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Work Addiction and Depression, Anxiety, and Stress: the Mediating Role of Food Addiction Among Lebanese Young Adult Workers

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Abstract
Work addiction is considered a public health concern, as it can lead to negative and harmful health outcomes. However, patterns leading from work addiction to mental health concerns remain so far largely unknown and under-studied. We aimed to verify whether the relationship between work addiction and psychological distress (i.e., depression, anxiety, and stress) is mediated by food addiction among young adult workers in the context of Lebanese culture. The second objective was to validate the Arabic version of the Bergen Work Addiction Scale (BWAS). The online cross-sectional survey was conducted among 1268 Lebanese young adult workers (65.1% females, mean age 26.18 years) using the Bergen Work Addiction Scale, the Depression Anxiety and Stress Scale, the Yale Food Addiction Scale, and the Three-Factor Eating Questionnaire. The PROCESS SPSS Macro version 3.4, model four, was used to compute the mediation analysis. Findings revealed that 175 (13.8%) were presented as work-addicted individuals, and 226 (17.8%) exhibited *addictive*-like eating behaviors. Bivariate analyses showed that higher degree of work addiction and food addiction was significantly associated with higher levels of depression, anxiety, and stress. The results of the mediation analysis showed that the association between work addiction and depression, anxiety, and stress was mediated by food addiction. In light of our findings, we cautiously suggest that the link of work addiction to psychological distress via food addiction implies that strategies targeting food addiction might mitigate the harmful effects of work addiction on workers' mental health.

Keywords Work addiction · Depression · Anxiety · Stress · Food addiction · The Bergen Work Addiction Scale · Arabic sample

Work addiction (WA) refers to "the stable tendency of excessive and compulsive working" (Andreassen, 2014). It has been defined by consensus as a behavioral addiction (Atroszko,

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2019; Atroszko & Griffiths, 2017; Griffiths et al., 2018) that "is characterized by the loss of control over the working activity and persists over a significant period of time" (Atroszko et al., 2019). This problematic behavior related to work leads to "a significant harm and distress of a functionally impairing nature to the individual and/or other significantly relevant relationships" (Atroszko et al., 2019). Although WA shares various similarities with addictive behaviors (Andreassen et al., 2012a, b), including loss of control despite the known negative impact on health, the problem may be challenging to identify. Indeed, some features are opposite to other behavioral addictions (such as gaming and eating behaviors) (Lichtenstein et al., 2019), involving many positive aspects of engaging in WA, such as receiving recognition, gratification, financial benefits, and social status (Lichtenstein et al., 2019). Thus, despite its well-known clinical relevance, and having gained increased recognition as a disorder by the scientific community (Atroszko, 2019), WA has not yet been included as a diagnosis in formal diagnostic and classification systems (American Psychiatric Association & Association, 2013; Organization, 2018). To be recognized by psychiatric nosology, a deeper understanding and knowledge of its causation mechanisms, course, and outcomes and, as such, advancements in research on WA are still highly needed (P. A. Atroszko, 2019).

Work Addiction and Subsequent Psychological Distress

As previously mentioned, some evidence suggests that WA is associated with positive outcomes, including more job satisfaction (Ng et al., 2007) and overall career satisfaction (Bakker et al., 2009). However, it is also well-established that WA is considered a public health concern (Andreassen et al., 2014; Quinones & Griffiths, 2015; Sussman, 2012), as it can lead to negative and harmful health outcomes (Andreassen, 2014; Quinones & Griffiths, 2015; Shimazu et al., 2015; Sussman, 2012; van Beek et al., 2011). WA has a negative impact on both mental and physical health (Del Líbano et al., 2012; Schaufeli et al., 2009a, c; Taris et al., 2010; Taris et al., 2005). Common mental health consequences include psychosomatic symptoms (Schaufeli et al., 2008; Schou Andreassen et al., 2007), sleep problems (Andreassen, 2014; Kubota et al., 2010), conflicts between family life and work (Drønen, 2012), low life satisfaction (Shimazu et al., 2012), impaired quality of life (Azevedo & Mathias, 2017b; Lichtenstein et al., 2019), and poor well-being (Andreassen, 2014; Andreassen et al., 2011; Quinones & Griffiths, 2015; Schaufeli et al., 2009b; Shimazu et al., 2015). Apart from these psychosocial consequences, WA has been demonstrated to be strongly and consistently associated with high levels of depression (Carroll & Robinson, 2000), anxiety (Bartczak & Ogińska-Bulik, 2012; Robinson, 1999), and stress (Clark et al., 2016; Griffiths et al., 2018; Lichtenstein et al., 2019; Sandrin & Gillet, 2018). These work-related mental disorders engender heavy costs at the individual, institutional, and social levels (e.g., Atroszko (2019)). In addition, prolonged exposures of workers to depression, anxiety, and stress are likely to lead to heightened risk of cardiovascular disease (Cohen et al., 2015), inflammation (Pitsavos et al., 2006; Zou et al., 2020), metabolic problems (Kinley et al., 2015; Ruiz et al., 2018), and even suicide (Vilhjálmsson et al., 1998). However, despite these data, it has been shown that it takes considerable time for WA-related impact on workers' mental health to become evident (Griffiths et al., 2018). Also, patterns leading from WA to mental health concerns remain so far largely unknown and under-studied (Balducci et al., 2018).

