Connotations of psychological and physiological health in the psychosocial work environment: An industrial context

Muhammad Umair Javaid[a,*], Sobia Bano[b], Muhammad Zeeshan Mirza[c],
Ahmad Shahrul Nizam Isha[d], Shahid Nadeem[a], Arif Jawaid[a], Zulkipli Ghazali[d],
Matthias Nübling[e], Nazish Imtiaz[f] and Parveen Kaur[g]

[a]*Department of Management Sciences, Lahore Garrison University, Pakistan*
[b]*Department of Management Sciences, GIFT Business School, GIFT University, Pakistan*
[c]*Department of Engineering Management, National University of Science and Technology, Pakistan*
[d]*Department of Management & Humanities, Universiti Teknologi PETRONAS, Malaysia*
[e]*FFAW: Freiburg Research Centre for Occupational Sciences, Freiburg, Germany*
[f]*Department of Management Sciences, National Textile University, Pakistan*
[g]*Department of Anthropology and Sociology, Universiti Malaysia Sarawak, Malaysia*

Abstract.
BACKGROUND: Psychological conditions are experiences of the conscious and unconscious elements of the work context, which revolve around workers' perceptions of feeling either engaged or disengaged with the assigned tasks. In the psychosocial work environment of hazardous industries like petrochemicals where production lasts twenty-four hours a day and continues seven-days-a-week, a psychologically available worker is extremely important. Psychological availability refers to when workers who are physically, emotionally and psychologically engaged at the moment of performing tasks.
OBJECTIVE: The broad objective of this study was to investigate the direct and indirect effects of behavioral factors on the psychological and physiological health of workers.
METHODS: The latest, second generation technique, which is structural equation modeling, is used to identify the relationships between behavioral antecedents and health outcomes. A total of 277 technical workers participated, aged between 20 and 49 and were healthy in all aspects.
RESULTS: The study results showed quantitative demands, emotional demands, work-family conflict, and job insecurity were significantly associated with both psychological (stress) and physiological (Body Mass Index) factors. The social support of colleagues produced mixed findings with direct and indirect paths. Stress also significantly mediates the psychosocial factors and burnout of the workers.
CONCLUSION: The study concluded that workers were physically available, but they experienced distractions as members of social systems, affecting their physiological and psychological health.

Keywords: Health, psychosocial, physiological, multistage sampling, work

1. Introduction

The psychosocial work environment around the globe has been evolved significantly over the last two decades. This evolution has included emerging and complex technologies along with increased work

*Address for correspondence: Muhammad Umair Javaid, PhD, Department of Management Sciences, Lahore Garrison University, Pakistan. E-mail: umairjav@yahoo.com.

intensification, altered work schedules, the disintegration of production processes, product outsourcing, increased risks and challenges in the workplace. These workplaces are highly demanding in nature, even to an extent that they have become ill suited to the knowledge, skills, prior experiences and abilities of employees. The businesses of a 21st-century workplace are mostly conducted with the outdated norms of a 20th-century workplace particularly in developing countries [1–5]. Improperly designed and inadequate preparation for work tasks with accompanying psychosocial risks are likely to be one main driving force behind adverse health outcomes, and many past researchers have acknowledged a great practical need to assess such risks in the workplace to improve the health and wellbeing of workers [6]. Ultimately, it is in the industry's enlightened self-interest to monitor such risks. Therefore, the current study has examined connotations including risks along with both psychological (stress and burnout) and physiological (body mass index) health variables to provide timely and targeted measures to prevent burnout and to contribute knowledge about the increased prevalence of obesity epidemic [6–9].

Psychosocial factors encompass many dimensions and have been thematically grouped by the European Agency for Safety and Health at Work into areas such as job insecurity, quantitative demands, emotional demands, work-family conflict and poor social support [5, 10]. The effects of work stress on the body mass index in meta-analyses have shown mixed findings with respect either to weight gained or to weight lost or no effects [7, 11]. One issue related to these mixed findings is that country and cultural context are likely to be part of such relationships. Another is that mainstream studies have been mostly conducted in developed countries having a Western population. Therefore, in a cross-sectional design, this current study sets out to investigate the association between psychosocial factors with burnout and BMI through stress as mediation in an Eastern population and in the developing country of Malaysia where recently, 70% of the workforce has suffered from work-related stress and in which obesity rates rank among the highest in Southeast Asian countries [12].

2. Objectives and significance

To investigate the health of the workers comprehensively, the objectives of this paper have been broadened two-fold by studying both the psycholog-

ical and physiological health of industrial workers. The first intention is to directly investigate the physiological and psychological health variables based on five different behavioral factors. The second intention is to investigate the role of psychological mediation variable, which is stress in relationship to the five independent behavioral variables and two psychological and physiological health-related dependent variables, which are burnout and BMI respectively.

From psychologists who use subjective measures to biomedical scientists who preferably use objective measures, the most comprehensive stress research integrates the research methods and tools of both fields [13]. Moreover, the integration of both job demands and job resource behavioral variables in a single model is indeed a need-of-the-art particularly in the context with Job Demands-Resources (JD-R) theory [3, 14]. Therefore, this study has integrated both psychological (subjective) and physiological (objective) measures in a single empirically driven model, which is theoretically supported by JD-R theory.

