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FULL-LENGTH REPORT



# The mediation role of work-life balance stress and chronic fatigue in the relationship between workaholism and depression among Chinese male workers in Hong Kong

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## ABSTRACT

**Background and aims:** Few studies have tested the underlying mechanisms in the association between workaholism and depression. This study aims to investigate the potential mediation effects of work-life balance stress and chronic fatigue and depression among Chinese male workers in Hong Kong. **Methods:** A population-based study among male workers in Hong Kong ( $n = 1,352$ ) was conducted. The self-reported scales of assessing workaholism, work-life balance stress, chronic fatigue and depressive symptoms were included in the questionnaire. Path analysis was conducted to test the proposed mediation model. **Results:** Workaholism was directly and indirectly associated with depression through work-life balance stress and chronic fatigue, respectively. The association between work-life balance stress and chronic fatigue was statistically significant in the correlation analysis but not in the path analysis. As high as 30.5% of the participants were classified as having probable chronic fatigue, while 8.4% of the participants were classified as having probable depression. **Discussion:** Workaholism is a stressor that may induce negative consequences on well-being and health among male workers in Hong Kong. Interventions to help workers with time and stress management and fatigue reduction may be beneficial for their mental health. Theoretical and practical implications are discussed.

## KEYWORDS

work addiction, work-life balance stress, fatigue, depression, male workers

## INTRODUCTION

With the advancement in communication technology, the traditional working pattern has changed. People can work anywhere and anytime (Thomas, Sorensen, & Feldman, 2007); thus, the boundary between work and personal life has blurred (Jones, Burke, & Westman, 2006). Such changes may increase workers' working hours and work-life conflict (Oates, 1971; Robinson, 1999).

Workaholism is a work-related behavior or phenomenon that refers to "being overly concerned about work, driven by an uncontrollable work motivation, and to investing so much time and effort to work that it impairs other important life areas" (Andreassen, Hetland, & Pallesen, 2013) (p. 8). It is driven by inner compulsions and needs, instead of external stress or rewards (Shimazu, Schaufeli, & Taris, 2010). Three common characteristics of workaholics were highlighted by previous studies (Scott, Moore, & Miceli, 1997). First, workaholics spend a great deal of time on work when given the discretion to do so and work

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excessively hard. Second, they are reluctant to disengage themselves from work, and persistently and frequently think about work when they are not working. Third, they work beyond what is reasonably expected by their organizational or economic requirements. Although workaholism has not officially been defined as a mental/behavioral disorder and in some research is seen as something positive rather than negative, its potential negative consequences on health deserve public health concerns (Atroszko, Demetrovics, & Griffiths, 2019; Griffiths, Demetrovics, & Atroszko, 2018). Workaholics may develop “withdrawal” reactions and negative emotions when not working (Henchoz et al., 2016). Workaholism is positively associated with depression, anxiety, Attention-deficit hyperactivity disorder (ADHD) (Andreassen, Griffiths, Sinha, Hetland, & Pallesen, 2016), physical complaints, physical illnesses, and poor health (Del, Llorens, Salanova, & Schaufeli, 2010; Griffiths et al., 2018; Shimazu, Demerouti, Bakker, Shimoda, & Kawakami, 2011; Shimazu & Schaufeli, 2009). A recently published paper found the significant mediation effects of workaholism between work-related stress and health-related outcomes, including emotional exhaustion, somatic symptoms, social dysfunction, and insomnia (Andreassen, Pallesen, & Torsheim, 2018).

A dearth of studies has investigated the underlying mechanisms of the relationship between workaholism and mental problems such as depression. To our best knowledge, there was only one such a study; it tested the mediation effect of job burnout in 412 Chinese university teachers (Nie & Sun, 2016). The psychological stress theories (Masonjones & Cabieses, 2015) explain that daily life stressors (e.g., personality traits, daily stress events) can cause acute or long-term psychological strain, which in turn contributes to depression. The core element of workaholism, obsessive-compulsiveness for work, is a strong stressor that can induce work-life conflict and stressful feelings (Andreassen, Griffiths, Hetland, & Pallesen, 2012; Iwata, Ota, & Duman, 2013). In addition, being addicted to work and long working hours may limit ones’ resource (e.g., cognitive, energy, time, social) and effort to take care of their life. As a result, stress in various aspects of life, including sleep problems (Kubota et al., 2010), hostile and ineffective interpersonal relationships (Scott et al., 1997), poor social functioning (Frone, 2000), and family conflict (Robinson, 1999; Schaufeli, Taris, & Rhenen, 2008), will arise. In turn, the perceived work-life related stress can increase depressive symptoms (Frone, Russell, & Cooper, 1992, 1997). Empirical studies have reported significant positive associations between workaholism and work-family conflict (Shimazu et al., 2011; Shimazu & Schaufeli, 2009) and between work-family conflict and depression (Frone et al., 1992, 1997). This study aimed to test the mediation role of work-life balance stress in explaining the relationship between workaholism and depression.

