



# For freedom or income? Depression among independent self-employed individuals and the mediating mechanisms: empirical evidence from China

Yongjie Chen<sup>1,2</sup> · Zixian Zhang<sup>3</sup> · Tianyi Yang<sup>3</sup> · Jinxu Zhao<sup>3</sup> · Tianlan Liu<sup>3</sup> · Li He<sup>3</sup>

Accepted: 13 September 2023 / Published online: 3 October 2023  
© The Author(s) 2023

## Abstract

Independent self-employment (ISE) has a crucial impact on new job creation as well as sustainable and inclusive growth. However, the findings on depression status among self-employed individuals are mixed owing to the lack of targeted classifications or the use of different classification criteria. This study investigated the association between depression and ISE, and conducted a categorical comparison of ISE. Using logit models, the study employed data from the 2018 China Labor-force Dynamics Survey (CLDS) ( $N = 10,758$ ) to explore differences in depression status between individuals with ISE and those with non-ISE individuals and employees. Further, intellectual and physical ISE were distinguished. This study tested the mediating roles of job freedom and income. ISE individuals were significantly less likely to experience depression than non-ISE individuals and employees. The odds ratio (OR) of ISE with depression was 0.828 times that of non-ISE individuals and employees. The OR of intellectual ISE with depression was 0.717 times that of non-ISE individuals and employees. The regression results of depression in relation to physical ISE were not significant. A mechanism analysis showed that income (rather than work freedom) reduced the risk of depression among intellectually ISE individuals. Significantly different risk levels of depression were found between ISE individuals, and non-ISE individuals and employees in China, particularly between intellectually ISE individuals, and non-ISE individuals and employees. Moreover, the mediating role of income was identified, contradicting prior knowledge that a high degree of work freedom is what leads to high happiness and job satisfaction in self-employment.

**Keywords** Independent self-employment · Depression · Job freedom · Job income

## Introduction

Self-employment is crucial for creating new jobs and achieving sustainable and inclusive growth (OECD, 2017). As of November 2019, 33.7% of all employees worldwide were self-employed (Ilyashova et al., 2021). In China, the government generally uses the concept of flexible employment rather than self-employment. Flexible employment

includes informal, elastic, and non-standard employment. The two concepts share several characteristics such as work independence, a lack of security and discipline from a permanent formal labor contract, income instability, and marginal social security. By 2021, China had approximately 200 million flexible employees (National Development and Reform Commission, 2022),<sup>1</sup> accounting for 26.7% of the 750 million people employed in that year.<sup>2</sup> There are numerous self-employed individuals who face pressure due to job instability and economic insecurity (Ferrie et al., 2001; Mandelman & Montes-Rojas, 2009);

✉ Li He  
heli@zuel.edu.cn

<sup>1</sup> Hangzhou Normal University (School of Public Administration), Hangzhou, Zhejiang, China

<sup>2</sup> Centre for Urban Governance Studies, Hangzhou, Zhejiang, China

<sup>3</sup> Zhongnan University of Economics and Law (School of Philosophy), Wuhan, Hubei, China

<sup>1</sup> National Development and Reform Commission. [https://www.ndrc.gov.cn/fggz/jyysr/jysrsbxf/202205/t20220520\\_1324918.html?code=&state=123](https://www.ndrc.gov.cn/fggz/jyysr/jysrsbxf/202205/t20220520_1324918.html?code=&state=123) (Accessed on 19 November 2022).

<sup>2</sup> Ministry of Human Resources and Social Security of the People's Republic of China (PRC). [http://www.mohrss.gov.cn/xxgk2020/fdzdgnr/ghtj/tj/ndtj/202206/t20220607\\_452104.html](http://www.mohrss.gov.cn/xxgk2020/fdzdgnr/ghtj/tj/ndtj/202206/t20220607_452104.html) (Accessed on 22 November 2022).

they tend to languish at the margins of social security systems. Therefore, aspects of their psychological state (such as job satisfaction, sense of stress, and depression) have drawn increasing scholarly attention.

Although several studies have been conducted on depression among the self-employed, findings remain mixed. Some scholars have suggested that self-employed people have better psychological states and job satisfaction than traditional employees (Hessels et al., 2017; Lange, 2012; Nordenmark et al., 2012). Other studies have indicated that self-employed individuals experience more stress while working and have a greater probability of experiencing depression than others (Annink et al., 2016; Nordenmark et al., 2012). One possible reason for these mixed outcomes is the diversity and complexity in the types of self-employment. Some studies lack targeted classification or have used different classification criteria. Moreover, given China's large number of self-employed individuals, few scholars have specifically studied them or examined international research on the topic.

