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The Relationship Between Individual Stress Levels and Psychological Safety Among Employees in an Automotive Components Manufacturing Company in Cikarang

Rizky Purnomo Adji Churnawan[1]
[1]Department of Psychology, Universitas Kalbis, Jakarta, Indonesia, rizky.churnawan@kalbis.ac.id

Corresponding Author: rizky.churnawan@kalbis.ac.id[1]

Abstract: This study examined the relationship between individual stress levels and psychological safety among employees in an automotive components manufacturing company located in Cikarang, West Java. The manufacturing environment—marked by strict production targets, rotating shifts, and high precision demands—often generates psychological strain that may influence employees' sense of interpersonal safety at work. A quantitative, cross-sectional design was employed, involving 238 permanent employees from a large-scale automotive components manufacturer. Individual stress levels were measured using the Stress subscale of the Depression Anxiety Stress Scales-21 (DASS-21), while psychological safety was assessed using the Team Psychological Safety Scale (TPSS). Results revealed a significant negative correlation between individual stress levels and psychological safety ($r = –0.46$, $p < .001$), indicating that higher stress is associated with lower perceptions of psychological safety. The strongest association emerged in the Leader Interaction dimension ($r = –0.51$), followed by Peer Relationship and Team Climate. These findings support the Job Demands–Resources (JD–R) Model, suggesting that when personal and social resources are insufficient to offset high demands, employees' psychological well-being and openness to interpersonal risk decline. Overall, the study underscores the importance of supportive leadership, open communication, and a collaborative team culture in maintaining psychological safety in high-pressure manufacturing environments.

Keyword: Individual Stress Levels, Psychological Safety, Manufacturing Industry

INTRODUCTION

Manufacturing serves as one of the most strategic sectors driving national economic growth. Yet, behind its contribution to productivity and innovation, this industry is also characterized by structured workflows, strict production targets, rotating shifts, and continuous demands for precision and quality. Such conditions place employees under constant time pressure and performance expectations, which may strain their mental and emotional resources. In Indonesia's automotive components manufacturing sector—particularly in Cikarang, a major industrial hub—employees regularly navigate these

pressures while upholding safety, efficiency, and compliance with rigorous operational standards.

From an occupational psychology perspective, stress has long been recognized as a critical factor influencing employees' cognitive, emotional, and behavioral functioning. According to Karasek's (1979) Job Demand–Control Model, stress arises when job demands exceed an individual's capacity to exercise control or autonomy at work. Similarly, Cooper and Quick (2017) highlighted that unmanaged occupational stress can disrupt mental health, reduce job performance, and weaken interpersonal relationships. Building on these frameworks, the Job Demands–Resources (JD–R) Model proposes that an imbalance between demands and available resources—such as social support, feedback, and autonomy—can lead to psychological strain, whereas sufficient resources act as protective buffers (Bakker & Demerouti, 2007, 2017; Schaufeli & Taris, 2014).

At the individual level, stress is not confined to the workplace alone. Lovibond and Lovibond (1995) defined it as a psychological state in which environmental demands, whether occupational or personal, are perceived as exceeding one's ability to cope. Chronic exposure to such stress may result in burnout, marked by emotional exhaustion, depersonalization, and diminished motivation (Maslach et al., 2001). From the perspective of Self-Determination Theory (Deci & Ryan, 2000), stress threatens basic psychological needs for autonomy, competence, and relatedness—eroding intrinsic motivation and overall psychological well-being. In manufacturing settings, where precision and time management are essential, even general stress can have tangible consequences for safety behavior, focus, and interpersonal collaboration.

A related construct that captures the interpersonal side of well-being is psychological safety, defined by Edmondson (1999) as a shared belief that the work environment is safe for interpersonal risk taking. When employees believe they can speak up, ask for help, or admit mistakes without fear of negative consequences, collaboration and learning thrive. This concept builds upon Kahn's (1990) notion of personal engagement, emphasizing that a sense of psychological security enables individuals to invest their full selves in their work. Conversely, heightened stress—whether from job conditions or broader life pressures—can narrow attention, trigger defensive behavior, and reduce openness to dialogue (Frazier et al., 2017; Sonnentag & Frese, 2013).