Chronic fatigue is one of the most diseases that is linked to too much work and depression (Barroso et al., 2016; Schulz, Bloom, & Kinnunen, 2017). Fatigue is described as a subjective feeling, experience, sense or awareness that is akin to tiredness; it is extreme tiredness arising from mental or

physical effort (Phillips, 2015). Chronic fatigue syndrome is sometimes known as post viral syndrome or myalgic encephalomyelitis (Bested & Marshall, 2015). Workaholism may induce fatigue since long working hours and lack of physical activity, sleep, relaxation, or entertainment can induce tiredness and burnout (Andreassen. et al., 2018; Salanova, Del Libano, Llorens, & Schaufeli, 2014). In addition, the aforementioned work-life balance stress induced by workaholism may also induce chronic fatigue (Bohle, Willaby, Quinlan, & McNamara, 2011; Kocalevent, Hinz, Brahler, & Klapp, 2011). Furthermore, the person who continuously perceives his or her energy as insufficient and experience tiredness may become depressed. A longitudinal study reported that chronic fatigue could predict depression among cancer patients (Visser & Smets, 2014). Individuals may feel depressed especially when they feel compulsive but chronic fatigue makes them unable to work. We hypothesized that people who had higher levels of workaholism would be more likely to experience chronic fatigue and in turn such fatigue symptoms would be positively associated with depression.

The present study aims to test the relationships among workaholism, work-life balance stress, fatigue and depression among Chinese workers in Hong Kong. We hypothesize that (1) workaholism is positively associated with depression through work-life balance stress; (2) workaholism is positively associated with depression through fatigue; (3) workaholism may have a direct and positive association with depression; (4) work-life balance stress is positively associated with fatigue.

## METHOD

### Participants and procedure

This study is a part of the research program that studies risk behaviors and health among males in Hong Kong. Thus, only data from male participants were available and it served as a limitation. Anonymous telephone interviews were conducted. Telephone numbers were randomly selected from the up-to-date residential fixed-line phone directory. Inclusion criteria of the study included: Chinese males, 18–60 years old, and Hong Kong residents (holders of Hong Kong identification cards). Those who were not current full/part-time workers were not included into the current study. Well-trained and experienced interviewers administered the telephone interview during 6:00–10:30 p.m. Upon contact with a household member, the interviewers explained that the survey was about male behavioral and mental health. The eligible male member of each sampled household whose past birthday was closest to the day of the interview was invited for the study. Participants were informed that their telephone number would not be recorded, and their responses would be kept confidential. Verbal informed consent was obtained. At least three attempts were made during a 2-week period, before unanswered telephone calls were considered as invalid numbers. No incentive was provided to

the participants. Ethics approval was obtained from the corresponding author's University.

We identified 3,298 households with household members who were eligible to participate in the study; 945 (28.7%) of them were not contacted successfully. Out of the 2,353 remaining eligible persons being contacted and invited to join the study, 664 (28.2%) declined and 1,689 completed the interviews (71.8%). In this study, the results from 1,352 participants who were currently part/full-time workers (337 non-workers) were analyzed in the report.

## Measures

**Workaholism:** The 7-item Bergen Work Addiction Scale (BWAS) (Andreassen et al., 2012) was applied to measure workaholism levels. It includes seven criteria that are commonly used to define addictive behaviors: (1) salience, (2) mood modification, (3) tolerance, (4) withdrawal, (5) conflict, (6) relapse, and (7) health and other problems (Brown, 1993; Griffiths, 2005). Items were rated on 5-point Likert scales (1 = never to 5 = always). The scale has been widely used and showed satisfactory psychometric properties (Andreassen et al., 2014; Orosz, Dombi, Andreassen, Griffiths, & Demetrovics, 2015; Shonin, Gordon, & Griffiths, 2014). Higher total scores indicate higher levels of workaholism (Andreassen, Griffiths, et al., 2013; Andreassen et al., 2014; Atroszko, Andreassen, Griffiths, & Pallesen, 2015; Orosz et al., 2015). Two bilingual psychologists independently conducted translation and back-translation to obtain the Chinese version of the scale. Cronbach's alpha was 0.80, and the one-factor solution was confirmed by confirmatory factor analysis (CFI = 0.95, NNFI = 0.93, RMSEA < 0.08) in the current sample. Factor loading ranged from 0.41 to 0.88 ( $P < 0.05$ ). The scale was significantly and positively correlated with fatigue and depression ( $P < 0.05$ ).