## The definition and classification of self-employment

### Self-employment

According to *Merriam-Webster's Collegiate Dictionary*, self-employed people include intellectual workers (e.g., writers, editors, accountants) and service suppliers. They work under their own direction, are not affiliated with any organization, and do not make a long-term commitment to any employer to pursue a particular profession. According to the definition of the Organisation for Economic Co-operation and Development (OECD), self-employment includes the work of employers, those who work for themselves, members of production cooperatives, and unpaid family workers (OECD, 2022). Some scholars consider self-employed people to normally be independent. Compared with people at an organization, self-employed individuals perform a wide range of activities separately for their own sake; they either do not pay taxes or pay taxes only on their income and are simultaneously excluded from the social insurance system (Ilyashova et al., 2021). While the above definitions and classifications vary, there is some degree of consensus. First, self-employment comes with a high degree of self-determination and independence, rather than being bound by formal labor contracts and organizational management systems, as is the case for workers in organizations. Second, self-employed individuals do not receive a regular fixed income. Third, self-employed people are on the margins of the tax and social security systems.

### Independent self-employed people

Prottas and Thompson (2016) classified self-employed individuals as small business owners and independent contractors. The difference is that the former employ others, whereas the latter are independent. The participants in this study were independent self-employed (ISE) people, who are similar to independent contractors and do not employ others, thus excluding self-employment with employees. Referring to Jang (2017), the present study further divided ISE into intellectual and physical ISE. Those who are intellectually independent such as writers, painters, self-publishing staff, and freelance photographers generally have higher levels of education, job autonomy, innovative requirements, and income levels, and their career choices are often based on personal interests or the pursuit of a high standard of living. Those who are physically independent are primarily engaged in physical work, and their job autonomy, stability, and income levels are relatively low. This category includes casual workers, nannies without a dispatch *danwei* (the 2018 China Labor-force Dynamics Survey [CLDS] indicated that a *danwei* is an independent institution with its own financial and personnel management authority), self-employed drivers, and artisans.

### Non-ISE and employees

Non-ISE individuals and employees consist of two groups. One group comprises people who are self-employed but not independent, such as small, medium, and large business owners (Prottas & Thompson, 2016). This group is considered self-employed, but is non-independent because they hire others. The other group consists of non-self-employed individuals who are employees in an organization. Summarizing Webster's (1977) study, a significant difference between non-ISE persons and employees, and ISE people is that the former category is embedded in explicit organizations. Thus, non-ISE people and employees can also be called workers within an organization. In this study, non-ISE people and employees include groups working in national and local public organizations, groups working in different types of medium and large enterprises (with > 8 employees), and small and micro enterprises (with 1–8 employees), and agricultural laborers (Gevaert et al., 2018). It is important to point out that in China, agricultural laborers are not strictly independent, but are embedded in the village committee, a grassroots autonomous organization. In rural areas where there are business assets, these villagers are incorporated into rural collective economic cooperatives or specialized operating companies, which in turn form equity or employment relationships.

**Table 1** Classification of ISE and non-ISE and representative groups

Type	Definition	Classification	Representative groups
ISE	Self-employed individuals who do not employ others	Intellectual ISE	Online writers, painters, self-published authors, freelance photographers, etc
		Physical ISE	Casual workers, nannies without a dispatch <i>danwei</i> , self-employed drivers, artisans, etc
Non-ISE and Employees	Workers embedded in an organization	Non-ISE individuals: Self-employed people who employ others (e.g., owners of small and large businesses) Employees	Groups working in state and local public organizations such as party and government entities; the military; institutions and autonomous organizations; medium and large enterprises such as state-run organs, private agencies, and collectives; foreign and joint ventures; small and micro enterprises; and the agricultural sector

*ISE* independent self-employment

Heterogeneity does exist among non-ISE people and employees. This heterogeneity may result in differences in the depression status. For example, depression may be different for non-ISE people and employees working in public and private organizations. However, there is also a significant commonality among non-ISE individuals and employees: organizational embedding characteristics. These characteristics lead to three basic pairs of relationships between the organization and this group: (1) the employment relationship; (2) the wage-labor relationship; and (3) the binding and dependent relationship. Non-ISE people and employees are generally more susceptible to supervision and control by an organization than ISE individuals, and they are less autonomous and less able to control their plans. This commonality helped this study to better focus the classification of ISE and the comparison with non-ISE individuals and employees.

In sum, this study distinguished between ISE, and non-ISE individuals and employees. The relevant information has been tabulated for ease of understanding (as shown in Table 1).

## Literature review

There is a clear divergence between different scholars on the relationship between occupation and depression among the self-employed.

On the one hand, some studies suggest that self-employment results in higher job satisfaction, better psychological status (Andersson, 2008; Binder & Coad, 2013), and a lower prevalence of depression (Hundley, 2001; Stansfeld et al., 2011). The reasons for this can be explored in terms of two explanatory dimensions: (1) job characteristics and (2) individual traits. Explanations rooted in job characteristics imply that self-employment leads to greater

independence, more autonomy (Nordenmark et al., 2012; Stephan & Roesler, 2010), and higher levels of job control (Cole et al., 2002; Hessels et al., 2017). Self-employed people can obtain more procedural utility than employed individuals (Benz & Frey, 2008). Procedural utility is distinguished from outcome utility, which is characterized by financial income, in the sense that it satisfies the human need for autonomy in self-determination. Individual trait-based explanations denote that the individual traits of the self-employed have a significant impact on their psychological satisfaction and health status. For example, self-employed people have better health not because of being self-employed, but rather due to the selection effect of being healthy people entering self-employment (Rietveld et al., 2015). Since opportunity entrepreneurs are more rich in individual traits (e.g., positive emotions, demand achievement), they are more likely to choose freelancing than demand entrepreneurs (Bruk-Lee et al., 2009; Lange, 2012). Some scholars use the concept of self-efficacy to summarize the abovementioned traits of self-employment, arguing that self-employed people have higher self-efficacy, meaning they have greater trust in their abilities, a more optimistic mindset, and better control.