Empirical studies consistently show that psychological safety is associated with team learning, innovation, and engagement (Dong et al., 2024; Liu et al., 2024). However, excessive stress may undermine these outcomes by fostering emotional exhaustion and interpersonal tension (Kim & Kweon, 2020; Newman et al., 2017). In hierarchical and performance-driven settings such as manufacturing, this dynamic can be particularly pronounced, as employees may hesitate to share ideas or voice concerns under pressure. In Indonesia's industrial landscape, where shift work, strict quality control, and safety compliance are routine, understanding how individual stress relates to psychological safety is both theoretically and practically relevant.

Despite extensive global research, limited empirical evidence exists on this topic within the Indonesian manufacturing context. Moreover, most prior studies have relied on Western or cross-industry samples, leaving questions about whether these dynamics manifest similarly in high-reliability, precision-based environments like automotive component production. Addressing this gap can contribute to cross-cultural understanding and inform targeted interventions to promote employee well-being in demanding settings.

Accordingly, this study investigates the relationship between individual stress levels and psychological safety among employees in an automotive components manufacturing company in Cikarang. Grounded in the JD–R framework, it is hypothesized that higher perceived stress—reflecting elevated psychological strain—will be associated with lower

psychological safety, as heightened internal tension can hinder openness, trust, and collaborative communication. By focusing on the relational pattern rather than the absolute level of stress, this study aims to offer practical insights for developing supportive leadership, effective communication, and inclusive team climates in Indonesia's manufacturing sector.

METHOD

This study employed a quantitative, cross-sectional design to examine the relationship between individual stress levels and psychological safety among employees in an automotive components manufacturing company located in Cikarang, West Java. The cross-sectional approach was chosen because it allows data collection at a single point in time without manipulating variables, enabling the results to reflect employees' actual psychological conditions within their organizational environment (Creswell & Creswell, 2018). This design aligns with the study's aim to identify the relational pattern between variables rather than determine causality, making it appropriate for dynamic and high-pressure industrial settings such as manufacturing.

The participants consisted of 238 permanent employees from a large-scale automotive components manufacturer operating in the Cikarang Industrial Area, Bekasi Regency, West Java. The company produces engine and suspension components for automotive systems and applies a rotating shift schedule under strict production targets. The sampling technique used was convenience sampling, based on participants' availability and voluntary consent (Etikan, 2016). Inclusion criteria required participants to be active employees with at least six months of tenure, assigned to production, assembly, or quality control divisions, and willing to participate after receiving an explanation of the study's objectives and confidentiality assurances. Demographic data such as age, gender, educational background, tenure, and shift pattern were collected to support descriptive analysis. All responses were anonymous, and data were used solely for academic purposes to protect participants' privacy.

Two standardized instruments were used in this research. Individual stress levels were assessed using the Depression Anxiety Stress Scales-21 (DASS-21) developed by Lovibond and Lovibond (1995). The DASS-21 consists of 21 items representing three subscales—Depression, Anxiety, and Stress—each containing seven items. For the purpose of this study, only the stress subscale was analyzed, as it best reflects the respondents' general experience of tension, difficulty relaxing, and irritability, which are relevant to both occupational and non-occupational sources of strain. Each item was rated on a 4-point Likert scale from 0 ("Did not apply to me at all") to 3 ("Applied to me very much or most of the time"), referring to experiences during the previous week. The total score for the stress subscale was summed and multiplied by two to align with the scoring convention of the original 42-item version. Although DASS-21 does not exclusively measure job-related stressors, its stress subscale provides a reliable index of general psychological strain that may influence workplace attitudes and interpersonal behavior. Previous studies reported Cronbach's alpha values between .80 and .90 for this scale (Antony et al., 1998). The instrument was translated into Bahasa Indonesia through a forward–back translation process and reviewed by two psychometric experts familiar with the Indonesian industrial context to ensure conceptual and linguistic equivalence.