**Work-life balance stress:** Participants were asked by the question "To what extent you perceive stress to keep your work-life balance." It is a self-constructed question developed by the research team. The item was originally created in Chinese. The English version was translated and back-translated independently by two bilingual psychologists of the research team. Participants rated the items on a Likert scale (0 = not stressful at all to 5 = extremely stressful). A higher score indicates greater perceived stress.

**Chronic fatigue:** The 11-item Chalder Fatigue Scale (CFS) to test severity of experienced fatigue in the past 6 months, rating on 4-point Likert scales (1—not at all; 4—much more than usual). A total fatigue score is obtained by summing all items. Higher scores indicate greater fatigue. The four responses were dichotomized with responses "1" and "2" given a score of 0, and "3" and "4" a score of 1. These results in a total fatigue score of 11 and a cut-off score of  $\geq 4$  used to define fatigue cases. The Chinese version of the scale has been used in previous studies (Jing et al., 2016; Wong & Fielding, 2010a). The scale had high internal consistency in this study (Cronbach's alpha = 0.86).

**Depression:** The 10-item Center for Epidemiologic Studies Depression Scale (CESD-10) assessed depressive symptoms during the past week (Amtmann et al., 2014). It is a short version of the CESD-20 and has good reliability and validity (Amtmann et al., 2014). A cut-off point of  $\geq 10$  denotes probable depression; it was predictive of depression diagnosis (Arias, Martínez, Jaimes, Afanador, & Hernández, 2007; Björgvinsson, Kertz, Bigdapeyton, Mccoy, & Aderka, 2013). Items were rated on 4-point Likert scales, ranged from 0 (less than 1 day) to 3 (5–7 days). The Chinese version of the scale was validated in the Hong Kong population (Cheung & Bagley, 1998). The Cronbach's alpha was 0.71 in the current sample.

## Statistical analyses

Descriptive statistics were computed for participants' background characteristics. As a number of studies (e.g., (Perez-Lopez et al., 2014; Rajeevan, Murray, Oakley, Lin, & Unger, 2018)) did, we used the continuous variables of fatigue and depression in our analyses. Pearson's correlation analyses were performed to test the significance of the relationships between workaholism, stress, fatigue, and depression. Uni-variate linear regression analyses were conducted to test the associations between background variables and stress, fatigue, or depression, respectively. Dummy variables of the categorical background variables with more than two categories were created. Statistical significance level was set at  $P < 0.05$ . Path analysis was performed to test the proposed mediation model. The significant background factors of depression were adjusted for in the model. Unstandardized regression coefficients ( $B$ ) and standardized regression coefficients ( $\beta$ ) were reported. Bootstrapping analyses were used to identify the mediation effects of stress and fatigue. The 95% confidence interval (CI) of the indirect effect was based on 5,000 bias-corrected bootstrap samples. Proportion mediated (PM) was reported. These analyses were conducted by SPSS 21.0 and AMOS 18.0.

## Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. Verbal consent was obtained from participants before the telephone interview. The study and the consent procedure were approved by the Survey and Behavioral Research Ethics Committee of the corresponding author's university.