Both of these explanations can be incorporated into the framework of self-determination theory (SDT) (Deci & Ryan, 2000). SDT suggests that individuals have three basic psychological needs: (1) autonomy; (2) competence; and (3) belonging. In particular, the need for autonomy implies that individuals desire to make their own choices when engaging in various activities according to their own wishes. They also want to feel unrestricted in their activities and have the power to choose their own behavior and decisions. This means that the occupational characteristics of self-employment (e.g., flexibility, disposability, autonomy) fit the psychology of those who have a strong need for

autonomy, which in turn motivates individuals intrinsically, increases their job satisfaction, and reduces their level of depression (Krueger & Brazeal, 1994; Judge et al., 1998).

However, on the other hand, some scholars have reached conclusions opposite to those discussed above, positing that self-employment may result in a worse mental state and higher prevalence of depression than traditional employment (Otsuka & Kato, 2000). This is mainly related to three factors. First, self-employed people are economically unstable (Beland et al., 2020; Fairlie, 2020). Due to a lack of secure employment contracts, self-employed people are vulnerable to external circumstances, such as market fluctuations, which affect their psychological security (Patzelt & Shepherd, 2011). Second, the self-employed face greater job stress. Self-employment often entails a high workload and long working hours (Andersson, 2008; Hyytinen & Ruuskanen, 2007; Nordenmark et al., 2012); the self-employed must independently face situations and bear certain responsibilities such as business losses, bothersome customers, and reputation damage (Schonfeld & Mazzola, 2015). Such work stress may make the self-employed more prone to experiencing depressive symptoms (Parslow et al., 2004). Third, self-employed people typically face the threat of uncertain and low income (Prottas & Thompson, 2016; Schonfeld & Mazzola, 2015; Annink et al., 2016). Especially in the case of external shocks, self-employed people who lack an employment unit suffer a significant drop in earnings (Clark et al., 2007). Thus, self-employed individuals face greater job and income threats than employed people with formal *danwei* (Mandelman & Montes-Rojas, 2009).

Why do two opposite conclusions arise? Possible reasons for these opposing conclusions are that existing studies have ignored the heterogeneity among self-employed people or used different classification criteria. As some scholars have noted, comparing self-employed people as a whole with other types of workers in general is highly misleading (Kapoor et al., 2019). The types of self-employment are complex and diverse, with different job characteristics, occupational stability, income levels, and individual traits. Thus, it is difficult to explain high or low depression levels among all types of self-employed people as a whole. For example, although self-employed individuals generally have greater autonomy, small business owners typically face greater job stress than independent contractors, which diminishes the psychological benefits of autonomy derived from self-employment. In comparison, independent contractors can receive more psychological benefits from self-employed individuals (Prottas & Thompson, 2016).

As such, based on these debates and the limitations of existing studies, this study explores three aspects using data from a Chinese sample: (1) the comparison of depression status between ISE and non-ISE people and employees; (2)

the differences in depression status between people with intellectual ISE and physical ISE; and (3) the corresponding mediating mechanisms.

## Research hypotheses

The characteristics of ISE, such as flexibility and autonomy, are more prominent compared to non-ISE individuals and employees. According to SDT, these characteristics are better able to satisfy the autonomy-related needs of ISE people and to enhance their job satisfaction and subjective happiness (Benz & Frey, 2008; Hundley, 2001; Lange, 2012), thereby reducing anxiety and depressive symptoms (Allan et al., 2018; Gentzler et al., 2019; Soósová et al., 2021; Vanhove-Meriaux et al., 2020). Thus, the present study hypothesized that ISE people would be less likely to suffer from depression. As a result, the following hypothesis was formed:

**Hypothesis 1:** ISE people are less likely to suffer from depression than non-ISE people and employees.

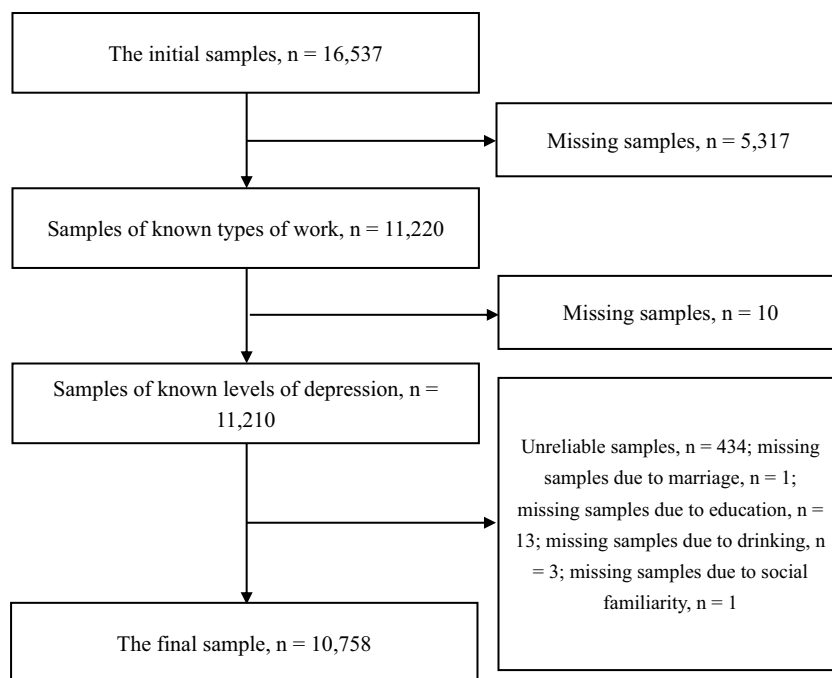
ISE encompasses a wide range of heterogenous occupations. This study classified ISE into intellectual and physical ISE. Between these two types, intellectually ISE people tend to have higher job earnings and stability; further, they are more entrepreneurial in terms of creativity, risk-taking, and innovation (Gartner, 1990; Hendry, 2004) and they have a stronger need for autonomy. In contrast, physically ISE people often work in China's informal labor economy, which means they are at the margins of the labor market and social security system. They tend to have less job stability, poorer levels of economic income and social security, and a relatively low need for autonomy. Thus, this study hypothesized that intellectually ISE people would be substantially less likely to experience an increased risk of depression than non-ISE people and employees. In contrast, the relationship between physical ISE and depression is likely not significant. Therefore, the following hypotheses were developed:

**Hypothesis 1a:** Intellectually ISE people are significantly less likely to experience an increased risk of depression than non-ISE people and employees.

**Hypothesis 1b:** No significant association exists between physical ISE and depression compared with non-ISE and employees.

Intellectually ISE individuals usually choose self-employment based on interest or the pursuit of a high quality of life. This means that they value the freedom, autonomy, and income level of self-employment. Several studies have found that high levels of freedom positively influence mental health among the self-employed (Benz

**Fig. 1** Flowchart for screening the samples



& Frey, 2008; Blanchflower, 2000; Lange, 2012; Parasuraman & Simmers, 2001). According to SDT, a flexible pace of work and the autonomy to make work-related decisions help self-employed people to better cope with negative emotions, maintain a better level of mental health (Bakker et al., 2003; Bencsik & Chuluun, 2021; Bond & Bunce, 2001; Patzelt & Shepherd, 2011), and achieve work-life balance. This fits the goal of intellectual ISE. In addition, income is an important factor affecting depression levels among the intellectually ISE. Lower and uncertain job earnings are an important factor in the level of depression among the self-employed (Prottas & Thompson, 2016; Schonfeld & Mazzola, 2015). Especially in China, the social security system is based on *danwei*. This means that the social security benefits of the intellectually ISE are also crippled. Hence, financial income is a vital guarantee for the intellectually ISE in their pursuit of quality of life. Prior studies show that work freedom and income are critical factors influencing the mental health and depression levels of the intellectually ISE and are negatively correlated with each other. Thus, the following was posited:

**Hypothesis 2a:** Work freedom mediates the relationship between intellectual ISE and depression.

**Hypothesis 3b:** Income mediates the relationship between intellectual ISE and depression.

## Method

### Data

This study used data from the 2018 CLDS, which is a biennial urban–rural tracking survey with a comprehensive database of the working population aged 15–65 years, focusing on the current conditions of China’s labor force and its modifications. The CLDS covers various topics: education, work, migration, health, social participation, economic activity, and grassroots organizations. The 2018 CLDS survey covers 28 provinces, approximately 400 communities, over 14,000 households, and more than 18,000 laborers in China using a multi-stage, multi-level probability sampling method that is scientifically valid and representative. Based on survey stratification, the CLDS includes three survey types: (1) village; (2) household; and (3) individual visits. This study used data from the 2018 individual survey, which gathered information about workers’ depression status in addition to investigating their primary conditions by occupational category, thus providing a good source of data. Stata 16 was used for statistical analysis, and after processing the sample data, the appropriate sample size for analysis was determined to be 10,758. Figure 1 outlines the process of screening the samples.