Table 1. Individual Stress Levels Scale – DASS 21

Dimensions	Items	Total Items
Depression	3, 5, 10, 13, 16, 17, 21	7
Anxiety	2, 4, 7, 9, 15, 19, 20	7
Stress	**1, 6, 8, 11, 12, 14, 18**	**7**

Psychological safety was measured using the Team Psychological Safety Scale (TPSS) developed by Edmondson (1999) and further refined by O'Donovan et al. (2020). The TPSS comprises 19 items organized into three dimensions: Leader Interaction (9 items), Peer Relationship (7 items), and Team Climate (3 items). Each item was rated on a 7-point Likert scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). Several negatively worded items were reverse-scored according to the original guidelines. Higher mean scores indicate stronger perceptions of psychological safety within the team. The TPSS has demonstrated excellent construct validity and reliability across cultures, with Cronbach's alpha values ranging from .85 to .90 (Sasaki et al., 2022).

Table 2. Team Psychological Safety Scale

Dimensions	Items	Total Items
Leader Interaction	1,2,3,4,5,6,7,8,9	9
Peer Relationship	10,11,12,13,14,15,16	7
Team Climate	17,18,19	3

Prior to full administration, both instruments underwent a pilot test with 30 employees from the same organization to evaluate item clarity, comprehension, and cultural suitability. The pilot yielded Cronbach's alpha coefficients of .81 for the DASS-21 stress subscale and .79 for the TPSS, confirming adequate internal consistency.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics summarized participants' demographic characteristics and overall score distributions. The relationship between individual stress level and psychological safety was examined using Pearson's correlation coefficient, with a significant threshold of $p < .05$ (Field, 2018). Reliability analyses (Cronbach's alpha) were conducted to assess internal consistency. Additionally, one-way ANOVA was employed to explore differences in stress and psychological safety scores across work shifts (morning, night, and regular).

Overall, this methodological framework was designed to provide valid and reliable evidence regarding the association between employees' individual stress levels and their perceived psychological safety within a high-demand manufacturing environment in Indonesia.

RESULT AND DISCUSSION

Result

The study involved 238 permanent employees from a large-scale automotive components manufacturing company located in the Cikarang Industrial Area, Bekasi Regency, West Java. The majority of participants were male (68.1%), while the remaining 31.9% were female. Participants' ages ranged from 21 to 45 years, with an average age of 31.4 years (SD = 6.8). Most respondents worked in the production division (58.4%), followed by assembly (25.6%) and quality control (16.0%). Their average tenure was 7.2 years, falling within the range of six to ten years. Approximately 62.3% of employees worked in a rotating shift system (day and night shifts), while the remaining 37.7% followed a regular schedule. These demographic characteristics indicate that most respondents were experienced workers operating in demanding and structured environments typical of industrial manufacturing, which requires precision, speed, and consistent adherence to quality standards (Karasek, 1979; Bakker & Demerouti, 2007).

Descriptive statistical analysis of individual stress levels, measured using the DASS-21 stress subscale (Lovibond & Lovibond, 1995), revealed scores ranging from 6 to 40, with a mean of 21.7 (SD = 8.4). Although the DASS-21 captures general psychological stress rather than job-specific stressors, these scores reflect employees' overall levels of tension, irritability, and difficulty relaxing, which may be influenced by both occupational and non-

occupational demands. Based on DASS classification, 28.2% of participants reported mild stress, 45.8% moderate stress, and 26.0% high stress. This distribution indicates that more than two-thirds of employees experienced moderate to relatively high stress levels, consistent with the high cognitive and emotional demands typical of manufacturing environments. These findings align with the Job Demands–Resources (JD-R) Model (Bakker & Demerouti, 2017), which posits that psychological strain occurs when overall demands—whether personal or professional—exceed available coping and social resources.