## RESULTS

### Descriptive statistics

Most of the participants (94.7%) were full-time workers, 55.4% of them aged 36–55 years, 21.3% aged 18–35; 23.3% aged 56–60. 68.9% of the participants were currently married or cohabitating with someone, about half of them (51.7%) had secondary school education or below, 40.8%



Table 1. Background characteristics of participants

Variables	N (%)
<b>Employment status</b>	
Full-time	1,281(94.7)
Part-time	71(5.3)
<b>Type of work</b>	
Mentally oriented	552(40.8)
Physical oriented	394(29.1)
Both mentally and physically oriented	406(30.0)
<b>Age group</b>	
18–35	288(21.3)
36–55	749(55.4)
56–60	315(23.3)
<b>Current marital/cohabitation status</b>	
Single	397(29.4)
Married/cohabitating	932(68.9)
Divorced/separation/widowed/other	23(1.7)
<b>Education level</b>	
Secondary school or below	696(51.7)
Higher than secondary school	656(48.3)
<b>Probable fatigue</b>	
No (<4)	940(69.5)
Yes (≥4)	412(30.5)
<b>Probable depression</b>	
No (<10)	1,238(91.6)
Yes (≥10)	114(8.4)

described their work as mentally oriented. Prevalence of probable depression and probable chronic fatigue was 8.4% and 30.5%, respectively (Table 1).

### Correlations among the variables

The Pearson's correlation analysis (Table 2) showed that workaholism was positively correlated with stress, fatigue, and depressive symptoms ( $r = 0.39, 0.52$  and  $0.37$ ), respectively ( $P < 0.01$ ). Additionally, stress was significantly correlated with fatigue and depressive symptoms ( $r = 0.07$  and  $0.17, P < 0.05$ ), fatigue was significantly correlated with depressive symptoms ( $r = 0.46, P < 0.01$ ).

As presented in Table 3, younger age, full-time work, lower education levels and being not currently married/cohabitating were associated with higher levels of stress scores. Lower education levels were significantly associated with higher fatigue scores. Divorced, mentally oriented work and younger age were significantly associated with higher depressive symptoms.

Table 2. Correlations, mean (M), and standard deviation (SD) of the psychological variables

	M	SD	1	2	3
1 Workaholism	0.20	0.72			
2 Stress	1.22	1.10	0.18**		
3 Fatigue	3.20	4.58	0.52**	0.07*	
4 Depression	5.32	0.72	0.37**	0.17*	0.46**

Note. \* $P < 0.05$ , \*\* $P < 0.01$ .

### Model testing

The proposed mediation model fitted the data well (Fig. 1),  $\chi^2(8) = 56.64, P < 0.05$ , CFI = 0.97, NNFI = 0.92, RMSEA = 0.07.

### Path coefficients

As hypothesized, the direct path from workaholism to depressive symptoms was significant and positive ( $B = 0.16, \beta = 0.17, P < 0.001$ ). Workaholism was positively associated with stress ( $B = 0.06, \beta = 0.18, P < 0.001$ ) and fatigue ( $B = 0.71, \beta = 0.53, P < 0.001$ ). Both stress ( $B = 0.33, \beta = 0.12, P < 0.001$ ) and fatigue ( $B = 0.25, \beta = 0.37, P < 0.001$ ) were significantly associated with depressive symptoms. However, the association between stress and fatigue was not significant ( $B = -0.12, \beta = -0.03, P > 0.05$ ).

### Mediation effects

Bootstrapping analyses indicated that workaholism was indirectly associated with depressive symptoms through increasing stress and fatigue ( $B = 0.20, \beta = 0.21, P < 0.001$ , PM = 55.56%; 95% CI, 0.16–0.26). Further analyses showed that the individual mediation effects of both stress ( $z = 4.77; P < 0.001$ ) and fatigue ( $z = 11.35; P < 0.001$ ) for the associations between workaholism and depressive symptoms were statistically significant. Fatigue ( $B = 0.18, \beta = 0.19$ , PM = 50.00%) had a greater mediation effect than stress ( $B = 0.02, \beta = 0.02$ , PM = 5.56%).

## DISCUSSION

To our best knowledge, this is the first study that proposed and tested the potential mediation effects of work-life balance stress and fatigue on the association between workaholism and depression. First, workaholism was associated with increased work-life balance stress; in turn, this stressful feeling was positively associated with depression. This result may support the stress models of depression (Henn & Vollmayr, 2005) that various stressors from work and life can lead to strain and stressful feelings, and it is a critical factor of depression. This study extends this theory to explain how such stressful feelings related to work-life balance may explain the association between workaholism, which played as a potential stressor, and depression (Bonebright, Clay, & Ankenmann, 2000). This mediation effect may be particularly pronounced when the work-life balance is personally or culturally valued. For the traditional Chinese men who view success in career, instead of keeping work-life balance, as a sign of manhood, the mediation effect may be weak or not significant. Such possible individual and cultural differences should be tested in future work. We also found that such stressful feelings were greater in younger-age (vs older-age), higher-educated (vs lower-educated), and full-time (vs part-time) working groups. It is consistent with previous studies (Allen & Finkelstein, 2014).