## Measures

### Dependent variable

Depression among ISE people was the dependent variable in this study; it was measured using the Center for Epidemiologic Survey Depression (CES-D) scale, developed by Radloff in 1977. The CES-D scale has been widely used to measure depression in adolescents, adults, and older adults (Radloff, 1977); it has 20 questions that address various aspects of depressed mood, positive mood, bodily characteristics, and interpersonal relationships (see Table 8 for details). Respondents rated the frequency of each symptom as follows: none/mostly none (< 1 day) = 0, rarely (1–2 days) = 1, often (3–4 days) = 2, and almost always (5–7 days) = 3. After summing the scores of the 20 items, total scores ranged between 0 and 60. The cutoff score was 16 to distinguish between those with and without depressive symptoms; scores greater than or equal to 16 indicated depressive symptoms (Gatz et al., 2005; Lewinsohn et al., 1997). A binary variable was generated to measure depression among ISE people. A value of 1 was assigned for scores of 16 or higher, and 0 if otherwise.

### Independent variable

ISE was the independent variable in this study. The CLDS classifies ISE as work that is either intellectual (e.g., Internet writers, painters, self-media workers, freelance photographers, other intellectual workers) or physical (e.g., casual workers, vendors, non-dispatched nannies, self-employed drivers, manual craftspeople). Respondents were assigned a value of 1 if they engaged in ISE, and 0 if they engaged in non-ISE individuals and employees.

### Control variables

Based on the questions explored in this study and with reference to Wang et al. (2018), gender, education level, marriage, and life choice (the freedom of choice in life) were selected as demographic variables; injury, drinking habits, and exercise as health awareness variables; sense of social equity (fair sense) and familiarity with residents of the community (socially familiar) as social capital variables; and province as a geographic variable.

### Mediating variables

ISE people are generally considered to be more accessible and to have a higher degree of job control (e.g., job autonomy and temporal and spatial flexibility of work) than other workers

(Hechavarría et al., 2017), which may affect their job satisfaction (Hytti et al., 2013) and depression status. In addition, income is strongly associated with depression among ISE people (Andersson, 2008; Schonfeld & Mazzola, 2015); therefore, *work freedom* and *income* were selected as mediating variables to analyze depression status among the target group.

**Work freedom** Respondents were asked to report their level of self-determination regarding their work task content, work schedule, and workload. In the present study, these were considered measures of *work freedom*. *Fully self-determined* and *partially self-determined* were assigned a value of 1, whereas *fully determined by others* was assigned a value of 0. By summing up the above three indicators, a *work freedom* score was obtained, ranging between 0 and 3. Higher scores denote greater levels of work freedom.

**Income** To facilitate the analysis, income data were processed. Annual incomes of below 10,000, 10,000–30,000, 30,000–50,000, 50,000–100,000, 100,000–200,000, 200,000–500,000, and above 500,000 yuan were assigned values of 1–7, respectively. In the data analysis, higher scores indicate higher incomes.

## Model selection

### Logit model

This study applied a logit model to preliminarily estimate the differences in depression among occupational groups as follows:

$$\ln\left(\frac{\text{depress}_i}{1 - \text{depress}_i}\right) = \alpha_0 + \alpha_1 \text{work}_i + \alpha_2 X_i + \varepsilon_i \quad (1)$$

where  $\text{depress}_i$  embodies the odds of the  $i$ th respondent having depression,  $\frac{\text{depress}_i}{1 - \text{depress}_i}$  indicates the ratio of the odds of the  $i$ th respondent having depressive symptoms or not, and  $\text{work}_i$  refers to the type of occupation of the  $i$ th respondent and whether he/she is engaged in ISE.  $X_i$  represents the other control variables, and  $\varepsilon_i$  denotes the random error term. This study mainly estimated the ratio of respondents' odds of having depressive symptoms or not, which is expressed as  $\left(\frac{\text{depress}_i}{1 - \text{depress}_i}\right)$  and is also focused on the significance of  $\alpha_1$ .

### The mediating effect model

To test the mediating effect of work freedom and income between ISE and depression, this study drew upon the stepwise regression method of Baron and Kenny (1986) and constructed models (2) and (3) based on model (1), as follows:

$$M = \beta_0 + \beta_1 \text{work}_i + \beta_2 X_i + \varepsilon_i \quad (2)$$

$$\ln\left(\frac{depress_{i,t}}{1-depress_{i,t}}\right) = \delta_0 + \delta_1 work_i + \delta_2 M + \delta_3 X_i + \epsilon_i \quad (3)$$

Given the mediating variables, the regression of the mediating variables on the independent variables in this study used the ordinary least squares (OLS) model (i.e., model (2)). *M* represents the mediating variable, and the other variables are defined in model (1). When analyzing the mediating effects, this study focused on the values of  $\frac{depress_i}{1-depress_i}$  and  $\frac{depress_{i,t}}{1-depress_{i,t}}$ , as well as the significance of  $\beta_1$ ,  $\delta_1$ , and  $\delta_2$ . If  $\beta_1$ ,  $\delta_1$ , and  $\delta_2$  are significant, when  $\frac{depress_i}{1-depress_i} < 1$ ,  $\frac{depress_{i,t}}{1-depress_{i,t}} > \frac{depress_i}{1-depress_i}$  indicates the presence of a mediating effect. If  $\beta_1$ ,  $\delta_1$ , and  $\delta_2$  are significant, when  $\frac{depress_i}{1-depress_i} > 1$ ,  $\frac{depress_{i,t}}{1-depress_{i,t}} < \frac{depress_i}{1-depress_i}$  denotes the presence of a mediating effect.