3. Methodology

3.1. Participants

The study participants were technical workers working in operational, maintenance and production activities in the petrochemical industries of Peninsular Malaysia. Initially, 300 total responses were collected, but due to missing values, the responses of 277 subjects were used in the study. Of these responses, 210 were male and 67 were female aged between 20 and 49 years. All the participants were healthy. Exclusion criteria included the use of illicit drugs, use of any prescribed medication, physical activity practice of more than five consecutive hours without having a leisure break of not less than thirty minutes of duration, provided 8×5 hours per week. Other conditions, especially for women such as pregnant or having any disturbance in regular menstrual cycles and ovulation, were also the part of exclusion criteria.

3.2. Sampling design

Multi-stage sampling was used due to large inquiries extending to the considerable large geographical area. The first stage in multi-stage sampling is to select the large primary sampling units like

states, then areas and finally people within the selected areas [15]. Javaid et al. in their study have proposed the multi-stage sampling procedure for the petrochemical industries of Malaysia, which this study followed [16].

3.2.1. Selection of states

The petrochemical industries in Peninsular Malaysia are located in the states of Johor Bahru, Kedah, Pahang, and Terengganu. The study targeted petrochemical companies, which owned 80% of the shares of petrochemical industries either in the form of fully owned shares or in joint association with other petrochemical Multinational Companies (MNCs) operating in Malaysia. One fully owned and one partially owned industry were selected from each state. Therefore, Johar Bahru state was dropped because of not meeting the selection criteria.

3.2.2. Selection of petrochemical industries from the three selected states

Three states i.e. Kedah, Pahang and Terengganu were selected to represent petrochemical industries. Kedah state represents only one joint venture and only one fully owned petrochemical industry, therefore, it sets the base criteria for equal representation of the industries from the other two states i.e. choosing one joint venture and one fully owned industry from Terengganu and Pahang respectively. Following the lottery method technique [15, 17] the names of the petrochemical industries were put in a jar, thoroughly mixed, and the required sample, which is one joint venture and one fully owned firm, from Terengganu and Pahang was randomly drawn. First, the joint venture and fully owned industries in Terengganu were added in the lottery technique followed by Pahang industries that were entered and selected based on the lottery technique.

3.2.3. Selection of study subjects from petrochemical industries

The Simple Random Sampling technique was used to collect data from the provided list of the study subjects. The subjects in three industrial zones were equally divided, which means that 50 subjects from each petrochemical industry were chosen as mentioned in Table 1. To have a maximum representation of subjects from each targeted industry (both morning and evening shifts were targeted from the provided list). Then, 25 subjects were randomly selected from the morning shift and the remaining 25 subjects were selected from the evening shift from the selected

Table 1
No. of respondents per industry

States	Petrochemical Industry Category		Total Respondents
	Fully Owned	Joint Venture	
Kertih, Terengganu	50	50	100
Gebeng, Pahang	50	50	100
Kedah, Gurun	50	50	100
Total Respondents	150	150	300

industries. The data from all three industrial zones were collected during normal working days over a period of one month, May 2016.

3.3. Questionnaire

The study constructs were adapted from the second version of Copenhagen psychosocial questionnaire COPSOQ II [18], a thorough questionnaire that covers all the aspects that are important to study the psychosocial work environment along with health and wellbeing [19, 20].

3.3.1. Translation of questionnaire

The current study was conducted in Bahasa Melayu (BM) the national language of Malaysia; therefore, all the study variables were translated into BM from English using the back translation technique [21]. The forward-then-back translation procedure was completed in multiple steps. Translation and back translation of the internationally recognized base questionnaire into BM were carried out with the help of two certified translators located in Kuala Lumpur, Malaysia. In the first step, the English version was translated into BM by one certified translator, and, in the second step, the back translation from BM to English was done by another certified translator. To retain the originality and authenticity of both translations, the two translators (unknown to each other) worked independently were selected. To ensure that the contents of each item were cross-linguistically comparable and generated the same meaning, the researchers used both translated languages in a single questionnaire.

3.4. Procedure and measurements

For data collection local enumerators were hired and given a full workshop to understand the questionnaire survey along with the other study protocols. To reduce any potential bias, careful monitoring was done by the authors.

The BMI is a non-invasive health biomarker, which was calculated based upon every subject's height and weight. The recommended protocols for calculating BMI (height and weight) were fulfilled [22]. A participant's one-time height was calculated with the help of the Seca-213 mobile height stadiometer, and weight was computed three times with the help of the Omron HBF-375 digital weight machine. The average weight was taken out for the evaluation of the BMI.

3.4.1. Quantitative demands

Quantitative Demands (QD) refer to work overload and time constraint depicted by workers [23]. QD was measured by a 4-item scale, coded by QD1, QD2, QD3, QD4, having items like "does your workload pile up due to uneven distribution?" translated into BM "*Adakah beban kerja anda semakin bertimbun disebabkan pembahagian tidak sekata?*". The overall construct composite reliability was 0.867. Item QD4 was deleted because of a factor loading of <0.7.

