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Keep the Ball Rolling in AI-Assisted Language Teaching: Illuminating the Links Between Productive Immunity, Work Passion, Job Satisfaction, Occupational Success, and Psychological Well-Being Among EFL Teachers

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Abstract

Artificial intelligence (AI) revolutionizes education by fundamentally altering the methods of teaching and processes of learning. Given such circumstances, it is essential to take into account the mental and psychological well-being of teachers as the architects of education. This research investigated the links between teacher immunity (TI), work passion (WP), job satisfaction (JS), occupational well-being (OW-B) and psychological well-being (PW-B) in the context of AI-assisted language learning. In order to achieve this objective, 392 Iranian teachers of English as a foreign language (EFL) were given the Language Teacher Immunity Instrument, the Work Passion Scale, the Job Satisfaction Questionnaire, the Occupational Well-Being Scale, and the Psychological Well-Being at Work Scale. By using confirmatory factor analysis and structural equation modeling, the study identified and quantified the impacts of TI, WP, JS, OW-B, and PW-B via data screening. The findings emphasize the crucial role that TI and WP play in providing a balance in teachers' JS, OW-B, and PW-B while applying AI in their language instruction. The broad ramifications of this research are explored.

Keywords: AI-assisted language teaching, teacher productive immunity, work passion, job satisfaction, occupational success, psychological well-being, EFL teacher

Introduction

In a broad sense, the success of any nation is contingent upon the educational system administered in that country. According to Simmons et al. (2019), education has the potential to be beneficial and efficient provided instructors fulfill the critical role they are expected to play in ensuring that students attain the educational goals imposed by the education system. As stated by Wessels and Wood (2019), the teaching profession is considered to be among the most successful professions in a given community. Due to the fact they are the foundation of any educational system, teachers are regarded as the architects of a country since they are responsible for the care and teaching of future generations. It is a well-known truth that teachers are considered to be the backbone of a country that is both healthy and happy. This is due to the fact that they are the only instructors capable of devotedly managing the challenging process of nation-building (Ryff & Keyes, 1995; Saaranen et al., 2013). In order to accomplish this important goal, it is imperative that educators fulfill their professional responsibilities effectively, especially in AI-assisted language learning. If the objective is to establish a setting where teachers are able to perform their jobs effectively, then some aspects, such as the level of work satisfaction, should get sufficient attention from those in charge of education.

The swiftly expanding discipline of computer science identified as AI is developing intelligent computers capable of simulating human intelligence and performing tasks that are typically executed by humans. Transportation, finance, and healthcare are among the industries that are increasingly adopting AI technology. AI's capacity to make decisions with remarkable speed and precision has the potential to radically alter many different types of enterprises. Using machine learning techniques, AI learns new things and becomes better at what it does. With the help of algorithms, robots can analyze massive databases, spot trends, and find insights that humans cannot fathom (Licardo et al., 2024). Despite AI being extensively used in several industries, its full potential in the context of EFL instructors' psychological well-being remains unfulfilled. The purpose of the current study was to assess the connections between TI, WP, JS, OW-P, and PW-B in the context of EFL education.

Literature Review

The concept of AI was first proposed by McCarthy, who defined it as a scientific and technical concept parallel to the development of intelligent machines (dos Santos & Rosinhas, 2023). AI is a fast-progressing discipline in computer science that focuses on creating robots and software capable of doing activities that typically need human intellect (Terra et al., 2023). These activities manifest the cognitive processes of humans, which include learning, thinking, problem-solving, recognizing patterns, and making predictions (Siemens et al., 2023). AI implementations may emerge in several modalities, using either physical or virtual components, and can function within self-governing or decentralized frameworks. Furthermore, the implementations have the ability to materialize as astute, autonomous entities with the capacity to engage with their surroundings and exercise judgment (Luxton, 2016). Artificial intelligence may be classified into two categories: narrow or weak AI, which focuses on specialized activities, and general or strong AI, which has the capability to do intellectual tasks at a level equivalent to humans (Kay, 2012). Recent inquiries indicate that the use of AI in instruction has a beneficial effect on language learning (Kohnke et al., 2023),

providing interactive learning affordances (Chiu et al., 2023). Applying AI in language learning might have both positive and negative effects on teachers, who are at the core of their students' education and who guide their learning step by step.

Immunity is a biochemical defense mechanism that activates the body's naturally inherent defenses and refuses infections, according to Hiver (2015). Its purpose is to shield the inside from outside forces that might cause harm or distress (Hiver, 2017). Teacher immunity, as described by Hiver and Dörnyei (2017), is an approach that effectively addresses many conflicts and difficulties encountered in the field of education. As stated by Haseli Songhori et al. (2018), one end of the teacher immunity spectrum represents teachers' levels of passion for teaching, mental wellness, and openness to change, while the other end represents teachers' levels of educational expectations, weariness, and dropout.

An offshoot of complexity theory, self-organization theory lies at the heart of the teacher immunity establishment (de Boer, 2005). The process of self-organization involves the transformation of a dynamic system's overall functioning through the interaction of its components. This transformation occurs in four distinct phases: activation, integration, adjustment, and equilibrium. (Randi, 2004). When confronted with challenges, language teachers may exhibit their immunity in two primary ways: productive or maladaptive responses (Hiver, 2015; Hiver & Dörnyei, 2017). Productive immunity includes emotions such as optimism, devotion, enthusiasm, resilience, and motivation. Apathy, conservatism, cynicism, and resistance to change may be attributed to maladaptive immunity. Additionally, maladaptive immunity is characterized by a biological counterpart that functions in a similar manner. This distinction emphasizes how adaptive and maladaptive immunity influence individual behavior and broader system dynamics.

Another teacher-associated concept is WP. It is an incentivizing procedure that enables people to efficiently tackle diverse activities. This enthusiasm is evident in workers' willingness to undertake important tasks that demand their energy, ultimately incorporating these behaviours as fundamental to their identity (Vallerand et al., 2003). Vallerand et al. (2003) proposed a dichotomous paradigm for passion, distinguishing two distinct types: harmonious and obsessive passion. Harmonious passion emerges when someone willingly engages in an activity and integrates it into their sense of self. It refers to purposefully engaging in meaningful and essential things, which helps create a sense of harmony with one's complete being. Obsessive passion is distinguished by the integration of control into an individual's psyche as they internalize the action. This fixation is driven by internal cumpulsion and/or external influences such as self-esteem or societal approval, or by overwhelming enthusiasm (Vallerand et al., 2003).