Food Addiction as a Mediator Between WA and Psychological Distress

Food addiction (FA) fits into the criteria for behavioral addiction, including the urge for food intake with a relative tolerance and the presence of some psychological and physiological food withdrawal-like symptoms (Bonder et al., 2018; Lennerz & Lennerz, 2018). However, unlike other eating disorders and behavioral addictions, there is no consensus definition of FA (Long et al., 2015). Similar to other substance and behavioral addictions, FA seems to be directly associated with a wide range of psychopathology, including mood disorders, anxiety disorders, and stress (Piccinni et al., 2021). At the same time, certain eating patterns and disorders have been previously linked to high workload (Schulte et al., 2007) and WA (Atroszko et al., 2021). For example, a few previous studies documented a co-occurrence of multiple addictive behaviors, including compulsive working and food starving, in young adults (MacLaren & Best, 2010; Pallanti et al., 2006).

Despite literature on the association between these two entities is scant (Atroszko et al., 2021), with no previous studies having reported an association between WA and FA to our knowledge, there are plausible arguments supporting a possible association between these two behavioral addictions. First, both WA and FA operate similarly to other addictions, involving core symptoms of addiction (e.g., tolerance, salience, withdrawal, conflict, problems, and relapse (Andreassen et al., 2013)). Second, WA and FA share similar clinical features, including impulsivity, perfectionism, and low self-esteem (Hauck et al., 2020; Maxwell et al., 2020; Serrano-Fernández et al., 2019; Wang & Lopez-Fernandez, 2019). Third, both WA and FA show similar associations with some constructs such as burnout, mood and anxiety disorders, and impaired psychological well-being, as well as certain personality traits (e.g., high neuroticism) (Atroszko et al., 2020; Brown & Pashniak, 2018; Brunault et al., 2018; Piccinni et al., 2021; Serrano-Fernández et al., 2021; Therthani et al., 2022). Therefore, it could be hypothesized that WA will show significant positive association with FA (Atroszko et al., 2021).

WA Assessment Measures

Several self-report Likert measures have been developed to assess WA, such as Workaholism Battery (WorkBAT) (Spence & Robbins, 1992), Work Addiction Risk Test (WART) (Robinson, 1996), and Dutch Workaholism Scale (DUWAS) (Schaufeli et al., 2009c). However, all these scales had major flaws, since they demonstrated poor psychometric properties (e.g., McMillan et al. (2002)), with a lack of evidential and theoretical support (Quinones & Griffiths, 2015), and failed to consider WA as one construct (Quinones & Griffiths, 2015). More recently, Andreassen et al. developed and validated the Bergen Work Addiction Scale (BWAS), which is aimed at exploring the core behavioral addiction symptoms (Andreassen et al., 2012a, b), and enables prevalence estimates to be obtained using an established cutoff for WA (Andreassen et al., 2012a, b). The BWAS has been translated and validated in different languages, including Danish (Lichtenstein et al., 2019), Polish (Atroszko et al., 2017), Turkish (Denizci Nazlıgül et al., 2021), and Italian (Molino et al., 2021). Although the BWAS has been recognized as the most recommended measure of WA for future research (Lichtenstein et al., 2019), no Arabic version is available as far as authors are aware.

The Present Study

The differences between cultural values across countries and over time have proven to substantially affect WA (Hu et al., 2014; Lior et al., 2018). Differences between countries lie to how national culture values hard, and engaged work and career advancement (Lior et al., 2018), but also to other factors, including employment policies pertaining to working conditions and career evolution (e.g., financial and non-financial rewarding of employees according to their performance). Most of the Arab countries have low growth in employment and productivity, making the move from education to productive and decent work quite challenging for young people (Kawar, 2010). In these countries, work patterns are imprinted by cultural traits that are unique to the Arab social environments (Sidani & Thornberry, 2010). However, the majority of existing research has focused mostly on exploring this phenomenon in the Western and Eastern cultures (Hu et al., 2014), while scarce literature emerged from developing countries of the Arab world. In addition, the very few existing Arab studies have been performed among specific working populations (e.g., healthcare workers (Adolfo et al., 2021; Kasemy et al., 2020) or managers (Burke & El-Kot, 2010)), which may not reflect the situation in the wider workers community. Moreover, none of these studies used the BWAS to measure WA. To overcome these gaps, and deepen our knowledge of the patterns leading from WA to psychopathology, we propose through this study to verify whether the relationship between WA as the independent variable and psychological distress (i.e., depression, anxiety, and stress) as the outcome is mediated by FA among young adult workers in the context of Lebanese culture. In addition, a validation of the Arabic version of the BWAS was performed during the course of this study.

Methods

Participants and Procedure

The current study was part of a large cross-cultural project (conducted in Lebanon and Poland) focusing on the Multidimensional Approach to Eating and Obesity (the MATEO study; *N*=1268) (Brytek-Matera et al., 2021). In this manuscript, we only focused on the data from Lebanon. Data was collected between September and November 2020 during the COVID-19 pandemic, when quarantine and social distancing procedures were implemented by the Lebanese Government. The sample was recruited through a snowball technique, from all Lebanese governorates (Beirut, Bekaa, Mount Lebanon, South Lebanon and North Lebanon). The participants were asked to forward the link to their contact list via social media applications. Before obtaining the informed consent, the participants were notified about the objective of the study and assured of the anonymity of the response. Participants had the right to enroll in this study without any obligation or pressure from the research team with no monetary compensation given to them for participation. A total of 1268 persons participated in the present study by filling in an online survey.