3.4.2. Emotional demands

Emotional demands (ED) refer to the affective component of work and the degree to which work puts a person into emotionally stressful situations. It refers to the emotionally charged interactions at work [24]. ED was measured by a 4-item scale, coded by ED1, ED2, ED3, ED4 having items like "do you have to deal with (or manage) other people's personal problems as part of your work?" translated into BM "*Adakah anda perlu berdepan dengan (atau mengurus) masalah peribadi orang lain semasa anda bekerja?*". 'The overall construct composite reliability was 0.868.

3.4.3. Work-family conflict

Work-Family Conflict (WFC) is defined as a conflict that occurs between work and family roles because of the highly demanding situation imposed by each role, which reduces the performances of people involved in both roles [25]. WFC was measured by a 4-item scale, coded by WFC1, WFC2, WFC3, WFC4 having items like "Do you feel that your work drains so much of your energy that it has a negative effect on your personal life?" translated into BM "*Adakah anda berasa yang kerja menghabiskan begitu banyak tenaga anda sehingga ia mempunyai kesan negatif ke atas kehidupan peribadi anda?*". The overall construct composite reliability was 0.892.

3.4.4. Job insecurity

Job insecurity (JI) is defined as the insecurity that employee has for the future [26]. JI was measured by a 4-item scale, coded by JI1, JI2, JI3, JI4 having items like "are you worried about becoming unemployed?" translated in BM "*Adakah anda risau tentang menjadi penganggur?*". The overall construct composite reliability was 0.854.

3.4.5. Social support of colleagues

Social support of colleagues is a resource that can offset the harmful impact of job demands by allowing workers to cope with them [27]. SSC was measured by a 3-item scale, coded by SSC1, SSC2, SSC3 having items like "how often your colleagues help and support you, if needed?" translated into BM "*Berapa kerapkah (rakan sekerja) anda membantu dan menyokong anda, jika perlu?*". The overall construct composite reliability was 0.910.

3.4.6. Stress

Stress is a harmful physical and emotional effect caused due to the imbalance between the perceived job demands and job resources and the ability of the individual to work out with such demands [28]. STR was measured by a 4-item scale, coded by STR1, STR2, STR3, STR4 having items like "how often have you been stressed?"translated into BM "*Berapa kerapkah anda tertekan?*". The overall construct composite reliability was 0.897.

3.4.7. Burnout

Burnout (BO) is a chronic state of work-related psychological stress [6]. BO was measured by a 4-item scale, coded by BO1, BO2, BO3, BO4 having items like "how often have you been emotionally exhausted?"translated into BM "*Berapa kerapkah anda berasa kepenatan emosi?*". The overall construct composite reliability was 0.893.

3.4.8. Body mass index (BMI)

WHO BMI index is defined as weight in kilograms divided by the square of the height in meters (kg/m^2). BMI was calculated with the following formula:

$$\text{BMI} \left[kg/m^2 \right] = \frac{\text{Weight in Kilograms}}{\text{Height in Meters} \times \text{Height in Meters}} \quad (1)$$

BMI as endogenous non-invasive biomarker variable was calculated with a single item having a composite reliability of 1.0. BMI was measured on

a ratio scale and added in the observed co-variance matrix directly with its construct using SEM similar to other items. Therefore, one measurement path links them together for analysis [29]. Weight was measured in kilograms "How much do you weigh?" translated into BM "*Berapakah berat anda?*". Height was measured in meters "How tall are you?"translated into BM "*Berapakah ketinggian anda?*".

3.5. Statistical analysis

The latest second generation technique structural equation modeling allows researchers particularly in health to examine and analyze complex and causal relationships in explaining the development of the phenomena such as diseases and health behaviors. The biggest advantage of using SEM in epidemiology studies over first generation research techniques such as multiple regressions is that it is more powerful and can manage measurement error and the path coefficients are measured simultaneously. Therefore the SEM method, Partial Least Square (PLS) was implemented using SmartPLS 3.2.7 [30] for data analysis.

Table 2 shows the demographic characteristics of the participating respondents who were technical workers of petrochemical industries of Malaysia. The character traits included were the gender, age, education, and experience of the respondents. The percentage of male respondents was high due to large male-dominated representation in petrochemical plants [31]. This was seen at the time of data collection in that 75.8% were male while the remaining 24.2% were females of the total study sample. Further details of the character traits of the participants are mentioned in the Table 2.

Table 2
Demographic characteristics of respondents

Domains		Frequency	Percentage
Gender	Male	210	75.8
	Female	67	24.2
Age	20–29	100	36.1
	30–39	116	41.9
	40–49	57	20.6
	50–60	4	1.4
Education	Primary	86	31
	Secondary	66	23.8
	College/Polytechnic	83	30
	Graduate/Postgraduate	42	15.2
Experience	<1 year	174	62.8
	$\geq 1 \leq 2$ years	61	22
	$\geq 2 \leq 5$ years	23	8.3
	$\geq 5 \leq 10$ years	18	6.5
	≥ 10 years	1	0.4

4. Results

The two-step approach was followed for the analytical process. In the first step, the measurement model and then the structural model were assessed. The measurement model was examined using convergent and discriminant validity.