The impact of harmonious and obsessive passion on people results in diverse interactions between passion and work needs. The latter refers to occupations that need exertion and are linked to particular expenses (Vallerand et al., 2007). Consequently, these activities have the capacity to exert control over workers, leading to feelings of discomfort, unease, and fatigue (Vallerand et al., 2003). Overwhelming expectations may fuel workers' motivations, leading to an obsessive zeal that compels them to approach their job responsibilities in inflexible and insufficient ways. This ultimately results in reduced levels of wellness for staff members (Cabrita & Duarte, 2023).

Therefore, it is reasonable to assume that WP mediates the relationship between job demands and emotional health in the workplace. Enthusiasm for one's work is highly related to intrinsic motivation.

According to the self-determination theory, both internal and extrinsic motivations drive and motivate human action (Ryan & Deci, 2017). A driving force that complements motivation, passion enhances motivation, promotes wellness, and infuses daily activities with significance (Cabrita & Duarte, 2023). Due to the joy and fulfillment experienced when performing, people tend to favor some pursuits over others. Moreover, participating in activities that ignite our passions and shape our identities, therefore offering a consistent sense of satisfaction, can significantly influence an individual's psychological well-being (Vallerand et al., 2007). In a nutshell, the desire to reach a goal is dictated by teachers' level of passion, and the process of being motivated is what gets them there.

Within educational settings, the level of JS experienced by teachers may be seen as an indicator of their likelihood to stay in their profession, a factor that influences their level of dedication, and ultimately, a factor that contributes to the overall efficacy of the school (Shan, 1998). In this regard, Buitendach and de Witte (2005) contended that JS has a significant effect in influencing teachers' viewpoints and evaluations of their work. This perception, in return, may greatly impact their objectives and accomplishments inside the school system. JS refers to an individual's emotional reactions to certain characteristics, environment, and conditions related to their work (Werang et al., 2017). Regarding teachers, the term pertains to their affective reactions towards their occupation and professional circumstances (Zhang, 2021). JS may manifest either in a broad or a particular manner. The former refers to a general sense of contentment with one's work, while the latter is more specific and pertains to certain parts of the profession (Lopes & Oliveira, 2020). JS is determined by the extent to which one's wants and wishes are fulfilled in comparison to the actual practices in the workplace (Baluyos et al., 2019).

In order to evaluate their careers, educators look at what makes their jobs special. JS may be defined as a teacher's subjective perception and attitude towards their profession. Similar to other attitudes, it encompasses an intricate combination of awareness, sentiments, and behavioral inclinations (Werang et al., 2017). A teacher who experiences a high degree of JS has favorable views towards their workplace. Conversely, a teacher who is unsatisfied with their employment harbors negative attitudes towards the working atmosphere. Hence, this favorable or adverse attitude might influence the conduct of instructors in the school setting. Employment satisfaction pertains to an individual's comprehensive attitude towards their employment. JS is the emotional response, either favorable or bad, that arises from evaluating one's experience in a job. Professional factors such as subject knowledge, teaching effectiveness, competence, and academic credentials play a role in teachers' JS (Michaelowa, 2002).

OW-B refers to the state of well-being in the context of the workplace. Working on Ryff's (1989) and Warr's (1994) generic definition of well-being, van Horn et al. (2004) related it to a complementary and multi-dimensional phenomenon. Van Horn et al. (2004) focused on emotional state as a critical affective aspect of work well-being. They approached it to measure it through the emotional state of employees, such as JS, emotional exhaustion, and organization commitment. They proposed two further dimensions, psychosomatic well-being (e.g. pain or aches dues to work stress or long working hours) and cognitive well-being (e.g., attention and engagement), to the existing concept of OW-B. OW-B has received interest in education and positive psychology. It is commonly observed that the state of well-being is naturally reflected in teachers' classroom practices (Chan et al., 2023). Therefore, investigating occupational well-being recognizes the teachers' presence in their work lives, giving ideas about improving well-being initiatives at

work for the practical outcomes of teaching. The PW-B of teachers is a critical factor that has a substantial effect on their performance and, therefore, affects the achievements of their students. It could be due to the fact that students are generally impacted by the caliber of the instructors. Furthermore, there is a considerable emphasis on teachers' well-being as a possible means to alleviate work stress and discontent. (Parker, 2012). Teacher well-being includes aspects such as managing stress, mental health, overall life satisfaction, and a sense of fulfillment. Well-being among students and teachers is associated with both a more favorable emotional state and improved academic achievement (Paterson & Grantham, 2016). Teacher PW-B refers to a broad spectrum of favorable emotions and states of being at the workplace, together with general contentment with life and one's professional path (McInerney et al., 2015). Moreover, there are several distinct perspectives on the concept of well-being. Several academics have identified self-acceptance, a sense of purpose, personal growth, supportive connections, empowerment, and appreciation for nature as essential factors for achieving a state of thriving (Mercer, 2021).

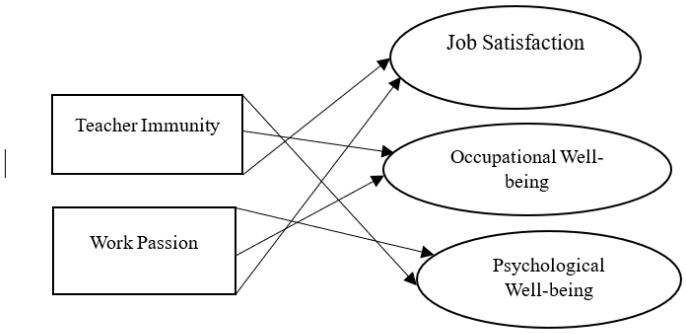
Objectives of the Current Research

Due to the insufficient amount of research that has been carried out in the field of education and the relevance of the components that have been identified in terms of improving language instruction, the aim of this research was to investigate the potential interplay between TI, WP, JS, OW-B, and PW-B of EFL teachers involved in AI-integrated language teaching. A conceptual framework was developed to demonstrate the interaction among TI, WP, JS, OW-B, and PW-B as illustrated in Figure 1. The conceptual framework was set by recent research and theories in the field. The assessment was conducted using confirmatory factor analysis (CFA) and structural equation modeling (SEM), and the findings were subsequently presented. The following research questions were formed:

1. Does the EFL instructors' TI and WP indicate their JS in AI-integrated instruction?
2. Does the EFL instructors' TI and WP indicate their OW-B in AI-integrated instruction?
3. Does the EFL instructors' TI and WP indicate their PW-B in AI-integrated instruction?