Minimal Sample Size Calculation

A minimal required sample of 413 was deemed necessary using the formula suggested by Fritz and MacKinnon (Fritz & Mackinnon, 2007) to estimate the sample size, $n = \frac{L}{f2} + k + 1$, where f=0.14 for small effect size, L=7.85 for an α error of 5% and power β=80%, and k=12 variables to be entered in the model.

Data Collection

The first of the Arabic questionnaire contained sociodemographic characteristics: age, sex, educational level, marital status, body mass index (BMI) calculated from self-reported height and weight measurements. The second part contained the following scales:

The Bergen Work Addiction Scale (BWAS) defines workaholism as having seven main addictive components: (1) preoccupation with work; (2) mood modification, work to go away from or avoid emotional pain; (3) conflict; (4) withdrawal, dysphoria when not allowed to work; (5) tolerance, increase efforts to attain the same mental and physiological effect; (6) relapse; and (7) problems, work excessively to the point of harming one's health (Andreassen et al., 2012a, b). All items are scored on a 5-point Likert scale ranging from never (1) to always (5), and inquire how frequently the symptoms have occurred in the last year. A score of "often" or "always" on four out of seven components indicates workaholism. The Arabic version is displayed in Table 5 in the Appendix.

The Arabic version (Ali & Green, 2019) of the Depression Anxiety and Stress Scale (DASS-21) was used for assessing of mental health issues. It is composed of 21 items, scored on a 4-point Likert scale, and yields 3 scores for depression, anxiety, and stress. The higher the scores, the more the presence of the mental health issue. In this study, the Cronbach's alpha values were very good for depression (0.850), anxiety (0.845), and stress (0.917). We chose these three variables to assess divergent validity since FA has been previously shown to be associated with mental health issues (Abdelrehim, 2021; Lin et al., 2020; Raymond & Lovell, 2016).

The Arabic version (Fawzi & Fawzi, 2018) of the modified version of the Food Addiction Scale (mYFAS) was used for assessing food addiction. Validated in Lebanon (Hallit et al., 2022), it is composed of 9 question items, one from each of the 7 diagnostic criteria's symptom groups, plus two unique items that measure the existence of clinically substantial impairment and distress (Flint et al., 2014). The criteria are satisfied if at least one question from each the criterion is scored as one. The criteria satisfied (excluding impairment/distress) can be added together to get a continuous symptom count. That is, the number of symptoms might range from zero to seven. When at least three symptoms and the criteria of clinically substantial impairment or distress are fulfilled, food addiction can be diagnosed.

We used the Three-Factor Eating Questionnaire (TFEQ-R18), one of the most used methods to evaluate eating behaviors. It measures three aspects of eating behavior: cognitive restraint (CR), uncontrolled eating (UE), and emotional eating (EE). It is composed of 18 items coded on a four-point Likert scale (Angle et al., 2009). Each response is given a score between 1 and 4 (Karlsson et al., 2000). Domain scores are calculated as the average of all items within each subscale, ranging from 1 to 4 (CR: 6 items, UE: 9 items, and EE: 3 items), with greater domain scores indicating greater CR, UE, and EE (Karlsson et al., 2000). Higher scores in the respective scales are indicative of greater cognitive restraint, uncontrolled, or emotional eating.

The Arabic version (IPAQ Website, n.d.) of the International Physical Activity Questionnaire (IPAQ) Short Form (Craig et al., 2003) is a regularly used measure for assessing physical activity and sitting time that people engage in on a daily basis in order to calculate total physical activity and sitting time. The brief version consists of seven items that cover three distinct types of activities (relaxation time, household and gardening (yard) activities, work-related or transportation-related activity, and sitting). The particular types of activity that are measured are walking, moderate-intensity activities, and vigorous-intensity activities. For each type of activity, frequency (days per week) and duration (time per day) are recorded independently. The questions were designed to produce individual scores for each activity level, as well as a combined total score to indicate entire activity level. The total score is computed by adding the duration (in minutes) and frequency (in days) of walking, moderate-intensity, and vigorous-intensity exercise. There are three categories: insufficiently active; minimally active ($\geq$3 days of high-intensity activity (at least 20 min/day) or $\geq$ 5 days of moderate-intensity activity or walking (at least 30 min/day) or $\geq$5 of any combination of walking, moderate-intensity, or high-intensity activities (at least 600 MET-min/week)); HEPA (surpass the minimal public health physical activity standards).

Statistical Analysis

SPSS version 25 was used to perform the statistical analysis. Cronbach's alpha values were recorded for reliability analysis for the total scales, with values higher than 0.7 indicating adequate composite reliability (Taber, 2018). To confirm the BWAS construct validity, a confirmatory factor analysis (CFA) was carried out using Mplus v7.2. The root mean square error of approximation (RMSEA) statistic, standardized root mean squared residual (SRMR), the Tucker-Lewis index (TLI), and the comparative fit index (CFI) were used to evaluate the goodness-of-fit of the model as these are the most commonly used indices (Byrne, 2013). Values of RMSEA of 0.06 or less indicate a good-fitting model and a value larger than 0.10 is indicative of a poor model (Byrne, 2013), while TLI and CFI values greater than 0.95 indicate good model fit (Byrne, 2013). Finally, SRMR values $\leq$0.08 indicate good model fit (Hu & Bentler, 1999).