### The model of mediating effect decomposition

In order to further investigate the mediating effect between self-employment and depression, this study used the KHB model to estimate the total effect, direct effect, and indirect effect based on the mediating effect test. Previously, mediation analysis methods were employed for linear regression models. Unfortunately, because of issues related to measurement scales, many methods could not be applied to nonlinear regression models. The KHB model, proposed by Karlson, Holm, and Breen (Karlson et al., 2012), can identify the mediating effect in nonlinear probability models. It distinguishes the effects of discrete and continuous variables, thereby extending the decomposability of linear models to non-linear probability models. The operating principle of the KHB model is as follows:

Assume a linear regression model:

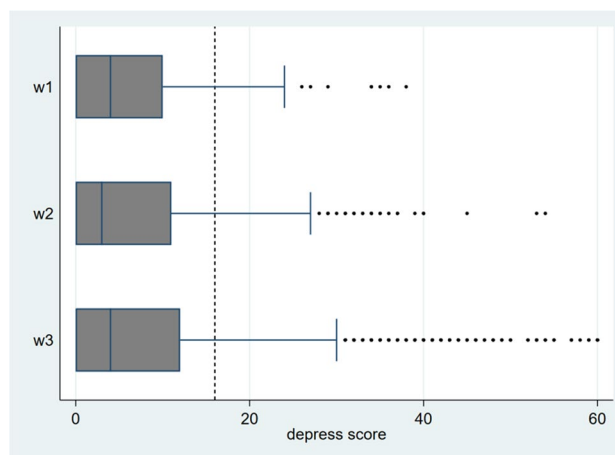
$$P = \alpha + \beta_i work_i + \varphi_i M + \eta_i X_i + \epsilon \quad (4)$$

where *P* is the dependent variable, and the definitions of other variables are the same as in models (1) and (2). *work<sub>i</sub>* can indirectly affect *P* by influencing *M*. Under this assumption,  $\beta_i$  represents the direct effect of *work<sub>i</sub>* on *P*, and the total effect of *work<sub>i</sub>* on *P* can be obtained through the following model:

$$P = \alpha + \beta_i work_i + \eta_i X_i + \epsilon \quad (5)$$

Hence, the indirect impact of *work<sub>i</sub>* on *P* through its influence on *M* is:

$$\beta_w = \beta_t - \beta_i \quad (6)$$



**Fig. 2** Boxplot of depression scores of various types of workers. Note: w1 refers to intellectually ISE people; w2 refers to physically independent workers; and w3 refers to non-ISE individuals and employees. The dashed line denotes a depression score of 16

## Results

### Descriptive statistics

Figure 2 shows the boxplot of depression scores of various types of workers. Boxplots can visually describe the distribution characteristics of data using five statistics (minimum, lower quartile, median, upper quartile, and maximum). Overall, all three boxes are skewed to the left, and the medians are close to 0 and far from 16, indicating that most workers have low depression scores. Among them, the box of w1 is narrower, implying that the depression scores of intellectually ISE people are low and concentrated; the box of w3 is wider, suggesting that the depression scores of non-ISE people and employees are high and fluctuate more.

Table 2 shows the descriptive statistics. Unsurprisingly, a fairly low percentage of respondents displayed depressive symptoms. Among all respondents, 10.6% were ISE. Of the remaining sample characteristics, 54% of the respondents were male, with a reasonable and scientific gender ratio. The average number of years of education was 8.602; nearly 87.5% of the sample had a spouse; life choices were moderately high; 11.3% had an illness or injury within the last two weeks; 22.6% drank alcohol at least weekly; 30.1% had exercised in the past month; most had a high sense of fairness and familiarity with the residents of their community (i.e., the overall sample had high levels of social recognition and

**Table 2** Variable definitions and descriptive statistics

Variable	Definition	Obs.	Mean
Depression	depressive symptoms = 1, non-depressive symptoms = 0	10,758	depressive symptoms (18.7%), no depressive symptoms (81.3%)
ISE	ISE individuals = 1, non-ISE individuals and employees = 0	10,758	ISE individuals (10.6%), non-ISE individuals and employees (89.4%)
Gender	male = 1, female = 0	10,758	male (54%), female (46%)
Education	doctorate = 23, master's degree = 19, undergraduate degree = 16, college = 15, general high school/vocational high school/technical school/secondary school = 12, middle school = 9, elementary school/private school = 6, did not attend school = 0	10,758	0–23, mean = 8.602
Marriage	with spouse = 1, without spouse = 0	10,758	with spouse (87.5%), without spouse (12.5%)
Life choice	Degree of freedom respondents have to choose their own lives. On a scale of 1 to 10, 1 means no choice and 10 means many choices	10,758	1–10, mean = 6.888
Sick	sick = 1, not sick = 0	10,758	sick (11.3%), not sick (88.7%)
Drink	drinks at least once a week = 1, does not drink = 0	10,758	drinks at least once a week (22.6%), does not drink (77.4%)
Exercise	regular exercise = 1, no regular exercise = 0	10,758	regular exercise (30.1%), no regular exercise (69.9%)
Fair sense	completely fair = 5, comparatively fair = 4, not fair but not unfair = 3, comparatively unfair = 2, completely unfair = 1	10,758	1–5, mean = 3.298
Social familiarity	very familiar = 5, more familiar = 4, general = 3, less familiar = 2, very unfamiliar = 1	10,758	1–5, mean = 3.903
Province	eastern region = 1, other regions = 0	10,758	eastern region (42.1%), other regions (57.9%)