Figure 1

Research Model for Exploring Factors of EFL Teacher Well-Being in the AI-Assisted Classroom



Method

Context and Participants

All 392 survey participants were EFL instructors; 105 men and 287 women participated. They were teaching in Iranian private language institutions which are equipped with AI as part of their language teaching. The participants had been teachers from 1 to 25 years, and their ages ranged from 22 to 48. They completed training courses offered by the institutions they attended in order to incorporate AI into their lessons regarding the scalability of teaching resources and materials and provide suggested teaching strategies for specific subjects in the curriculum.

The data was collected via online forms, most especially Google Forms, in 2023. Scales were employed in the target language (English) to maintain the authenticity of the instruments. Data loss was very unlikely because of the meticulous planning that went into the computerized survey. The distribution of the data was initially analyzed using the Kolmogorov-Smirnov test. The data's normality was validated by data screening, proving that parametric procedures would be reliable. With the data assumed to follow a normal distribution, the software LISREL 8.80 (https://ssicentral.com/index.php/products/lisrel/) was used to perform CFA and SEM.

Instruments

The Language Teacher Immunity Instrument (LTII) developed by Hiver (2017) was applied to determine the level of immunity possessed by participants. The 39 questions that make up this instrument are organized into seven subscales, and each of these subscales has a six-point response scale (1 = *strongly disagree*; 6 = *strongly agree*). The subscales include seven items on teaching self-efficacy, five items each on burnout, resilience, and attitudes toward teaching, six items on openness to change and classroom

affectivity, and five items on coping. Cronbach's alphas for these items were satisfactory, ranging from 0.72 to 0.83.

Work passion was assessed using the Work Passion Scale (WPS) created by Vallerand and Houlfort (2003). The scale is comprised of fourteen components. Seven questions are used to evaluate harmonious passion ($\alpha = 0.76$), while the other seven are used to examine obsessive passion ($\alpha = 0.77$). The anchors of the scale range from 1 (*strongly disagree*) to 7 (*strongly agree*). The WPS's reliability as determined by Cronbach's alpha was satisfactory for the present inquiry, with values ranging from 0.77 to 0.76.

Furthermore, the Job Satisfaction Questionnaire (JSQ) developed by Spector (1985) was used to assess the degree of instructors' job satisfaction. It includes 36 statements that pertain to different aspects of job satisfaction. The questionnaire uses a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The research results approved the good reliability of the JSQ as evidenced by Cronbach's alpha values varying from 0.71 to 0.83.

A total of twelve questions are included in Warr's (1990) Occupational Well-Being Scale (OWS), which is used to assess the level of happiness experienced by educators. The purpose of this measure is to assess the well-being of educators across two dimensions: physical and emotional. Anxiety, contentment, depression, and enthusiasm were the job-related emotions that participants were asked to rate in the past few weeks. Participants were asked to indicate the degree to which they experienced these emotions. There were six answer alternatives, ranging from 1 (*never*) to 6 (*always*). The Cronbach's alpha estimated reliability of the OWS was satisfactory ($\alpha = 0.75$).

This research used the Psychological Well-Being at Work (PWBW) scale developed by Dagenais-Desmarais and Savoie (2012) to assess the psychological well-being of educators. PWBW has 25 assertions, each rated on a 5-point scale ranging from 0 (disagree) to 5 (completely agree). PWBW comprises five distinct components: interpersonal fit at work, thriving at work, feeling of competence at work, perceived recognition at work, and desire for involvement at work. The Cronbach's alpha value for PWBW yielded an acceptable result (ranging from 0.95 to 0.71).

Results

This section provides a summary of the data analyzed. In Table 1, the descriptive data from the instruments and scales administered in this study are shown.

Table 1

Descriptive Statistics of Psychological and Professional (P&P) Measures in Teaching

P&P Measures	Minimum	Maximum	*M*	*SD*
Teaching self-efficacy	12	49	31.02	6.05
Burnout	5	35	22.69	4.44
Resilience	5	33	22.80	4.00
Attitudes toward teaching	5	34	22.95	4.60
Openness to change	6	39	27.12	4.88
Classroom affectivity	6	40	28.40	4.35
Coping	5	34	23.24	4.94
Teacher immunity	120	233	178.25	20.11
Harmonious passion	7	46	31.39	6.45
Obsessive passion	18	46	31.93	5.74
Work passion	25	89	63.33	10.20
Supervision	3	15	10.33	2.90
Colleagues and communication	4	20	13.20	3.93
Working conditions and operating procedures	3	15	10.29	2.94
Pay and benefits	4	20	13.73	3.70
Rewards and profits	6	20	13.71	2.95
Work itself	7	20	15.31	2.92
Advancement/Promotion	6	20	14.81	3.34
Operating procedures	6	20	14.73	3.00
Communication	6	15	10.76	2.57
Contingent rewards	12	30	21.67	5.09
Job satisfaction	80	167	127.80	17.47
Occupational well-being	17	72	47.28	7.16
Interpersonal fit at work	10	25	19.71	3.73
Thriving at work	6	25	15.94	4.28
Feeling of competence at work	10	25	17.90	3.98
Perceived recognition at work	5	25	17.82	5.41
Desire for involvement at work	5	25	18.47	4.98
Teacher psychological well-being	43	120	89.84	19.72

Note. N=392

Table 1 shows that the among LTII subcomponents, the teaching self-efficacy score was 31.02 (*SD* = 6.05). On the WPS, the second instrument used, obsessive passion was shown to be more significant (*M* = 31.93, *SD* = 5.74). Contingent rewards had the highest mean score in the JSQ (*M* = 21.67, *SD* = 5.09). The mean score relevant to the OWS was occupational well-being (*M* = 47.28, *SD* = 7.16). Furthermore, interpersonal fit at work had the highest mean score in the PWBW (*M* = 19.71, *SD* = 3.73).

Subsequently, the Kolmogorov-Smirnov test was conducted to find any patterns. As shown in Table 2, the p values of all the instruments and their components exceeded 0.05, indicating that the findings normally distributed, which provided justification for using parametric approaches over the data analysis stage.