4.1. The measurement model

Table 3 shows the results of measurement model. The convergent validity was established through item loadings, composite reliability and the average variance extracted. The item loadings of all the constructs were above the required threshold value of 0.7 [32] except for two items, but, as recommended by [32] they were only considered for removal if the composite reliability (CR) and AVE of that variable were below the acceptable range. As seen in the table, the CR and AVE of all variables were greater than the suggested threshold value of 0.7 for CR and 0.5 for AVE [33].

Table 3
Result of Measurement Model

Variables	Items	Loadings	Composite Reliability	AVE
Quantitative Demands	QD1	0.771	0.867	0.687
	QD2	0.886		
	QD3	0.826		
Emotional Demands	ED1	0.793	0.868	0.623
	ED2	0.735		
	ED3	0.814		
	ED4	0.815		
Work-Family Conflict	WFC1	0.700	0.892	0.676
	WFC2	0.881		
	WFC3	0.894		
	WFC4	0.799		
Social Support Colleagues	SSC1	0.872	0.910	0.771
	SSC2	0.902		
	SSC3	0.861		
Job Insecurity	JI1	0.692	0.854	0.596
	JI2	0.767		
	JI3	0.838		
	JI4	0.785		
Stress	STR1	0.743	0.897	0.686
	STR2	0.826		
	STR3	0.860		
	STR4	0.879		
Burnout	BO1	0.854	0.893	0.678
	BO2	0.696		
	BO3	0.867		
	BO4	0.866		
Body Mass Index	BMI	1.000	1.0	1.0

Table 4
Fornell and larcker criterion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Body Mass Index	**1**						
(2) Emotional Demands	0.076	**0.824**					
(3) Job Insecurity	0.192	0.516	**0.790**				
(4) Quantitative Demands	−0.051	0.226	0.180	**0.772**			
(5) Social Support Colleagues	0.025	0.403	0.557	0.151	**0.829**		
(6) Stress	0.029	−0.167	−0.156	−0.073	−0.253	**0.879**	
(7) Work-Family Conflict	0.055	0.717	0.497	0.260	0.454	−0.277	**0.828**

Note: Square root of AVE is on the diagonal while off-diagonals are correlations.

Table 5
Heterotrait-Monotrait (HTMT) values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Body Mass Index							
(2) Emotional Demands	0.082						
(3) Job Insecurity	0.228	0.605					
(4) Quantitative Demands	0.068	0.267	0.204				
(5) Social Support Colleagues	0.037	0.499	0.687	0.200			
(6) Stress	0.031	0.193	0.194	0.125	0.317		
(7) Work-Family Conflict	0.073	0.852	0.579	0.292	0.557	0.324	

Table 6
Results of Direct Relationships (IVs to DVs)

Hypotheses	Relationship	Std-Beta	t-value	Decision
H_1	QD⟶BO	0.049	0.753	Not supported
H_2	ED⟶BO	0.304	4.592***	Supported
H_3	SSC⟶BO	−0.072	1.390	Not supported
H_4	JI⟶BO	0.051	1.026	Not supported
H_5	WFC⟶BO	0.302	4.668***	Supported
H_6	QD⟶BMI	−0.141	1.967**	Supported
H_7	ED⟶BMI	0.233	3.109***	Supported
H_8	SSC⟶BMI	0.042	0.620	Not supported
H_9	JI⟶BMI	−0.116	1.853*	Supported
H_{10}	WFC⟶BMI	0.127	1.704*	Supported

Note: $^*p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

Table 7
Results of Direct Relationships (IVs to Stress) (Stress to DVs)

Hypotheses	Relationship	Std-Beta	t-value	Decision
H_{11}	QD⟶STR	0.115	1.941**	Supported
H_{12}	ED⟶STR	0.232	3.687***	Supported
H_{13}	SSC⟶STR	−0.169	3.559***	Supported
H_{14}	JI⟶STR	0.087	1.832*	Supported
H_{15}	WFC⟶STR	0.296	4.791***	Supported
H_{16}	STR⟶BO	0.055	21.696***	Supported
H_{17}	STR⟶BMI	0.717	0.931	Not supported

Note: $^*p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

The discriminant validity was assessed through the Fornell and Larcker criterion [34], which requires that the square root of AVE for all the variables should be greater than correlations between all the variables. As shown in Table 4, all the values on the diagonal are greater than the correlations between the variables ascertaining discriminant validity. However, a recent concern has been observed about the Fornell and Larcker criterion. Henseler et al. proposed an alternative and more robust approach for establishing discriminant validity, i.e., the Heterotrait-Monotrait Ratio (HTMT) [35]. In Table 5, all the HTMT values are given, and all the values are comfortably below the conservative threshold value of 0.90 [35]. Thus, both criteria confirm the discriminant validity of all the constructs.