*ISE* independent self-employment; *life choice* the freedom of choice in life

participation); 42.1% came from the eastern region, and the regional distribution of the sample on the whole was balanced.

### Benchmark regression analysis

Table 3 presents the benchmark regression results. Column (1) shows the regression outcomes of the dependent variable (depression) on ISE only. Column (2) controls for the demographic and health awareness variables based on Column (1), and Column (3) controls for the social capital and geographic variables based on Column (2). The findings were interpreted according to Column (3). When controlling for a range of other variables, ISE people were 0.828 times more likely to experience depression than non-ISE people and employees; this was significant at the 5% level. As such, Hypothesis 1 was supported. Column (4) outlines the regression results of depression on intellectual ISE individuals, and non-ISE individuals and employees after controlling for the other variables. The rate of depression among intellectually ISE people was 0.717 times higher than among non-ISE individuals and employees; this was significant at the 10% level. Thus, intellectually ISE people were less likely to display depressive symptoms than non-ISE people and

employees. Column (5) indicates that the regression results for depression among physically ISE people were insignificant. Thus, individuals with ISE and intellectual ISE were less likely to experience depressive symptoms than those with non-ISE individuals and employees. However, the association between physical ISE and depression was insignificant. Hypotheses 1a and 1b were thus supported.

Next, the results were interpreted in relation to the control variables. Regarding demographic traits, depressive symptoms were more common in men than women and less common in more educated respondents, those with a spouse, and those with more life choices, all of which were significant. As for health awareness, respondents with exercise habits in the past month were less likely to experience depressive symptoms. In contrast, those who reported an illness or injury in the previous two weeks were more likely to experience depressive symptoms. In terms of social capital level, those with more social capital (e.g., a stronger sense of social equity, greater familiarity with community residents) were less likely to experience depressive symptoms. For the effect of geographic characteristics, respondents in the eastern region were less likely to experience depressive symptoms than those in other regions.



**Table 3** Benchmark regression results

	(1) depress	(2) depress	(3) depress	(4) depress	(5) depress
ISE	0.814** (0.069)	0.820** (0.071)	0.828** (0.073)		
Intellectual ISE				0.717* (0.139)	
Physical ISE					0.858 (0.083)
Gender		0.754*** (0.043)	0.769*** (0.045)	0.764*** (0.046)	0.765*** (0.045)
Education		0.958*** (0.006)	0.956*** (0.006)	0.960*** (0.006)	0.955*** (0.006)
Marriage		0.703*** (0.053)	0.716*** (0.054)	0.740*** (0.059)	0.713*** (0.055)
Life choice		0.869*** (0.010)	0.904*** (0.011)	0.906*** (0.011)	0.903*** (0.011)
Sick		2.399*** (0.163)	2.279*** (0.158)	2.303*** (0.0165)	2.304*** (0.160)
Drinking habits		1.100 (0.075)	1.080 (0.075)	1.074 (0.078)	1.093 (0.076)
Exercise		0.802*** (0.048)	0.840*** (0.051)	0.834*** (0.053)	0.842*** (0.052)
Fair sense			0.696*** (0.020)	0.703*** (0.021)	0.694*** (0.020)
Social familiarity			0.886*** (0.025)	0.901*** (0.026)	0.887*** (0.025)
Province			0.742*** (0.040)	0.738*** (0.042)	0.753*** (0.041)
_cons	0.235*** (0.006)	1.228* (0.146)	5.361*** (0.950)	4.514*** (0.842)	5.399*** (0.968)
N	10,758	10,758	10,758	9875	10,500
r <sup>2</sup>	0.001	0.048	0.068	0.065	0.068

Robust standard errors are in parentheses; \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively  
*ISE* independent self-employment; *life choice* the freedom of choice in life

**Robustness test**

The above results provide preliminary evidence that individuals with ISE and intellectual ISE have a lower likelihood of experiencing depression. However, further examination is needed to validate this finding. To address this, we employed two different robustness testing methods:

First, we replaced the data sample and conducted a robustness test using the 2016 CLDS data, as displayed in Table 4. However, since the 2016 data do not differentiate