Table 2

Results of Kolmogorov-Smirnov Test on the Distribution of Factors Related to EFL Teacher Well-Being

Factors related to EFL Teacher Well-being	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
Teaching self-efficacy	0.823	0.508
Burnout	1.036	0.233
Resilience	0.943	0.336
Attitudes toward teaching	0.801	0.543
Openness to change	0.799	0.546
Classroom affectivity	0.997	0.273
Coping	1.345	0.054
Teacher immunity	0.446	0.989
Harmonious passion	1.083	0.192
Obsessive passion	0.868	0.439
Work passion	0.892	0.404
Supervision	0.936	0.346
Colleagues and communication	1.088	0.187
Working conditions and operating procedures	0.978	0.294
Pay and benefits	0.567	0.905
Rewards and profits	1.092	0.184
Work itself	0.911	0.377
Advancement/Promotion	0.747	0.633
Operating procedures	1.595	0.052
Communication	1.016	0.253
Contingent rewards	0.904	0.388
Job satisfaction	0.688	0.731
Occupational well-being	0.696	0.719
Interpersonal fit at work	1.137	0.150
Thriving at work	1.134	0.153
Feeling of competence at work	0.997	0.274
Perceived recognition at work	1.054	0.216
Desire for involvement at work	1.295	0.070
Teacher psychological well-being	1.004	0.266

Since all instruments and their subscales had statistically significant values, greater than 0.05, parametric methods were deemed appropriate to evaluate the data since it followed a normal distribution. This study employed a Pearson product-moment correlation to investigate the relation between TI, WP, JS, OW-B, and PW-B. Results are displayed in Table 3.

Table 3

Correlations for TI, WP, JS, OW-B, and PW-B

Factors in teacher well-being	1	2	3	4	5	6	7	8	9	10	11	12
1. Teaching self-efficacy	-*											
2. Burnout	0.678**	-										
3. Resilience	0.589**	0.678	-									
4. Attitudes toward teaching	0.612**	0.627**	0.489**	-								
5. Openness to change	0.633**	0.682**	0.514**	0.477**	-							
6. Classroom affectivity	0.505**	0.589**	0.631**	0.615**	0.578**	-						
7. Coping	0.604**	0.623**	0.477**	0.646**	0.458**	0.615**	-					
8. Harmonious passion	0.689**	0.712**	0.703**	0.705**	0.613**	0.543**	0.469**	-				
9. Obsessive passion	0.703**	0.577**	0.664**	0.531**	0.664**	0.618**	0.441**	0.485**	-			
10. Job satisfaction	0.742**	0.641**	0.751**	0.722**	0.703**	0.677**	0.651**	0.504**	0.488**	-		
11. Occupational well-being	0.579**	0.525**	0.598**	0.641**	0.584**	0.621**	0.543**	0.423**	0.431**	0.612**	-	
12. Psychological well-being	0.887**	0.776**	0.846**	0.894**	0.832**	0.824**	0.801**	0.472**	0.458**	0.631**	0.572**	-

Note. TI = teacher immunity; WP = work passion; JS = job satisfaction; OW-B = occupational well-being; PW-B = psychological well-being.
* Dash is used to report that data was not available.
**Correlation is significant at the 0.01 level (2-tailed).

As displayed in Table 3, significant associations were found across various subcomponents such as job satisfaction, occupational well-being, and psychological well-being, with particularly strong associations noted in areas like teaching self-efficacy and attitudes toward teaching. After this computation, the statistical program LISREL 8.80 was used in combination with CFA and SEM to examine the structural relationships between TI, WP, JS, OW-B, and PW-B. The fit model was assessed using indicators: the chi-square magnitude, the root-mean-square error of approximation (RMSEA), the normed fit index (NFI), the good fit index (GFI), and the comparative fit index (CFI). These metrics evaluate how well the model and data match. The relationship for this study is displayed in Table 4. Table 4 presents the fit criteria for two models assessed in the study.

Table 4

Comparison of Fit Indices in Models Exploring Factors in EFL Teachers' Well-Being

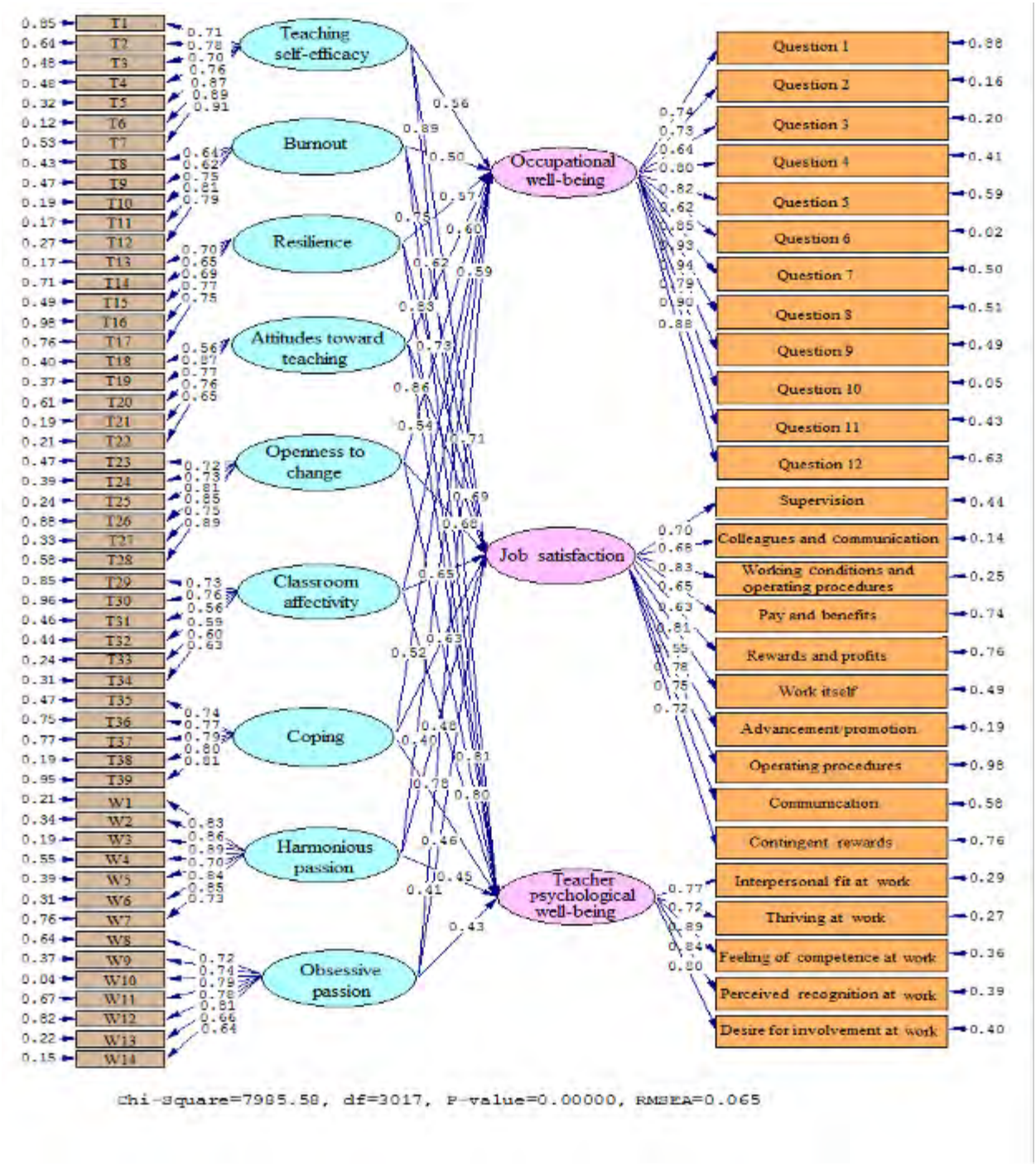
Fit index	$\chi 2$	df	$\chi 2/df$	RMSEA	GFI	NFI	CFI
Cut value			< 3	< 0.1	> 0.9	> 0.9	> 0.9
Model 1	1669.81	587	2.845	0.069	0.931	0.920	0.942
Model 2	7985.58	3017	2.647	0.065	0.931	0.935	0.956

