ≤5 years; B. 6–15 years; C. 16–25 years; D. ≥26 years
5. Your marital status: A. Unmarried; B. Married
6. Your fertility: A. No children; B. Only child; C. Many children
7. Your type of work: A. Carpenter; B. Steelworker; C. Bricklayer; D. Erector; E. Special equipment (elevator, tower crane, hoist, etc.); F. Other types of work (odd jobs, small jobs, etc.)

Part II: Job Stress, Psychosocial Safety Behavior, and Psychological Resilience Measurement (Please answer the following questions based on your real feelings and put a tick on the number that best matches. “1” = strongly disagree, “2” = disagree, “3” = not sure, “4” = agree, “5” = strongly agree.)

The job itself:
8. My job is simple and has a low workload.
9. At work, I never worry about personal safety.
10. I never work overtime.
11. I am not afraid of being accountable at work.

Job insecurity:
12. I could be without this job at any time.
13. I believe I will be able to keep this job.
15. I may lose this job in the near future.

Family-work conflict:
16. I have been away from my family for a long time and do not take much care of them.
17. My family does not understand and support my work enough.
18. My financial income is not high, and I have a heavy family burden.

Psychosocial safety compliance:
19. I use measures to prevent or minimize psychological strain in my job.
20. I use the correct regulations and protocols for psychological safety when carrying out my job.
21. I ensure the highest levels of psychological safety when I carry out my job.

Psychosocial safety participation:
22. I promote the psychological safety program within the organization.
23. I put in extra effort to improve the psychological safety of the workplace.
24. I voluntarily carry out tasks or activities that help improve workplace psychological safety.
25. I can adapt to change.
26. No matter what happens, I can handle it.
27. I can see the humorous side of things.
28. Coping with stress makes me feel empowered.
29. I will recover quickly from illness and hardship.
30. I can overcome obstacles to achieve my goals.
31. Under pressure, I can focus and think clearly.
32. I do not get discouraged by failure.
33. I feel that I am a strong person.
34. I can handle my negative emotions.
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