The normality of distribution of the BWAS score was confirmed via a calculation of the skewness and kurtosis; values for asymmetry and kurtosis between -1 and $+1$ are considered acceptable in order to prove normal univariate distribution (Hair Jr et al., 2021). The Student t test was used to test for an association between the BWAS score and dichotomous variables. Finally, the Pearson correlation test was used to correlate continuous variables. The PROCESS SPSS Macro version 3.4, model four (Hayes, 2017), was used to calculate three pathways. Pathway A determined the regression coefficient for the effect of work addiction on food addiction; pathway B examined the association between food addiction and mental health; and pathway C' estimated the direct effect of work addiction on mental health. An indirect effect was deemed significant if the bootstrapped 95% confidence intervals of the indirect pathway AB did not pass by zero. Covariates that were included in the mediation model were those that showed an effect size or correlation $> \left| 0.24 \right|$ in the bivariate analysis to have parsimonious models (Vandekerckhove et al., 2014). P<0.05 was deemed statistically significant.

Results

Sociodemographic Characteristics of the Participants

The mean age of the participants was 26.18 years (SD = 11.17), with 65.1% females. Other characteristics are summarized in Table 1. The results showed that 175 (13.8%) had WA, whereas 226 (17.8%) had FA.

Confirmatory Factor Analysis of the Arabic Version of the Bergen Work Addiction Scale (BWAS)

The following results were obtained from the CFA of the one-factor model: TLI= 0.911, CFI= 0.941, RMSEA= 0.078 [95% CI 0.065–0.091], SRMR= 0.038, respectively, indicating an excellent fit of the model. When adding a correlation between

Table 1 Sociodemographic and other characteristics of the participants (*N*=1268)

Variable	*N* (%)
Gender	
Male	443 (34.9%)
Female	825 (65.1%)
Marital status	
Single	953 (75.2%)
Married	315 (24.8%)
Education level	
Secondary or less	262 (20.7%)
University	1006 (79.3%)
Variable	Mean ± SD
Age (in years)	26.18 ± 11.17
Body mass index (kg/m^2)	24.99 ± 5.81
Work addiction (BWAS)	16.88 ± 6.04
Depression (DASS-21)	17.08 ± 8.98
Anxiety (DASS-21)	16.43 ± 8.81
Stress (DASS-21)	12.86 ± 9.59
Food addiction (mYAS)[a]	17.60 ± 7.50
Cognitive restraint (TFEQ-R18)	15.40 ± 3.35
Uncontrolled eating (TFEQ-R18)	18.64 ± 5.73
Emotional eating (TFEQ-R18)	5.85 ± 2.31
Total physical activity (IPAQ-SF) (MET-min·wk^{-1})[b]	10,950.49 ± 16,224.08

Note: *BWAS*, the Bergen Work Addiction Scale; *DASS-21*, the Depression, Anxiety and Stress Scale; [a]*mYAS*, the modified version of the Yale Food Addiction Scale; [a]food addiction status was based on presenting at least 3 of the 7 dependence symptoms and meets criterion for clinical significance (Flint et al., 2014); *TFEQ-R18*, the Three-Factor Eating Questionnaire; *IPAQ-SF*, the short version of the International Physical Activity Questionnaire; MET-min·wk^{-1}, MET-minutes per week

residuals of items 6 and 7, the fit indices improved more as follows: TLI= 0.934, CFI= 0.959, RMSEA= 0.067 [95% CI 0.054–0.080], SRMR= 0.032 respectively. Figure 1 presents the standardized coefficients with p values of the direct effects of variables on each other. All items of the BWAS scale converged into one factor, with all loadings varying between 0.59 and 0.74 (higher than the 0.5 cutoff value suggested by Chin (Chin, 1998)). The Cronbach's alpha of the scale was 0.811.

Bivariate Analysis

The results of the bivariate analyses are summarized in Tables 2 and 3 to determine which variables would be considered in the mediation model.