Note. RMSEA = root-mean-square error of approximation; GFI = goodness-of-fit index; NFI = normed fit index; CFI = comparative fit index.

The model 1 fit criteria are met by the chi-square/degrees of freedom ratio of 2.845, the RMSEA of 0.069, the GFI of 0.931, the NFI of 0.920, and the CFI of 0.942. Additionally, this table shows that every fit index associated with model 2 is suitable. The chi-square/degrees of freedom ratio of 2.647, the RMSEA of 0.065, the GFI of 0.931, the NFI of 0.935, and the CFI of 0.956 show that the fit criteria have been met.

Figure 2

Path Coefficients for the Interaction Between TI, WP, JS, OW-B, and PW-B Subcomponents (Model 1)



Note. TI = teacher immunity; WP = work passion; JS = job satisfaction; OW-B = occupational well-being; PW-B = psychological well-being.

Figure 3

t-*Values Indicating the Relevance of Route Coefficients in Model 1*

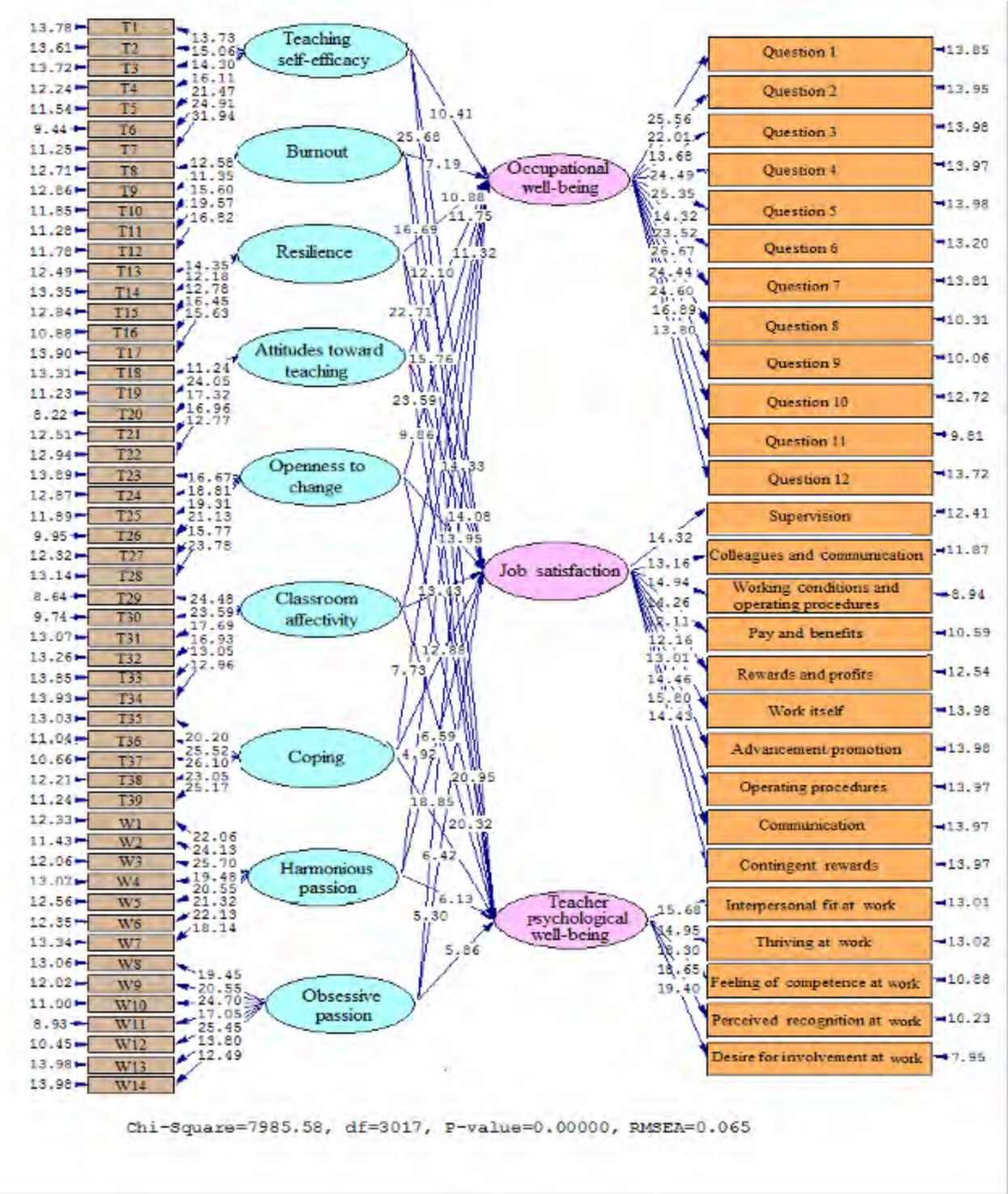


Table 5

Review of Model 1's Outcomes

Path			Path coefficient	*t* statistic	Result
Teacher immunity	→	Job satisfaction	0.67	14.25	Supported
Teacher immunity	→	Occupational well-being	0.55	10.36	Supported
Teacher immunity	→	Teacher psychological well-being	0.82	21.48	Supported
Work passion	→	Job satisfaction	0.47	7.52	Supported
Work passion	→	Occupational well-being	0.41	5.27	Supported
Work passion	→	Teacher psychological well-being	0.44	6.38	Supported

A complete analysis of the robustness of the causal relations among the variables is presented in Figures 2 and 3. These variables are also included in Table 6. During the course of the analysis, it was discovered that TI had a noteworthy and favorable influence on JS ($\beta = 0.67$, $t = 14.25$), OW-B ($\beta = 0.55$, $t = 10.36$), and PW-B ($\beta = 0.82$, $t = 21.48$). Furthermore, WP had a significant and favorable impact on JS ($\beta = 0.47$, $t = 7.52$), OW-B ($\beta = 0.41$, $t = 5.27$), and PW-B ($\beta = 0.44$, $t = 6.38$).