For psychological safety, as measured by the Team Psychological Safety Scale (O'Donovan et al., 2020), total scores ranged from 57 to 123, with a mean of 92.3 (SD = 11.6). Based on score distribution, 31.1% of respondents reported high levels of psychological safety, 52.9% moderate, and 16.0% low. This suggests that while most employees generally felt safe to collaborate and communicate within their teams, a subset still experienced hesitation in expressing opinions or acknowledging mistakes. Across dimensions, Peer Relationship recorded the highest mean score (M = 4.98, SD = 0.84), followed by Team Climate (M = 4.76, SD = 0.91) and Leader Interaction (M = 4.43, SD = 1.02). This pattern echoes findings from Edmondson (1999) and Newman et al. (2017), indicating that horizontal trust and cooperation among peers are typically stronger than vertical relationships with supervisors, particularly in hierarchical work structures.

Reliability testing confirmed high internal consistency for both instruments, with Cronbach's alpha values of .87 for the DASS-21 stress subscale and .89 for the psychological safety scale (Antony et al., 1998; Sasaki et al., 2022). Pearson's correlation analysis revealed a significant negative relationship between individual stress levels and psychological safety ($r = –0.46$, $p < .001$). This indicates that employees experiencing higher levels of stress tend to perceive lower psychological safety in their work environment. The finding aligns with the JD-R framework's assertion that increased psychological strain can diminish engagement, interpersonal openness, and participation (Bakker & Demerouti, 2007; Frazier et al., 2017). In other words, as stress intensifies, employees may become more cautious, defensive, and less likely to engage in interpersonal risk-taking due to fear of negative evaluation or repercussions (Kahn, 1990; Deci & Ryan, 2000).

When examined by dimension, individual stress levels showed the strongest negative correlation with Leader Interaction ($r = –0.51$, $p < .001$), followed by Peer Relationship ($r = –0.38$, $p < .001$) and Team Climate ($r = –0.33$, $p < .01$). This finding underscores the particular sensitivity of leader–employee dynamics under conditions of stress. Similar to the findings of Kim and Kweon (2020), stress may heighten employees' awareness of evaluation and criticism, thereby weakening vertical trust. Conversely, relationships among peers appeared more resilient, potentially due to the buffering role of social support within teams (Crawford et al., 2010; Sonnentag & Frese, 2013).

A supplementary one-way ANOVA revealed significant differences in individual stress levels across work systems ($F(2, 235) = 4.72$, $p = .01$). Employees working night shifts reported the highest stress levels (M = 24.3, SD = 8.9), followed by those on day shifts (M = 20.8, SD = 7.6) and regular schedules (M = 19.9, SD = 6.8). This result supports findings by Hakanen, Schaufeli, and Ahola (2008), who observed that rotating and night-shift work can disrupt work–life balance and elevate psychological strain. However, there were no significant differences in psychological safety across work systems ($F(2, 235) = 1.43$, $p = .24$), suggesting that psychological safety is more strongly shaped by social and organizational factors—such as leadership behavior, communication climate, and mutual trust—than by structural work conditions (Edmondson, 1999; Bakker & Demerouti, 2017).

Overall, the findings reveal a moderate negative correlation between individual stress levels and psychological safety among manufacturing employees. Employees reporting higher stress tend to feel less psychologically secure in expressing ideas or taking

interpersonal risks, particularly in interactions with supervisors. Conversely, lower stress levels correspond with greater openness, trust, and communication, reinforcing the role of inclusive leadership and supportive team environments in maintaining psychological well-being (Frazier et al., 2017; Dong et al., 2024). These results highlight the importance of fostering social support systems, empathetic leadership, and open communication to sustain psychological safety in high-pressure industrial contexts.