Mediation Analysis

The results of the mediation analysis are summarized in terms of direct and indirect effects in Table 4 and in terms of regression coefficients and standard errors in Figs. 2, 3, and 4. FA mediated the association between WA and depression (Fig. 2), anxiety (Fig. 3), and stress (Fig. 4). Those results were considered adjusted over all variables that showed an effect size or correlation > 0.24.
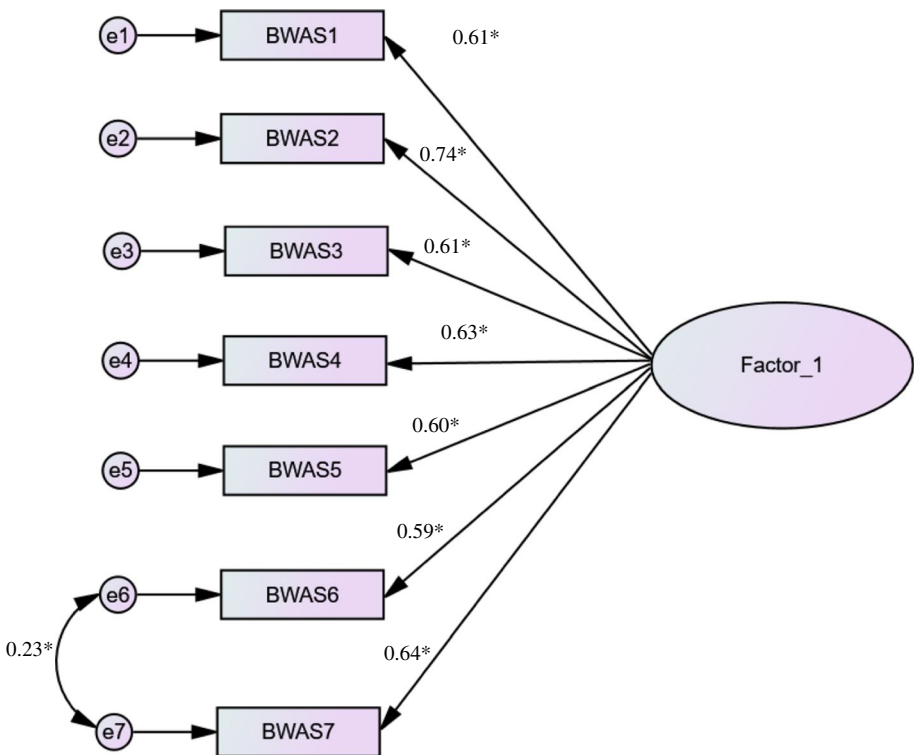

Fig. 1 Standardized loading factors of the Bergen Work Addiction Scale. *$p<0.001$

Table 2 Bivariate analysis of categorical variables associated with depression/anxiety/stress

Variable	Depression			Anxiety			Stress		
	Mean ± SD	p	Effect size	Mean ± SD	p	Effect size	Mean ± SD	p	Effect size
Gender		0.201	0.088		0.415	0.057		0.472	0.050
Male	17.19 ± 9.03			16.78 ± 8.98			13.21 ± 9.61		
Female	17.85 ± 8.21			17.19 ± 7.93			13.60 ± 8.56		
Marital status		0.030	0.122		0.139	0.083		0.606	0.029
Single/widowed/divorced	18.00 ± 8.61			17.30 ± 8.40			13.56 ± 9.12		
Married	16.92 ± 8.29			16.58 ± 8.13			13.29 ± 8.62		
Education level		0.138	0.083		0.104	0.176		0.141	0.160
Secondary or less	17.79 ± 8.35			17.24 ± 8.14			13.66 ± 8.72		
University	16.89 ± 9.14			16.22 ± 8.98			12.65 ± 9.81		

Table 3 Bivariate analysis of continuous variables associated with depression/anxiety/stress

Variable	Depression		Anxiety		Stress	
	r	*p*	r	*p*	r	*p*
Depression	1	**-**				
Anxiety	0.941	**<0.001**	1	**-**		
Stress	0.909	**<0.001**	0.910	**<0.001**	1	**-**
Work addiction	0.436	**<0.001**	0.409	**<0.001**	0.432	**<0.001**
Food addiction	0.467	**<0.001**	0.460	**<0.001**	0.537	**<0.001**
Cognitive restraint	0.408	**<0.001**	0.399	**<0.001**	0.292	**<0.001**
Uncontrolled eating	0.382	**<0.001**	0.381	**<0.001**	0.462	**<0.001**
Emotional eating	0.362	**<0.001**	0.365	**<0.001**	0.459	**<0.001**
Total physical activity	0.002	0.956	0.028	0.313	−0.012	0.656
Body mass index	0.107	**<0.001**	0.119	**<0.001**	0.154	**<0.001**
Age	−0.045	0.109	−0.032	0.252	0.033	0.244
Years of work	−0.055	**0.050**	−0.017	0.542	−0.035	0.208

IPAQ-SF, the short version of the International Physical Activity Questionnaire; *r*, Pearson correlation coefficient; numbers in bold indicate significant *p* values

Table 4 Mediation analysis: direct and indirect effects of the association between work addiction and depression/anxiety/stress, taking food addiction as a mediator

	Direct effect			Indirect effect		
	Effect	SE	*p*	Effect	SE	95% BCa
Depression	0.39	0.03	<0.001	0.05	0.01	0.03–0.07*
Anxiety	0.33	0.03	<0.001	0.05	0.01	0.03–0.07*
Stress	0.40	0.04	<0.001	0.05	0.01	0.03–0.08*

*Indicates significant mediation; direct effect, effect of work addiction on depression/anxiety/stress in the absence of the mediator; indirect effect, effect of work addiction on depression/anxiety/stress in the presence of the mediator; *SE*, standard error; *BCa*, bootstrap confidence interval