Figure 4

Path Coefficients for the Interaction Between TI, WP, JS, OW-B, and PW-B Subcomponents (Model 2)

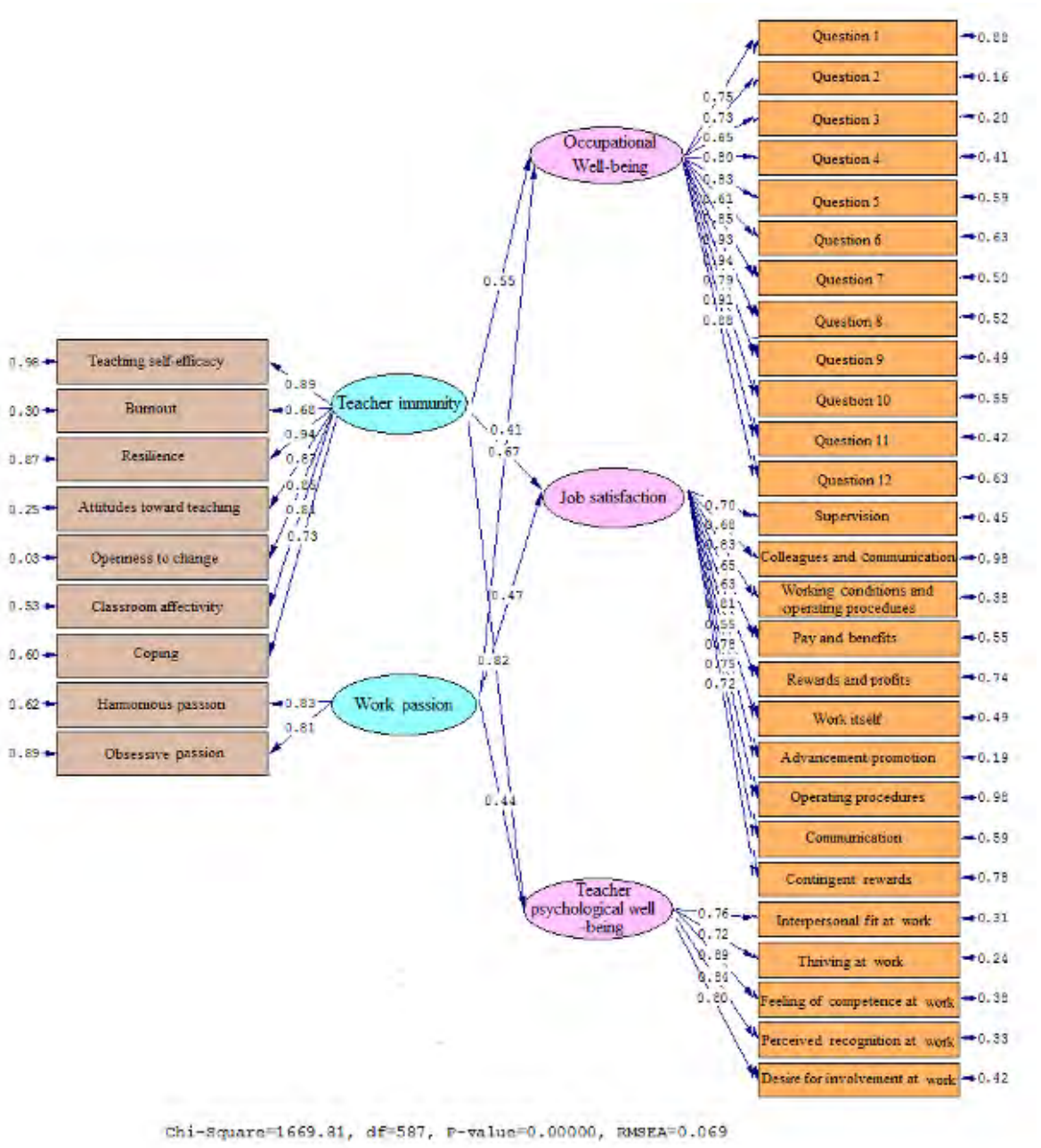


Figure 5

t-*Values Indicating the Relevance of Route Coefficients in Model 2*

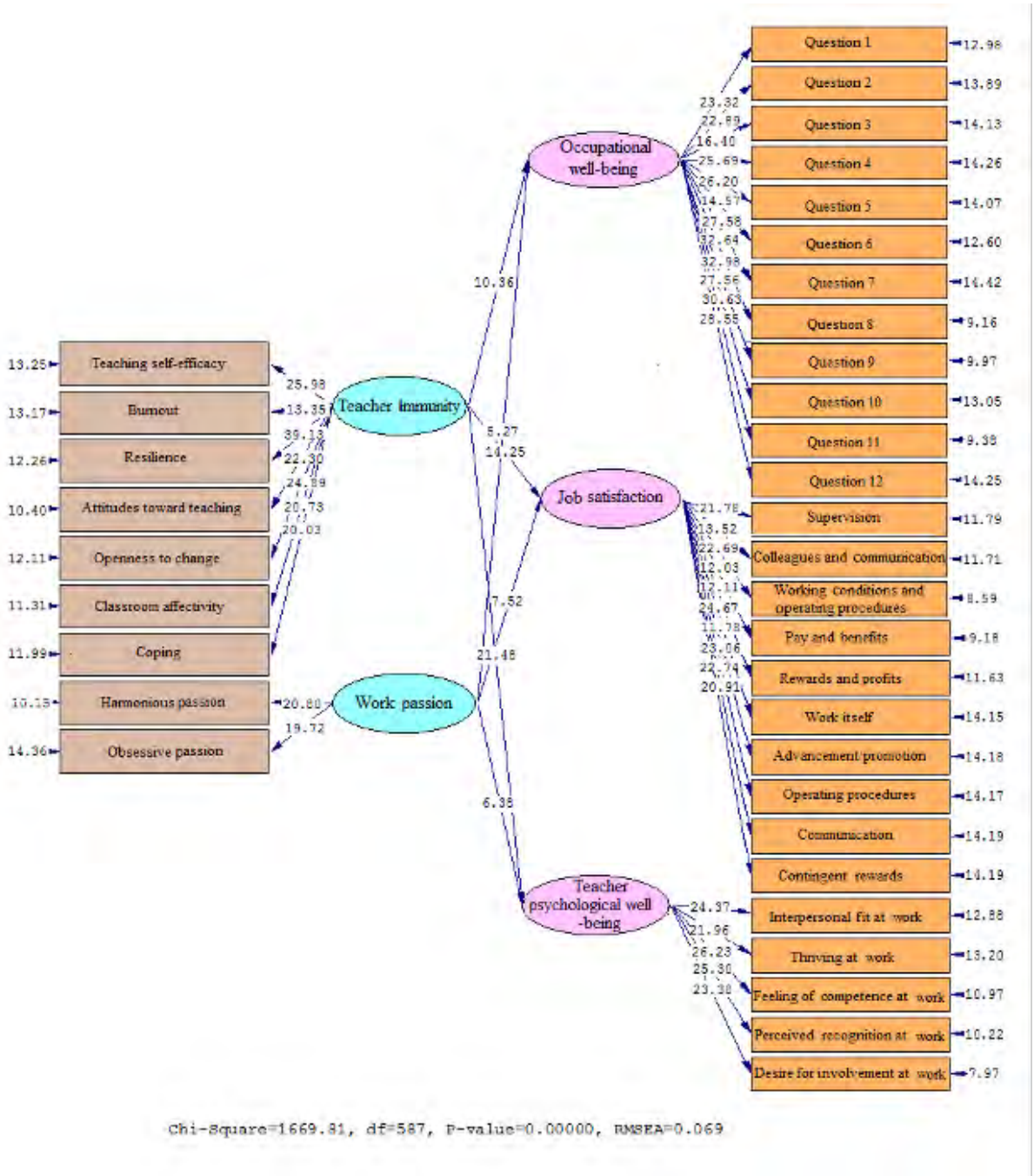


Table 6

Review of Model 2's Outcomes

		Path	Path coefficient	*t* statistic	Result
Teaching self-efficacy	→	Job satisfaction	0.71	14.33	Supported
Burnout	→	Job satisfaction	0.62	12.10	Supported
Resilience	→	Job satisfaction	0.73	15.76	Supported
Attitudes toward teaching	→	Job satisfaction	0.69	14.08	Supported
Openness to change	→	Job satisfaction	0.68	13.95	Supported
Classroom affectivity	→	Job satisfaction	0.65	13.43	Supported
Coping	→	Job satisfaction	0.63	12.88	Supported
Harmonious passion	→	Job satisfaction	0.48	6.59	Supported
Obsessive passion	→	Job satisfaction	0.46	6.42	Supported
Teaching self-efficacy	→	Occupational well-being	0.56	10.41	Supported
Burnout	→	Occupational well-being	0.50	7.19	Supported
Resilience	→	Occupational well-being	0.57	10.88	Supported
Attitudes toward teaching	→	Occupational well-being	0.60	11.75	Supported
Openness to change	→	Occupational well-being	0.54	9.86	Supported
Classroom affectivity	→	Occupational well-being	0.59	11.32	Supported
Coping	→	Occupational well-being	0.52	7.73	Supported
Harmonious passion	→	Occupational well-being	0.40	4.92	Supported

Obsessive passion	→	Occupational well-being	0.41	5.30	Supported
Teaching self-efficacy	→	Teacher psychological well-being	0.89	25.68	Supported
Burnout	→	Teacher psychological well-being	0.75	16.69	Supported
Resilience	→	Teacher psychological well-being	0.83	22.71	Supported
Attitudes toward teaching	→	Teacher psychological well-being	0.86	23.59	Supported
Openness to change	→	Teacher psychological well-being	0.81	20.95	Supported
Classroom affectivity	→	Teacher psychological well-being	0.80	20.32	Supported