Discussion

The findings of this study revealed a significant negative relationship between individual stress levels and psychological safety among employees in an automotive components manufacturing company in Cikarang. This indicates that as employees experience higher general stress levels, their sense of psychological safety within the workplace tends to decline. In other words, when individuals feel psychologically strained—whether due to occupational or personal pressures—they may be less inclined to share ideas, voice concerns, or acknowledge mistakes. This pattern supports Edmondson's (1999) proposition that psychological safety flourishes in environments that are open, supportive, and free from interpersonal threat, where employees feel confident that speaking up will not lead to punishment or criticism.

From a theoretical perspective, this finding can be interpreted through the Job Demands–Resources (JD-R) Model (Bakker & Demerouti, 2007, 2017). The model posits that strain arises when overall demands exceed the available personal or social resources that enable coping and adaptation. In the manufacturing context, factors such as production pressure, precision requirements, and rotating shift systems represent high demands, while limited supervisory support or weak peer cohesion can reduce employees' capacity to manage stress effectively. When stress remains unbuffered by adequate social or organizational resources, individuals become more vulnerable to emotional strain, which in turn undermines their perception of safety in interpersonal interactions. This aligns with Schaufeli and Taris (2014), who emphasized that a lack of supportive resources can erode psychological well-being and engagement over time.

The strong negative correlation found between individual stress and the Leader Interaction dimension underscores the pivotal role of leadership in shaping employees' perceptions of psychological safety. According to Kahn (1990), psychological safety enables individuals to engage fully at work when they feel secure in their interpersonal environment. Leaders who demonstrate empathy, openness, and participative communication foster a climate of trust that encourages employees to share challenges or report errors without fear. Conversely, authoritarian or performance-centric leadership can amplify the effects of stress on workplace relationships (Kim & Kweon, 2020; Dong et al., 2024). Consistent with Frazier et al. (2017), these results suggest that leaders' behaviors—particularly their responsiveness and interpersonal respect—are central determinants of psychological safety.

By contrast, the weaker correlations between stress and the dimensions of Peer Relationship and Team Climate suggest that horizontal social support may act as a buffering mechanism. As Crawford, LePine, and Rich (2010) noted, collegial relationships can mitigate stress by providing emotional validation and practical assistance. From the lens of Self-Determination Theory (Deci & Ryan, 2000), such peer support fulfills the need for relatedness, a fundamental source of motivation and psychological well-being that helps maintain interpersonal trust and cooperation even under stress.

The absence of significant differences in psychological safety across different work schedules (morning, night, or regular shifts) indicates that psychological safety is more strongly shaped by social and cultural factors than by structural work arrangements. Hakanen, Schaufeli, and Ahola (2008) observed that while shift systems may influence energy balance

and fatigue, the quality of trust and communication within the organization exerts greater influence on well-being. Similarly, Newman, Donohue, and Eva (2017) emphasized that a supportive organizational culture—characterized by open dialogue and non-punitive feedback—remains the foundation of psychological safety regardless of scheduling differences.

These findings also resonate with the Job Burnout framework proposed by Maslach, Schaufeli, and Leiter (2001), which describes how prolonged psychological strain can lead to emotional exhaustion and depersonalization. In precision-oriented manufacturing work, chronic stress can weaken team cohesion and diminish motivation for collaborative engagement. As emotional fatigue escalates, employees may withdraw socially or avoid potentially risky interactions, thereby reducing overall psychological safety.

Furthermore, this study supports evidence from Sasaki, Kuroda, and Takahashi (2022), which validated the cross-cultural structure of the Team Psychological Safety Scale across East Asian contexts. This reinforces the understanding that psychological safety is a universal construct relevant across diverse cultural environments, including Indonesia—where hierarchical relationships and respect for authority play a central role in shaping workplace behavior and communication patterns.