Discussion

Research on WA is relatively new and growing (Clark et al., 2016), remains limited, and of low quality (Andreassen et al., 2018). Most of the prior research has been conducted in Western and Eastern countries (Hu et al., 2014), while only very limited research has been done in Arab countries. Lebanon is an Arab developing country with a large youthful population that faces unprecedented economic and political crises (Chaaban & El Khoury, 2016; du Liban & Unies, 2019), and whose labor market is characterized by very high rates of youth unemployment, skill-mismatch problems, misaligned expectations, and increased desire to emigrate (Dibeh et al., 2019). Due to these local specificities, Lebanon represents an interesting case on WA research. Exploring the mediating factors between WA and psychological distress has never been performed as far as we know, and there are no studies to date on WA in the Lebanese population. Taking all these data into account, we carried out the present study to test the hypothesis that the association between WA and depression, anxiety, and stress is mediated by FA among Lebanese workers. In all path analyses, models showed partial mediation confirming our hypothesis.
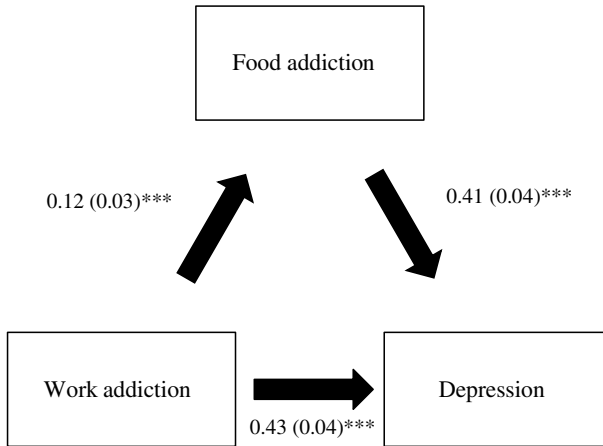
Fig. 2 Relation between work addiction and depression, mediated by food addiction. Numbers are displayed as regression coefficients (standard error). ***$p<0.001$
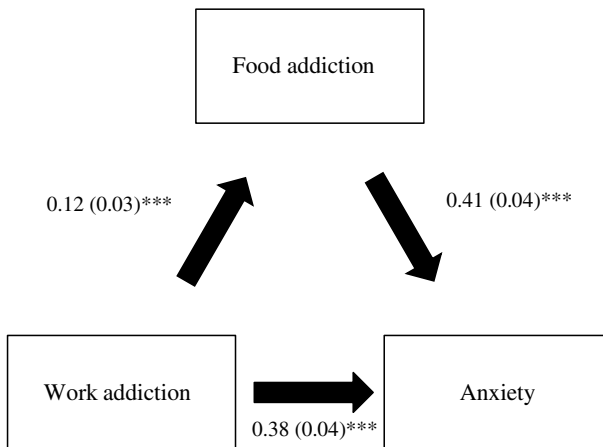

Fig. 3 Relation between work addiction and anxiety, mediated by food addiction. Numbers are displayed as regression coefficients (standard error). ***$p<0.001$

Validation of the Arabic Version of the BWAS

We tested the psychometric features of the Arabic version of the BWAS. Our findings supported the psychometric robustness of the scale. As we expected, the confirmatory factor analysis was able to replicate the 7-item one-factor structure of the BWAS found by Andreassen et al. (2012a, b) in their original validation work in Western samples. Consistently, the unidimensional structure was also replicated in other validation works in Denmark (Lichtenstein et al., 2019), Turkey (Denizci Nazlıgül et al., 2021), and Italy (Molino et al., 2021), whereas a Polish study failed to support the original one-factor solution of the BWAS (Atroszko et al., 2017). Our findings also suggested that the BWAS in its Arabic version has good reliability, with a Cronbach's alpha value of 0.811 for the total scores, corroborating the good psychometric characteristics of the original
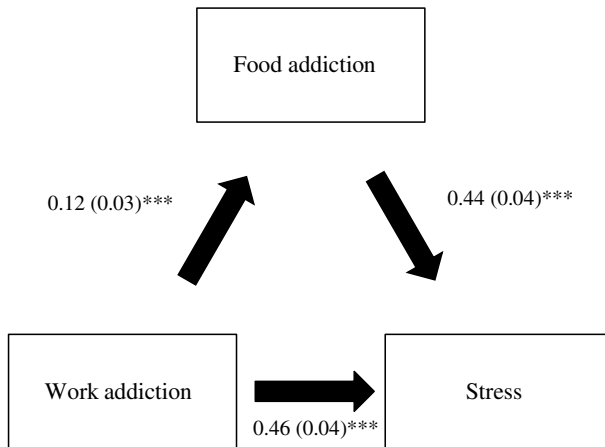
Fig. 4 Relation between work addiction and stress, mediated by food addiction. Numbers are displayed as regression coefficients (standard error). ***$p<0.001$

version of the BWAS which yielded alpha values of 0.80–0.84 (Andreassen et al., 2012a, b). Similar evidence of adequate reliability was also found in the Danish ($\alpha = 0.83$) (Lichtenstein et al., 2019), Italian ($\alpha = 0.82$) (Molino et al., 2021), Polish ($\alpha = 0.84$) (Atroszko et al., 2017), and Turkish ($\alpha = 0.76$) (Denizci Nazlıgül et al., 2021) validation studies. Overall, the present findings reinforce the ability of the Arabic version of the BWAS to evaluate the seven core elements of WA throughout a unidimensional measure, practical, and easy-to-use to detect WA in Arabic-speaking workers. The assessment of WA using BWAS represents the first step towards supporting individual intervention and monitoring in workplace settings. Arabic is the fifth most spoken language in the world, with more than 420 million Arabic-speaking individuals globally (Kamusella, 2017). An Arabic version of the BWAS would allow clinicians and researchers to explore WA in Arab settings, and compare findings from countries speaking different languages, having various cultural backgrounds and different levels of development (Ziegler & Bensch, 2013). These cross-cultural comparisons may help gain advanced knowledge of the conceptualization, assessment, and diagnosis of WA which are still largely unknown (P. A. Atroszko, 2019).