4.2. The structural model

After achieving the measurement model, the next step is to examine the structural model, which is also called as the path model. It is recommended to report R^2, beta, and the t-value, using the bootstrapping technique of 5,000 resamples [33]. In addition to that, Kaufmann and Gaeckler suggested reporting Q^2 values (predictive relevance) [36]. Tables 6 and 7 present the results for the direct relationships, and considerable support exists for hypotheses H_{11} to H_{16} but no statistical support was present for hypothesis H_{17}. More interesting results exist for the direct relationships between WFC, QD, ED, and JI with BMI. The support for these hypotheses indicates that these variables has a more direct and impactful role in improving BMI. ED and WFC also has a direct relationship with BO; however, no support was found for hypotheses H_1, H_3, H_4, and H_8.

Table 8 presents the results of the structural model, and the results show support for four of the ten pro-

Table 8
Results of mediation analysis

Hypotheses	Relationship	Std-Beta	t-value	Decision
H_{18}	ED⟶STR⟶BMI	0.013	0.826	Not supported
H_{19}	ED⟶STR⟶BO	0.166	3.458***	Supported
H_{20}	JI⟶STR⟶BMI	0.005	0.685	Not supported
H_{21}	JI⟶STR⟶BO	0.062	1.820	Not Supported
H_{22}	QD⟶STR⟶BMI	0.006	0.821	Not supported
H_{23}	QD⟶STR⟶BO	0.083	1.966**	Supported
H_{24}	SSC⟶STR⟶BMI	–0.009	0.887	Not supported
H_{25}	SSC⟶STR⟶BO	–0.121	3.655***	Supported
H_{26}	WFC⟶STR⟶BMI	0.016	0.894	Not supported
H_{27}	WFC⟶STR⟶BO	0.212	4.583***	Supported

$^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 9
Determination of predictive power

Variables	R^2	Q^2
STR	0.394	0.249
BO	0.514	0.326
BMI	0.003	–0.002

posed hypotheses. The results show statistical support for the mediation path for H_{19} ($\beta = 0.166$, $t = 3.458$), H_{23} ($\beta = 0.083$, $t = 1.966$), H_{25} ($\beta = -0.121$, $t = 3.655$) and H_{27} ($\beta = 0.212$, $t = 4.583$). Remaining hypotheses showed no statistical support and were rejected. Thus, support was found for the mediating role of stress for emotional demands, quantitative demands, the social support of colleagues, work-family conflict, and burnout.

Table 9 shows the summarized results of predictive power. According to Cohen (1988), the R^2 value of both stress and burnout was large (>0.35), and predictive relevance (Q^2) was achieved for stress and burnout (>0), while no predictive relevance was found for the BMI.

5. Discussion

The main purposes of this study were to investigate the direct and indirect effects of the behavioral factors on the psychological and physiological health of the industrial workers. A thorough multistage sampling procedure was done to address the range of outcomes from the selected sample. The study results showed a strong direct link between behavioral factors and physiological factor BMI rather than with the indirect effect, i.e., stress as mediation. This clearly depicts the importance of behavioral factors in studying the physiological health of the workers with respect to either an increase or decrease of weight. On the other hand, a strong association of the mediation variable

stress was found between the behavioral factors and psychological factor burnout. This relationship shows the importance of stress as mediation in studying the psychological health of the workers.

5.1. Enlightenment on direct and indirect effects

All behavioral demand factors such as quantitative demands, emotional demands, work-family conflict and job insecurity had a significant and strong direct association with the BMI of the workers except for one behavioral resource factor, i.e., social support of colleagues. The direct relationship between demands (WFC, QD, ED, and JI) and BMI indicates the possible role of context [37]. Wu et al. found that no significant relationship existed between physiological factors and social support even after adjusting for age, education, and income. They have argued that to control the biomarkers of health such as BMI in this case other pathophysiology needs to be examined besides social support [38].

Job resources vary their roles based on prevailing job characteristics. Besides, social support of colleagues, many other coping factors that are both action-oriented and intra-psychic exist that need to be managed, and these psychosocial factors generally depend based on an individual's perception of the resources available. There are characteristics in the working environment that some workers would perceive as resources while others would not. For instance, petrochemical industry workers may be happy when they feel that the assigned tasks are manageable and within their control at one point in time. However, in the next hour, a worker's positive emotions can be disturbed due to situational factors in which supervisory support is more influential than is the support of colleagues. This within-person fluctuation because of changing behaviors may also result in psychological and physiological changes.

However, limited literature has focused on the role (quality) of leadership in ensuring less obese and healthy employees, even though the quality of leadership is key to the success of any policy or practice [39]. The success of any health-related programs or policies introduced or implemented by an organization are largely dependent on the active involvement of their leadership. Especially with the advent of health-specific leadership HS-L [40] a leadership style, which primarily focuses on the improvement of health and ensuring that any health-related issue of employees is dealt with before it becomes chronic, is critical.

The psychological conditions of workers may also affect cultural values. When work is the central feature of life, sources of conflict outside work such as family domain may cause workers to expend efforts and time in an area upon which they are not as focused, diminishing health and leading to conditions such as burnout syndrome. Accordingly, double engagement in work and family may lead to burdensome experiences and be less beneficial. Past studies have acknowledged that Malaysia is a collective society in which harmony is desired and any kind of confrontation is seen as a threat, which is consistent with studies in which authors have found that occupational stress factors created a highly stressful situation in Malaysian workers [41].