Coping	→	Teacher psychological well-being	0.78	18.85	Supported
Harmonious passion	→	Teacher psychological well-being	0.45	6.13	Supported
Obsessive passion	→	Teacher psychological well-being	0.43	5.86	Supported

Figures 4 and 5 provide a graphical depiction of the route coefficients for the links between the TI, WP, JS, OW-B, and PW-B. These coefficients are also shown in a different format in Table 6. When it comes to the JS, TI, and WP subscales, there is a strong and essential connection between JS and the following subscales: teaching self-efficacy (β = 0.71, t = 14.33), burnout (β = 0.62, t = 12.10), resilience (β = 0.73, t = 15.76), attitudes toward teaching (β = 0.69, t = 14.08), openness to change (β = 0.68, t = 13.43), classroom affectivity (β = 0.78, t = 18.56), coping (β = 0.63, t = 12.88), harmonious passion coping (β = 0.48, t = 8.59), and obsessive passion (β = 0.46, t = 6.42).

In addition, it was observed that there was a noteworthy and favorable correlation between the subfactors of the OW-B, TI, and WP subscales. These subfactors include teaching self-efficacy (β = 0.56, t = 10.41), burnout (β = 0.50, t = 7.19), resilience (β = 0.57, t = 10.88), attitudes toward teaching (β = 0.60, t = 11.57), openness to change (β = 0.54, t = 9.86), classroom affectivity (β = 0.59, t = 11.32), coping (β = 0.52, t = 7.73), harmonious passion coping (β = 0.40, t = 4.92), and obsessive passion (β = 0.41, t = 5.30).

The subsequent inference is the result of an examination of the relationships between the PW-B, TI, and WP subcomponents: teaching self-efficacy (β = 0.89, t = 25.68), burnout (β = 0.75, t = 16.69), resilience (β

= 0.83, *t* = 22.71), attitudes toward teaching (β = 0.86, *t* = 23.59), openness to change (β = 0.81, *t* = 20.95), classroom affectivity (β = 0.80, *t* = 20.32), coping (β = 0.78, *t* = 18.85), harmonious passion coping (β = 0.45, *t* = 6.13), and obsessive passion (β = 0.43, *t* = 5.86).