Prevalence of Work Addiction Among Lebanese Workers

Our findings revealed that WA prevalence was 13.8% among Lebanese workers. Previous studies having reported prevalence rates of WA using the BWAS found substantial differences across countries. For instance, estimates of WA prevalence were 6.6 % in Denmark (Lichtenstein et al., 2019), 8.3% in Norway (Andreassen et al., 2014), 6.0–10.3% in Italy (Molino et al., 2021), 17.4% in Poland (Atroszko et al., 2017), 18.1% in Turkey (Denizci Nazlıgül et al., 2021), and 20.6% in Hungary (Orosz et al., 2016). Cross-cultural research highlighted that individuals from Eastern countries (i.e., China and Japan) experienced higher rates of WA than those from Western countries (i.e., Finland, the Netherlands, and Spain) (Hu et al., 2014). Apart from the cultural orientation of these countries (individualistic versus collectivistic), other factors would have contributed to these differences as suggested by authors, such as variation in work ethic (self-enhancement and personal development in the Western world, versus enhancement of the group and self-sacrifice in the Eastern world) (Hu et al., 2014). However, it is worth noting that other variables also contribute

to the differences in prevalence estimates between studies, including methodological differences (measures, samples, response rates) (Lichtenstein et al., 2019). As previously mentioned, studies from Arab countries are scarce, which makes it difficult to make comparisons. In Saudi Arabia, 37% of the nurses assessed using the Work Addiction Risk Test (WART) displayed high levels of WA tendencies (Adolfo et al., 2021). An Egyptian study using the Dutch Workaholism Scale (DUWAS) found that 24% of healthcare workers versus 5.9% non-healthcare workers exhibited WA (Kasemy et al., 2020). Another study from Egypt surveyed university staff during COVID-19 pandemic using the DUWAS, and found that 33% were workaholics before COVID-19 pandemic, whereas rate significantly increased to 43.5% after COVID-19 (Allam et al., 2021). The high prevalence rates of WA in this study have been explained by the fact that Egyptian workers often resort to extra hours to compensate for low salaries (Allam et al., 2021). Although the prevalence rates are difficult to compare across studies, it can be deduced that WA is relatively frequent in Lebanese workers. The current Lebanese economic and political crisis is not without impact on the working population. Indeed, prevalence rates are often subject to the interplay between local culture, socioeconomic conditions, and economic pressures (Atroszko et al., 2019, 2020). Further research in different countries and settings is needed to consolidate our findings.

Direct Mediation Effects

In agreement with the available literature data, we found that WA was significantly and positively associated with psychological distress, in terms of depression (Bartczak & Ogińska-Bulik, 2012; Quinones & Griffiths, 2015), anxiety (Bartczak & Ogińska-Bulik, 2012; Robinson, 1999), and stress (Bartczak & Ogińska-Bulik, 2012; Quinones & Griffiths, 2015; Schaufeli et al., 2009b). Serrano-Fernández et al. (Serrano-Fernández et al., 2021) have recently showed that WA variables (i.e., excessive work and feelings generated by work) helped to predict 18.3% of depression and 20.3% of anxiety in Spanish workers. However, we emphasize that, due to the cross-sectional nature of the analysis, we are unable to suggest causality. It has been suggested that mental health problems including stress may have preceded WA, or be a result thereof (Lichtenstein et al., 2019). In the case distress is present before the emergence of work addiction behaviors, the latter has been hypothesized as a mechanism to cope with mental health issues (Lichtenstein et al., 2019). Stress has even been suggested as a potential etiological factor in the development of WA (Paweł Andrzej Atroszko, 2019). Additional longitudinal studies are necessary to investigate whether depression, anxiety, and stress are causal or subsequent to WA.

Indirect Mediation Effects

There is enough empirical data to support the relationships between FA, WA, and psychological distress of clinical relevance in young adults (Piccinni et al., 2021; Serrano-Fernández et al., 2021). On the other hand, it has been suggested that the interrelationship of work, food patterns, and disease is subject to cultural and social shaping (Schulte et al., 2007). Hence, the potential interest of our study relies on the fact that it describes the indirect effect of FA in the relationship between WA and psychological distress, in an under-researched cultural context (i.e., Arab) and an unexplored country (i.e., Lebanon). As expected, we found that FA played an indirect role in the associations between WA and depression, anxiety, and stress. Workers with WA are likely to develop subsequent mental health problems, and consequently develop other concurrent behavioral addictions, such as FA, to escape from distress and negative affects (Carpenter & Hasin, 1999). The coexistence of these two behavioral addictions has been linked to a worse overall prognosis, with poor health outcomes, more difficult clinical management, and heightened

healthcare costs (Valderas et al., 2009; Vall & Wade, 2015). By documenting for the first time a mediating (indirect) effect of FA on the link between WA and psychological distress, this study may have potential implications that we discuss below.