Emotional Demands (ED) was the only variable that had a significant and direct effect on both the psychological and physiological health of the workers. Past studies [42] have shown that emotional energy is a main distraction influencing psychological availability. Emotional energy demands that workers exhibit personal expressions in tasks that require a certain level of emotionality, which engages and influences psychological availability. Emotional Demands in many studies has been found to be related to emotional labor wherein workers look for emotional resources to meet demands and minimize stress. If the provided resources are not sufficient enough, then emotional labor charged with emotional demands results in an impairment of health that further exhausts the mental and physical resources of workers, which, in turn, leads to the depletion of energy, i.e., emotionally exhausted workers with health problems as shown by the study sample.

Past researchers have also acknowledged the connection between workplace stress and mental health of workers in the oil and gas industry wherein psychosocial factors affect the psychological health state [43]. In the oil and gas industry, psychosocial risks can cause ill-health for individuals or groups due to long-time exposure to poor working conditions [44]. The results also align with the findings of the past researchers, which found that stress was strongly correlated with the adverse working conditions of the petrochemical industry [45].

Insecurity creates anxiety and stress and distracts workers from their work. Psychological availability also corresponded with how secure workers felt about their work and status. Job insecurity is surrounded by dimensions like a lack of self-confidence, heightened self-consciousness, and uncertainty about the fit with the industry and its purposes.

A lack of self-confidence is a particular issue for new or low-status workers. The demographic characteristics of this study have shown that almost 63% of the workers are those who are new to work and have less than one year of experience within the existing organization. The operational activities in petrochemical plants need a high level of concentration and motivation due to excessive petrochemical products production. A new worker can show anxiousness about how the speed and quality of his work are compared to a coworker in the plant. The psychological factors keep coming up, forcing him to think of questions like "Was I working fast enough or was I doing the work correctly enough? Are the employers going to keep me or terminate me because of my small contributions?". So, at times workers tend to worry more about performed tasks and the way that these tasks will be perceived by the employer rather than considering the actual task itself. This lack of self-confidence is a product of psychological factors that are firmly associated with job insecurity and lead to stress experienced by the workers.

Heightened self-consciousness arises when workers are focused on how others perceived and judged them (whether or not such judgment actually occurred). This type of psychological thinking forced them to be distracted rather than to be engaged with assigned tasks. This dimension of job insecurity normally arises when workers perceive themselves, consciously or not, as stage actors surrounded by audience and critics, rather than as co-workers who simply do their jobs. A self-consciousness worker engages himself in managing impressions rather than focusing on the task at hand.

Fit uncertainty preoccupies workers, leaving them little space, energy or the desire to express them at the time of task performance. Such a psychological condition pulls a worker's concentration from tasks and forces him to show a lack of commitment. A worker's

uncertainty about his fit within the industry and its purposes make him struggle with his desires to contribute to achieve the end goals of his systems because of a low willingness and often leads to absenteeism due to sickness.

The demographic characteristic of this study showed that around 31% of the respondents fell in the category of low-qualified with only a primary education and around 24% had only a secondary education. Therefore, based on past studies and the results of the current study arguments can be presented that a reason for the unhealthy behaviors and increased health impairments of respondents in this study was the increased psychological stress that workers faced in the forms of psychosocial job demands, emotional demands, job insecurity and work-life conflicts. Additionally, the European working conditions survey showed that low-qualified workers receive low social support in comparison to more qualified workers. Low-qualified workers not only receive low social support but also tend to have less access to occupational training for professional development and health promotion. Therefore, the combination of low social support and high psychosocial demands are both associated with increased health risk.

This current study has significantly contributed to the determination of a difference between stress and burnout. This study found that stress significantly contributed as a mediation variable for the outcome of the psychological health variable of burnout. The study results have shown that stress and burnout seem to have a few different antecedents, correlations and outcomes as discussed in the past studies [46]. This study found a significant and direct relationship of all the behavioral factors with stress; however, only emotional demands and work-family conflict significantly affected the burnout of members of the study sample which is in lieu to studies where psychological demands are significantly associated with the burnout [47]. Interestingly, the burnout concept is often conceptualized and overlapped with the framework of stress. This study also found that the mediating role of stress is significant in quantitative demands, emotional demands, work-family conflict and social support of colleagues' relationship with burnout. The study results clearly demonstrate that stress and burnout are different concepts, and stress leads to burnout.

The limitation of this study was the time frame and availability of the workers to be part of longitudinal study. Future studies should objectively measure health biomarkers by conducting longitudinal stud-

ies and to calculate the worker's biomarkers at two different points of time by adding different physiological and physical biomarkers. This may help future research studies to determine the causal relationships more strongly. Future studies should consider the role of quality of leadership as a job resource factor, in particular, the role of Health-Specific Leadership (H-SL) which is a kind of leadership that can show commitment and dedication for ensuring employees health. This type of leadership can convey to the employees an organization's seriousness about their health. Therefore, the study proposes that health-specific leadership be considered as a key factor in future studies with the BMI issue of employees. Employee's commitment and grit is required to become a fitter and for that purpose HS-L can play an important role in conveying organization resolve for a fit workforce and solidifying employee's dedication for good physiological health.