Discussion

The aim of this study was to determine the interplay among TI, WP, JS, OW-B, and PW-B. The research revealed a significant and favorable link between TI, WP, JS, OW-B, and PW-B in the EFL setting while the instruction was integrated with AI. The findings of the first part of the research indicate that those who effectively and efficiently fortified their instruction would have been more adept at managing challenging circumstances and conflicts in the workplace. The results of the present study aligned with Rahmati et al.'s (2019) findings, which emphasized the importance of promoting contemplation as a method of enhancing TI.

More precisely, the results indicate that there is a correlation between the level of tenacity in following instructions, enthusiasm and determination in teaching, self-awareness, and attention toward others. Productive immunity, in accordance with the self-organization theory's principles, functions as a means of protection against various obstacles encountered in the workplace (Hiver, 2017). The research revealed a robust association between language teachers' efforts to adapt to changes and their cognitive capacities in this domain. It might be argued that higher level cognitive functions enhance self-awareness and that efficient and productive immunity is a consequence of self-organization. Job satisfaction fosters emotional equilibrium, leading to improved immune function and therefore increasing teachers' dedication to perseverance, purpose in the classroom, excitement, and their awareness of themselves and others.

Another perspective that may be used to comprehend the results of this research is self-organization theory. Language instructors may adapt to the novel circumstances brought about by AI in the classroom by employing productive immunity. In addition, the study's findings suggest that EFL teachers who adopt productive immunity all through their jobs have a better understanding of their instructional environment and the factors that affect their effectiveness. Previous research (e.g., Amirian et al., 2023; Namaziandost & Heydarnejad, 2023; Rahmati et al., 2019) has identified noteworthy correlations between professional achievement, self-efficacy, resilience, and exhaustion (which are the subscales of the LTII). However, the absence of previous research specifically examining the correlation between TI, WP, and JS precludes any ability to draw comparisons between this finding and others. Consequently, this study can inspire further research on the well-being of teachers at the time of AI applications in language education.

The results of the second research question (Does the EFL instructors' TI and WP offer any indication of their OW-B in AI-integrated instruction?) indicate that TI and WP predict the state of OW-B in AI-integrated language instruction. In accordance with positive psychology principles, this result may be supported. Similar to other domains within positive psychology, language education employs self-help principles to enhance the learning experience (Seligman, 2018). So, instructors who exhibit TI and WP are more likely to achieve intrapersonal and interpersonal mindfulness, which can lead to more success. They are less certain and more ardent in the classroom. The study found that positive interactions and peer

support enhanced not only the resiliency and determination of EFL instructors in their classrooms but also their sense of purpose and significance. While definitive evidence linking TI, WP, and OW-B is still lacking, the research conducted by Zhang (2021) implies that increased engagement is linked to more persistent behavior as a teacher, which indirectly supports this result.

Additionally, it was demonstrated that TI and WP significantly influence a teacher's level of PW-B. Teachers who are immunized and dedicated are more likely to feel a sense of mission and importance in their teaching. Teachers who have acquired the appropriate immunizations are more likely to develop a sense of professional fulfillment, which in turn improves their overall health and satisfaction. Tolerance, self-efficacy in the classroom, fatigue, perseverance, teaching attitudes, adaptability readiness, and responsiveness in the classroom are all potential contributors to professional engagement. It would appear that educators who possess positive relationships with both students and colleagues, exhibit fruitful immunity, and develop engaging and impactful lesson plans are more inclined to exhibit feelings of competence and self-assurance in their vocation. This sense of competence and reliability may increase job satisfaction and contentment, thereby fostering psychological health as a whole (Noori, 2023). Additionally, it can be inferred that educators are less prone to feel exhausted and emotionally distressed when they have a sense of autonomy in their work and possess the necessary abilities and resources to confront any challenges that may emerge. This can be attributed to their exceptional capacity to manage stress and navigate challenging situations effectively, which eventually brings about improved psychological health. Educators who possess adaptive immunity are more likely to be inclined toward improvement, a trait that positively correlates with their mental and psychological health and assists them in managing stressors (Rahmati et al., 2019). Moreover, the results of the study indicate that educators who have immunity demonstrate an unwavering dedication to accomplishing their scholastic objectives and achieving success.

The implications of these findings for the design and implementation of AI-based programs and initiatives that aim to enhance the well-being of EFL instructors are substantial. As previous research witnessed (e.g., Jamal, 2023; O'Dea & O'Dea, 2023), AI can improve educators' skills by providing them with access to various tools and resources that may help them become more effective teachers. Assessment systems that are driven by AI may also provide instructors with real-time feedback on the performance of their students. This gives teachers the ability to modify their instructional methods to better comply with the requirements of the students. Additionally, AI may assist educators in personalizing learning by enabling them to develop classes that are tailored to meet the requirements to meet the requirements of each of their students.

Conclusion and Pedagogical Implications

The study underscore the significance of TI, WP, JS, OW-B, and PW-B, potentially providing educators with insights to enhance their pre-service and in-service curricula, especially in AI-supported language learning. The potential influence of educators' TI and WP on their responses to reform initiatives suggests that the findings of this research may inspire language instructors to employ strategies for productive immunization and engagement when instructing via AI. The integration of AI in language education only maintains effective teaching methods but also enhances language instruction, ensuring continuous progress in effective teaching practices (keep the ball rolling). Furthermore, it is highly recommended that

policymakers consider the findings of the current study so as to develop a holistic comprehension of the elements that contribute to the efficacy of certain programs and instructors while rendering others ineffectual. Policy makers, language educators, and instructors must acknowledge the significance of language instructor immunity, considering the novelty and efficacy of this concept.

Further investigation may be warranted to address certain constraints that were identified in the current study. To begin with, further research is suggested to enhance the applicability of the results acquired across different higher education institutions nationwide, given that the participants were selected via convenience sampling and AI-based applications were used in teaching. Future research may employ mixed-methods designs to examine the correlation between TI, WP, JS, OW-B, and PW-B, as was done in this quantitative investigation, so as to offer a more detailed understanding of the matter. Moreover, due to the cross-sectional design of the current investigation, additional long-term studies are required to examine the relationships between TI, WP, JS, OW-B, and PW-B. Furthermore, additional descriptive variables, such as the demographics of the language instructors, were not examined in this study. Therefore, it is suggested that future research use demographic information regarding language instructors. Last but not least, additional investigation is necessary to determine the degree to which productive immunity, physiological well-being, buoyant inclinations, and learner engagement can serve as predictors of teacher success.

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