Study Strengths and Limitations

This study has strengths. First, we used well-validated measures. Particularly, we examined WA using the most contemporary and recommended measure (i.e., WAS (Andreassen et al., 2012a, b)), unlike previous Arab studies. Second, a convenient sample size was used, providing high statistical power (Cohen, 2013). Third, this study is (to the best of our knowledge) the first to investigate the role of FA as a mediator between WA and psychological distress.

This study also has limitations that deserve to be addressed. The main limitations lie to the use of a cross-sectional design and self-report measures. In addition, WA has not been investigated across various occupational groups. However, it is known that some occupations are highly demanding (e.g., more workload, more responsibilities, longer work time) (Dutheil et al., 2020). Also, in some professions (e.g., medical and healthcare fields), working excessively hard is rather considered a desirable trait (Kasemy et al., 2020). Thus, other studies evaluating WA across various occupational categories are highly required.

Study Implications

The results showed that WA is relatively common among Lebanese young adult workers, and that workers with higher levels of WA displayed greater psychological distress in terms of depression, anxiety, and stress. Evidence demonstrates that the unstable local political and economic context might further increase the burden of behavioral addictions and distress on workers (Atroszko et al., 2019, 2020), suggesting that this behavioral problem requires closer attention, and calling for urgent actions. Due to the lack of formal diagnostic criteria for WA, workers may be considered highly work addictive based on psychometric measures, hence the importance of validating the Arabic version of the BWAS in this study. Identifying and detecting the presence of WA in workplace settings should lead to specific interventions to workers. The group of workers at risk for WA or exhibiting high levels of WA should benefit from free and individual psychological counseling services (Ishiyama & Kitayama, 1994). Some interventions can be particularly helpful in overcoming WA, such as constructive leadership training (Molino et al., 2019). However, it is important to point out that to date there are no treatments available for WA, suggesting that there is an urgent need to develop therapeutic interventions and perform future experimental studies in this area (Azevedo & Mathias, 2017a; Nené, 2015).

Furthermore, in light of our mediation analyses' findings, we suggest that it can be useful to consider interventions that address WA and FA simultaneously. Indeed, the link of WA to distress via FA implies that strategies targeting FA might mitigate the harmful effects of WA on workers' mental health. Prevention and intervention programs are currently lacking (Atroszko et al., 2020; Austin, 2016); some approaches targeting both constructs have been proposed, such as cognitive-behavioral therapies (Atroszko et al., 2021), which are suggested to act on shared features of both WA and FA (e.g., poor problem-solving skills and problem-solving orientation (Aldao et al., 2010)).

Research on WA has been hindered by lack of consensus on terminology, definition, conceptualization, and measurement tools (Andreassen et al., 2014; P. A. Atroszko, 2019). Thus, there is a clear need for additional cross-cultural research to uncover the prevalence of WA in different cultural backgrounds with valid and reliable measures and to explore the extent to which the

various psychosocial and cultural contexts affect WA (Lichtenstein et al., 2019). Further longitudinal studies are also required, to help elucidate whether psychological distress is a cause, effect, or part of the clinical manifestation of FA and WA.

Conclusion

The present findings significantly expand the existing knowledge about WA and provide further insights into the interrelationships between WA, FA, and psychological distress. At the organizational level, findings suggest that assessing WA and related psychological distress among workers is meaningful as it can help promote mental health, limit healthcare costs, and prevent absenteeism. Mediation analyses results suggest that it may be useful to consider prevention and intervention strategies that address both WA and FA. These strategies need to be tailored to the local psychosocial and cultural context. Further longitudinal and experimental research on this topic is highly needed to gain advances in knowledge about the concept of WA across workplace settings and cultures. The good psychometric properties of the Arabic version of the BWAS validated in the current study would help extending research in the under-explored Arab sample.

Appendix

Table 5 Arabic version of the Bergen Work Addiction Scale

دائمًا	غالبًا	بعض الأحيان	نادرًا	أبدًا	
					فكرت في كيفية توفير المزيد من الوقت للعمل؟ thought of how you could free up more time to work?
					قضيت الكثير من الوقت في العمل مما كان مقصودًا في البداية؟ spent much time working than initially intended?
					عملت من أجل الحد من الشعور بالذنب والقلق والعجز و/ أو الاكتئاب؟ worked in order to reduce feelings of guilt, anxiety, helplessness and/or depression?
					أخبرك الآخرون بخفض ساعات العمل دون الاستماع إليهم؟ been told by other to cut down on work without listening to them?
					نتوتّر إذا تم منعك من العمل؟ become stressed if you have been prohibited from working?
					لم تعط أولويّة للهوايات و/ أو أنشطة ترفيهية و / أو ممارسة الرياضة بسبب العمل؟ deprioritized hobbies, leisure activities, and/or exercise because of work?
					عملت كثيرًا بحيث أثّرت سلبًا على صحتك؟ worked so much that it has negatively influenced your health?

Declarations

Ethics Approval and Consent to Participate The Psychiatric Hospital of the Cross Ethics and Research Committee approved this study protocol (HPC-040-2020). A written informed consent was considered obtained from each participant when submitting the online form. All methods were performed in accordance with the relevant guidelines and regulations.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests.

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