6. Conclusions

The history of human beings in the connotations of psychological and physiological health can be seen in the pursuit of making working life easier and minimizing the efforts required for subsistence. All the practitioners and researchers of the world of work are in agreement that the nature of work has considerably changed over recent decades. It was from the middle of the 1900s that practitioners and researchers started working together on the concept of work and organization by focusing on appropriate ways of organizing work before moving into the importance of particular tasks.

The research findings suggest that the development of psychological and physiological health symptoms is determined by a specific constellation of working conditions. When psychosocial job demands are high, workers experience increased health syndromes. When psychosocial job resources such as the social support of colleagues are high, workers experience a buffering effect of such supports toward demands especially in the direct and indirect relationship with stress. The research findings further showed that physiological health factor BMI played a significant role as a health biomarker in context with the direct effect of behavioral factors. The biomarker approach is feasible in identifying critical exposure levels with respect to the health of the workers. In addition, although human reactions to stressors are universal, the means at disposal to counteract these are unevenly distributed.

Hence, undoubtedly potential differences exist in addressing health related issues due to different levels of awareness and knowledge about the prevention of work-related stress and psychosocial risks. The study results suggest that an action plan is required to mitigate the negative effects of such risks and that plans must come from the governmental level and be implemented by organizations and followed by workers. By creating a supportive psychosocial working environment and by resolving the connotations of psychological and physiological health issues, industries will not only achieve a safe workplace but also can potentially increase the satisfaction and health of their workers.

Conflict of interest

None declared.

Ethical approval

Informed consent was obtained from all individual participants included in the study.

References

[1] MIDA. Why Malaysia [Internet]. 2015. Available from: http://www.mida.gov.my/home/why-malaysia/posts/.

[2] EU-OSHA. Calculating the cost of work-related stress and psychosocial risks. 2014.

[3] Dollard MF, Shimazu A, Nordin RB Brough P, Tuckey MR. Psychosocial factors at work in the asia pacific. Springer Science+Business Media Dordrecht. 2014;2014:1-396.

[4] Towers W. Engagement at risk: Driving strong performance in a volatile global environment [Internet]. Global Workforce Study. 2012.

[5] Parent-Thirion A, Vermeylen G, van Houten G, Lyly-Yrjänäinen M, Biletta I, Cabrita J. Fifth European Working Conditions Survey [Internet]. 2012.

[6] Schaufeli WB. Applying the Job Demands-Resources model: A ' how to ' guide to measuring and tackling work engagement and burnout. Organ Dyn [Internet]. 2017;46(2): 120-32.

[7] Overgaard D, Gyntelberg F, Heitman BL. Psychological workload and body weight: Is there an association? A review of the literature. Occup Med (Chic Ill). 2004;54(1):35-41.

[8] Brunner EJ, Chandola T, Marmot MG. Prospective effect of job strain on general and central obesity in the whitehall II study. Am J Epidemiol. 2007;165(7):828-37.

[9] Ayanian JZ, Block JP, He Y, Zaslavsky AM, Ding L. Psychosocial stress and change in weight among US adults. Am J Epidemiol. 2009;170(2):181-92.

[10] EU-OSHA. European Survey of Enterprises on New and Emerging Risks (ESNER): Managing Safety and Health at Work. 2009;1-160.

[11] Wardle J, Chida Y, Gibson EL, Whitaker KL, Steptoe A. Stress and adiposity: A meta-analysis of longitudinal studies. Obesity [Internet]. 2011;19(4):771-8.

[12] Ministry of Health Malaysia. National Health and Morbidity Survey 2015 Volume II: Non-Communicable Diseases, Risk Factors & Other Health Problems [Internet]. Vol. II. 2015.

[13] Poms LW, Fleming LC, Jacobsen KH. Work-family conflict, stress, and physical and mental health: A model for understanding barriers to and opportunities for women's well-being at home and in the workplace. World Med Heal Policy [Internet]. 2016;8(4):444-57.

[14] Bakker AB, Demerouti E. Job demands–resources theory: Taking stock and looking forward. J Occup Health Psychol. 2016.

[15] Kothari CR. Research Methodology: Methods & Techniques. New Age International (P) Ltd. 2004, p. 418.

[16] Javaid MU, Isha ASN, Sabir AA, Ghazali Z, Nübling M. Does psychosocial work environment factors predict stress and mean arterial pressure in the malaysian industry workers? Biomed Res Int [Internet]. 2018;2018:11.

[17] Malhotra NK, Birks DF. Marketing research: An Applied Approach. 2006;738.

[18] Nuebling M, Seidler A, Garthus-niegel S, Latza U, Wagner M, Hegewald J, et al. The Gutenberg Health Study: Measuring psychosocial factors at work and predicting health and work-related outcomes with the ERI and the COPSOQ questionnaire. BMC Public Health [Internet]. 2013;13(1):1.