Overall, the results highlight that individual stress influences not only personal well-being but also the social fabric of the workplace. Elevated stress can narrow attention, promote self-protective communication, and hinder open collaboration, consistent with Sonnentag and Frese's (2013) model of stress mechanisms in organizations. Conversely, when employees operate in supportive, trust-based environments, they can better regulate stress, remain engaged, and contribute actively to team learning and innovation (Liu et al., 2024).

In conclusion, this study reinforces that maintaining a balance between personal demands and social resources is essential to sustaining psychological safety in high-pressure manufacturing environments (Karasek, 1979; Bakker & Demerouti, 2017). Cultivating inclusive leadership, two-way communication, and a collaborative team climate should be key organizational strategies for safeguarding both productivity and employee psychological well-being.

CONCLUSION

This study aimed to examine the relationship between individual stress levels and psychological safety among employees in an automotive components manufacturing company in Cikarang. The results revealed a significant negative correlation between the two variables, indicating that higher levels of individual stress are associated with lower perceptions of psychological safety within the workplace. These findings suggest that when employees experience greater psychological strain—stemming from both occupational and personal pressures—their sense of openness, trust, and willingness to communicate freely may decline, thereby weakening the overall interpersonal climate of the organization.

Theoretically, this study supports the Job Demands–Resources (JD-R) Model (Bakker & Demerouti, 2007, 2017), which posits that an imbalance between demands and available personal or social resources can erode well-being. In this context, the cumulative stress experienced by employees—whether due to production targets, precision requirements, or shift-related fatigue—negatively influences their perceptions of psychological safety. Conversely, supportive leadership, peer collaboration, and open communication act as buffering resources that help employees maintain interpersonal trust and emotional stability even in demanding environments (Frazier et al., 2017; Newman et al., 2017).

The dimensional analysis further indicated that individual stress had the strongest negative association with leader interaction, underscoring the critical role of leadership in

fostering psychological safety. Leaders who show empathy, openness to feedback, and a non-punitive approach toward mistakes can mitigate the detrimental effects of stress on employees' interpersonal confidence (Kahn, 1990; Kim & Kweon, 2020). Additionally, positive coworker relationships and a collaborative team climate serve as protective factors that reinforce emotional balance and engagement at work (Crawford et al., 2010; Deci & Ryan, 2000).

Overall, this study contributes empirical evidence to the literature on psychological well-being in industrial settings by highlighting the interconnectedness between stress regulation and social dynamics at work. Maintaining psychological safety requires not only managing external demands but also nurturing an environment characterized by inclusive leadership, mutual trust, and effective two-way communication. From a managerial standpoint, fostering a transparent and supportive organizational culture is essential for sustaining employee engagement, teamwork, and psychological health in high-pressure manufacturing environments.

Suggestions and Recommendation

Based on the findings demonstrating a significant negative relationship between individual stress levels and psychological safety, organizations are encouraged to strengthen the factors that help preserve employees' sense of psychological security when facing demanding work conditions. Social support and open communication are key to minimizing the detrimental impact of stress on team interactions and collaboration. Leaders at all levels should be trained to adopt supportive and empathetic leadership styles, ensuring that employees feel safe to express their opinions, acknowledge mistakes, and participate in decision-making without fear of negative consequences.

Furthermore, organizations should actively promote a collaborative and trust-based work culture among employees. Positive peer relationships can serve as valuable psychological resources that buffer the effects of individual stress and sustain emotional resilience. Maintaining role clarity, fair workload distribution, and transparent performance systems is also essential to prevent ambiguity, interpersonal tension, and perceptions of unfair treatment in the workplace.

For future research, it is recommended to employ longitudinal or mixed-method designs to better capture the causal direction between individual stress and psychological safety over time. Future studies could also explore potential mediating or moderating variables—such as leadership style, social support, or organizational culture—to deepen understanding of how these factors influence the relationship between stress and psychological safety. Such insights can provide a stronger empirical foundation for developing targeted organizational interventions that foster a psychologically safe, open, and productive work environment in high-pressure industries like manufacturing

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