Table 3. Associations between background variables and stress/fatigue/depression

	Stress B (95% CI)	Fatigue B (95% CI)	Depression B (95% CI)
<b>Age</b>			
18–35 <sup>a</sup>			
35–55	–3.63 (–4.13, –3.12)	0.20 (–0.43, 0.82)	0.47 (0.05, 0.90) *
56–60	–4.51 (–4.99, –4.03) ***	–0.24 (–0.97, 0.49)	0.14 (–0.36, 0.64)
<b>Marital/cohabitation status</b>			
Currently unmarried and non-cohabiting <sup>a</sup>			
Married/cohabitating	0.04 (–0.17, 0.09)	0.08 (–0.46, 0.61)	0.12 (–0.25, 0.49)
Divorced/separated/widowed	–0.16 (–0.62, 0.30)	1.44 (–0.49, 3.37)	2.02 (0.71, 3.33) **
<b>Education level</b>			
Secondary school or below <sup>a</sup>			
Tertiary education	0.12 (0.01, 0.24) *	0.25 (0.07, 1.04)*	0.09 (–0.24, 0.43)
<b>Nature of work</b>			
Mental oriented <sup>a</sup>			
Physical oriented	0.10 (–0.04, 0.24)	–0.52 (–1.11, 0.08)	0.43 (0.03, 0.84)*
Both mentally and physically oriented	–1.38 (–0.28, 0.01)	–0.04 (–0.63, 0.55)	–0.01 (–0.41, 0.39)
<b>Employment status</b>			
Full-time <sup>a</sup>			
Part-time	–1.08(–1.34, –0.82)***	0.37(–0.73, 1.46)	–0.56(–1.30, 0.39)

Note. B = unstandardized regression coefficients.

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

<sup>a</sup> Reference group.

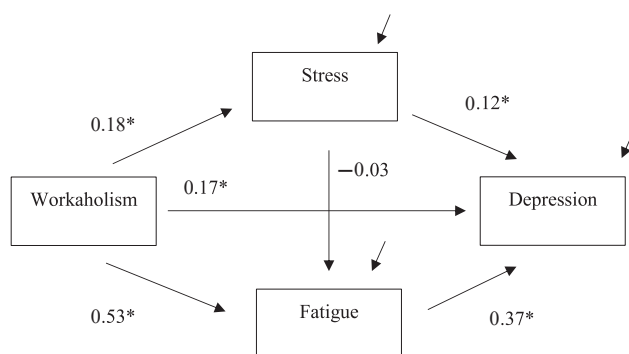


Figure 1. The proposed mediation model with standardized coefficients. Age, marital/cohabitation status, and nature of work were adjusted for in the model. \* $P < 0.05$

Fatigue was another potential mediator and it had a greater mediation effect than that of work-life balance stress in the model. Fatigue has various negative consequences on physical and mental health including depression but its factors were not sufficiently studied. Our results provide preliminary evidence on its association with workaholism (Gini, 1998; Salanova Del Libano, Llorens, & Schaufeli, 2014). Long-time and excessive working behavior may increase tiredness and physical fatigue; the obsessive-compulsive feeling induced by working addiction is often related to negative affect, anxiety and psychological fatigue. Although this study assumed that fatigue may be one factor of depression and mediator between workaholism and depression, there is a need to highlight the complexity of their causality (Visser & Smets, 2014). Fatigue may be the result of depressed mood. However, the person who continuously perceives his or her energy as insufficient may become depressed. To complicate

matters, depression and fatigue may co-occur without having a causal relationship, because they can both originate from the same pathology in persons with chronic disease such as cancer (Visser & Smets, 2014). Future longitudinal studies to validate the mediation role of fatigue are needed. The importance of fatigue is also highlighted by its high prevalence (about one third) in the current sample. The prevalence is higher than that of Wong's (2010) population-based study among Hong Kong adults (10.7%) (Wong & Fielding, 2010b). The prevalence difference may be due to the differences in sample characteristics between the two studies. For example, we did not include females or non-workers who may report different levels of fatigue. Among the background factors that we tested, education levels were positively associated with fatigue; the positive association is consistent with that of previous studies (Mollaoglu & Üstün, 2009).