[19] Pournik O, Ghalichi L, Tehraniyazdi A, Tabatabaee SM, Ghaffari M, Vingard E. Measuring psychosocial exposures: Validation of the persian of the copenhagen psychosocial questionnaire (COPSOQ). Med J Islam Repub Iran. 2015;29:221.

[20] Pejtersen JH, Tage Søndergaard K, Borg V, Bjorner JB. The second version of the copenhagen psychosocial questionnaire (COPSOQ II). Scand J Public Health. 2010;18-24.

[21] Running DM, Ligon JB, Miskioglu I. Back-translation for cross-cultural research. J Cross Cult Psychol. 1970;1(3): 185-216.

[22] Centres for Disease Control and Prevention. Anthropometry Procedures Manual. Natl Heal Nutr examinatory Surv [Internet]. 2007;(January):102.

[23] Peeters MCW, Montgomery AJ, Bakker AB, Schaufeli WB. Balancing work and home: How job and home demands are related to burnout. Int J Stress Manag. 2005;12(1):43-61.

[24] Xanthopoulou D, Bakker AB, Fischbach A. Work engagement among employees facing emotional demands: The role of personal resources. J Pers Psychol. 2013;12(2):74-84.

[25] Greenhaus JH, Beutell NJ. Sources of conflict between work and family roles. Acad Manag Rev. 1985;10(1):76-88.

[26] De Witte H. Job insecurity: Review of the international literature on definitions, prevalence, antecedents and consequences. SA J Ind Psychol. 2005;31(4):1-6.

[27] Daniels K, Blanc PM Le, Davis M. The models that made job design. In: An Introduction to Contemporary Work Psychology. 2014, pp. 63-88.

[28] ILO. Workplace Stress: A collective challenge. [Internet]. 2016.

[29] Hair JF, Anderson RE, Babin BJ, Black WC. Multivariate Data Analysis: A Global Perspective. Vol. 7. Pearson Upper Saddle River, NJ; 2010.

[30] Ringle CM, Wende S, Becker J-M. SmartPLS 3. Boenningstedt SmartPLS GmbH, http://www.smartpls.com. 2015;

[31] Petronas Chemical Group. Excellence Dynamic Growth: Annual Report 2016. 2016.

[32] Vinzi VE, Chin WW, Henseler J, Wang H. Handbook of partial least squares. Methods. 2011;627.

[33] Hair FJ, Matthews LM, Matthews RL, Sarstedt M. PLS-SEM or CB-SEM: Updated guidelines on which method to use Marko Sarstedt. Int J Multivar Data Anal. 2017;1(2).

[34] Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. J Mark Res. 1981;18(1):39-50.

[35] Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J AcadMark Sci. 2015;43:115-35.

[36] Kaufmann L, Gaeckler J. A structured review of partial least squares in supply chain management research. J Purch Supply Manag. 2015;21(4):259-72.

[37] Mirza ZM, Isha SAN. Context matters: A research agenda to move beyond conventional leadership-safety relationship. Saf Sci. 2017;98:167-73.

[38] Wu CY, Prosser RA, Taylor JY. Association of depressive symptoms and social support on blood pressure among Urban African American women and girls. J Am Acad Nurse Pract. 2010;22(12):694-704.

[39] Javaid MU, Isha ASN, Nübling M, Mirza MZ, Ghazali Z. Human Factors in Context to Occupational Health and Well-being. In: Christiansen B, editor. Handbook of Research on Organizational Culture and Diversity in the Modern Workforce [Internet]. IGI Global; 2017, pp. 60-77.

[40] Gurt J, Schwennen C, Elke G. Health-specific leadership: Is there an association between leader consideration for the health of employees and their strain and well- being? Work Stress. 2011;(November 2014):37-41.

[41] Taap Manshor A, Fontaine R, Siong Choy C. Occupational stress among managers: A Malaysian survey. J Manag Psychol [Internet]. 2003 Sep [cited 2015 Mar 12];18(6):622–8.

[42] Kahn WA. Psychological conditions of personal engagement and disengagement at work. Acad Manag J [Internet]. 1990;33(4):692.

[43] Bresic J, Knezevic B, Milosevic M, Tomljanovic T, Golubovic R, Mustajbegovic J. Stress and work ability in oil industry workers. Arh Hig Rada Toksikol. 2007;58(4):399-405.

[44] Bergh LIV, Hinna S, Leka S, Zwetsloot GIJM. Developing and testing an internal audit tool of the psychosocial work environment in the oil and gas industry. Saf Sci [Internet]. 2015;88:232-41.

[45] Thurston SW, Ryan L, Christiani DC, Snow R, Carlson J, You L, et al. Petrochemical exposure and menstrual disturbances. Am J Ind Med. 2000;38(5):555-64.

[46] Pines AM, Keinan G. Stress and burnout: The significant difference. Pers Individ Dif [Internet]. 2005 Aug [cited 2014 May 26];39(3):625-35.

[47] Knani M, Biron C. Psychosocial risks, burnout and intention to quit following the introduction of new software at work. Work. 2018;60:95-104.

www.manaraa.com