The results highlight a potential need to reduce fatigue for male workers in Hong Kong, especially for those with high workaholism scores and high education levels, as fatigue may be a significant health issue for these groups and it can induce depression. Prevalence of probable chronic fatigue was even much higher than that of probable depression in our sample, suggesting its urgent need to be addressed. Other potential consequences and associates of chronic fatigue in addition to depression also need to be tested in this sample. Additional work is also warranted to validate our findings in clinical subjects with clinical diagnosis of fatigue and depression. Effective psycho-social interventions, such as mindfulness-based stress reduction (MBSR), for reducing disease-induced fatigue are available (e.g., cancer) among clinical samples but have not been tested among community/non-clinical populations (Carlson & Garland, 2005; Cramp et al., 2013; Goedendorp, Gielissen, Verhagen, &

Bleijenberg, 2009). Future studies need to modify the interventions and test their effects on reducing chronic fatigue and preventing depression among workers.

Work-life balance stress was positively correlated with fatigue in the correlation analysis. It is consistent with previous studies (Bohle et al., 2011; Bohle, Quinlan, Kennedy, & Williamson, 2004; Kocalevent et al., 2011). However, this association was not significant in the model when the effect of stress on depression was accounted. It is plausible that the effect of work-life balance stress on fatigue was weaker than that on depression; thus, when we controlled for the effect of stress on depression, its effect on fatigue became non-significant. This result also suggests that fatigue and depression are related (e.g., sharing some common symptoms) but different concepts/conditions (Visser & Smets, 2014). The relationships between work-life balance stress and fatigue need more work to explore. Additional work is also needed to identify why work-life balance stress was more associated with depression than fatigue.

Our study found significantly positive associations between workaholism and depression in both bivariate correlation analyses and path analysis. Together with the positive relationships between workaholism and stress/fatigue, our results support the negative role of workaholism on one's quality of life and health (Bonebright et al., 2000), and imply a potential need to reduce such an addiction through individual or organizational-level interventions (Andreassen, 2014). Health behavioral change interventions may help individuals to develop a healthy life style and reduce their work addiction. Employers need to be aware of the negative consequences of workaholism and understand that excessive work does not mean being productive; they can help to adjust their employees' work behaviors by establishing norms and values that cater to maintain both work efficiency and work-health balance, and offering their employees training in time and stress management (Andreassen, 2014). Workaholism, like other emerging behavioral addiction such as Internet (gaming) addiction, is a non-substance addiction, and its causes, consequences and mechanisms have not been well studied. Thus, more theoretical and empirical studies on workaholism are warranted.

Limitations of this study included the exclusion of female participants, the cross-sectional design to study the mediation model, and the single-item non-validated measure of work-life balance stress. The cross-sectional study could not demonstrate the causal relationships between the studied variables. It is plausible that ones' emotional and mental health disorders may in turn reduce their ability to keep work-life balance, and increase the likelihood of problematic behaviors to avoid or escape from their negative emotions. Longitudinal studies are necessary in future work. In addition, some potentially important moderators, such as gender, stress-coping strategy/resource, and work-life value, were not tested in the model. Although we reported the CFA of the BWAS and its correlations with depression/fatigue, a comprehensive study for scale and cutoff validation is warranted. Finally, our sampling and data collection method might exclude non-users of land-line phones and some workaholics who were busy with work and thus less likely to join the study.

In spite of these limitations, the study suggests two potential mechanisms, work-life balance stress and fatigue, to explain the association between workaholism and depression. The partial mediation effects suggest that there may exist other mediators to explain this relationship and more studies are warranted. The need of interventions to enhance well-being and health outcomes for male workers in Hong Kong is highlighted given their high prevalence of fatigue and the negative consequences of workaholism.

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**Authors' contribution:** XY conceptualized the aims and hypotheses for the study. XY and JTFL took primary responsibility for drafting the introduction, analyses, results, and discussion. DQ assisted with manuscript drafting, and data analyses. MCML assisted with data collection. All authors have approved the final article.

**Conflict of interest:** The authors declare no conflict of interest.

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## Abbreviations

ADHD:	Attention-deficit hyperactivity disorder
CESD-10:	The 10-item Center for Epidemiologic Studies Depression Scale
CESD-20:	The 20-item Center for Epidemiologic Studies Depression Scale
CFS:	Chalder Fatigue Scale
CI:	95% confidence interval
MBSR:	mindfulness-based stress reduction

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