**Table 4** Results of the robustness test

	(1) 2016depress
ISE	0.769*** (0.068)
Control variables	yes
_cons	5.314*** (0.848)
N	14,136
r <sup>2</sup>	0.076

*ISE* independent self-employment

**Table 5** Robustness test (dependent variable replacement)

	(1) Continuous variable	(2) Excluding samples near the threshold of 16
ISE	-0.700*** (0.268)	0.768*** (0.078)
Control variables	yes	yes
_cons	21.615*** (0.590)	6.002*** (1.202)
N	10,758	9857
r <sup>2</sup>	0.119	0.076
Intellectual ISE	-0.762** (0.302)	0.639** (0.147)
Control variables	yes	yes
_cons	21.695*** (0.600)	5.205*** (1.096)
N	9875	9035
r <sup>2</sup>	0.120	0.074

In Column (2), the reported values for ISE and intellectual ISE are odds ratios rather than regression coefficients. *ISE* independent self-employment

ISE into intellectual and physical ISE, we only examined the relationship between ISE and depression.

Second, we replaced the dependent variable. First, we replaced the binary variable with a continuous one. Depression is a common mental health problem (Prince et al., 2007), and in the benchmark regression, we set a threshold of 16 on the CES-D scale to distinguish between depressed and non-depressed individuals. In this study, we used the CES-D score as a proxy for depression, where higher scores indicate greater levels of depression. As the dependent variable is no longer binary, we used OLS regression instead. Second, based on the binary variable, we eliminated variables near the threshold. We excluded samples near the threshold of 16 (within a range of 2

**Table 6** Estimation results of the mediating effect

	(1)	(2)	(3)	(4)
	Work freedom	Depression	Income	Depression
Intellectual ISE	-0.013 (0.067)	0.718* (0.139)	0.203*** (0.076)	0.726* (0.141)
Work freedom		1.020 (0.027)		
Income				0.937** (0.024)
Control variables	Yes	yes	yes	yes
N	9875	9875	9875	9875
r <sup>2</sup>	0.074	0.066	0.269	0.066

Columns (1) and (3) are the coefficients of the ordinary least squares (OLS) regression estimates; robust standard errors are in parentheses; \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. *ISE* independent self-employment

points) because samples in this range may involve random factors or measurement errors, making it difficult to accurately classify workers as depressed or non-depressed individuals. After excluding samples near the threshold of 16, the boundary between the depressed and non-depressed groups became clearer.

Table 5 presents the results of replacing the dependent variable. Column (1) shows the regression outcomes with a continuous variable replacing the binary one. We can see that both ISE individuals and intellectually ISE people exhibit lower levels of depression. The self-employed status leads to an average decrease of approximately 10% in depression levels (with an average depression score of 7.6), which is consistent with the results of the original benchmark regression. Column (2) depicts the regression outcomes after excluding samples near the threshold of 16, which also align with the original regression results, indicating that those with ISE and intellectually ISE have a lower likelihood of experiencing depression compared to non-ISE people and employees. Overall, regardless of the approach taken, both ISE individuals and intellectually ISE people show a lower likelihood of depression, confirming the robustness of the original conclusion.

**Mechanism analysis**

The results indicate that people with ISE displayed better mental health and were less likely to experience depressive symptoms than those with non-ISE individuals and employees. However, the mechanisms by which this effect occurs also need to be examined. In the previous analysis, two possible mediating mechanisms were suggested: work freedom and income.

**Table 7** Results of the mediating effect test based on the KHB model

	(1)	(2)
	Work freedom	Work income
Total effect	-0.3322* (0.1936)	-0.3341* (0.1937)
Direct effect	-0.3319* (0.1936)	-0.3165 (0.1938)
Indirect effect	-0.0003 (0.0013)	-0.0176** (0.0079)
Proportion of the mediating effect (%)	0.08	5.26

Robust standard errors are in parentheses; \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively

In Table 6, Column (1) shows the regression outcomes of work freedom on the independent variable, and Column (2) presents the regression results of the dependent variable on the independent variable after adding the mediating variables. The results revealed insignificant relationships between work freedom and intellectual ISE. Therefore, work freedom was not a factor that made individuals with ISE less likely to suffer from depression, which broke the previous perception that high freedom allows those with ISE to have increased happiness and job satisfaction (Hytti et al., 2013). As such, Hypothesis 2 was not supported.

Table 6 also reports the regression outcomes with income as a mediating variable. Column (3) shows the regression results of the effects of work income on the dependent variable, indicating a positive correlation between income and intellectual ISE, significant at the 1% level. Thus, intellectually ISE people receive higher work incomes. Column (4) depicts the regression outcomes for the dependent variable on the independent variable after adding the mediating variable. The odds ratio of the regression results of the dependent variable on the independent variable was significantly higher after including the mediating variable; it was also less than 1. This indicates that income earned from intellectual ISE is associated with a lower risk of depression. Thus, Hypothesis 3 was supported.

In addition, Table 7 presents the results of decomposing the mediating effects into total effects, direct effects, and indirect effects using the KHB model. As indicated in Column (1), the total effect of intellectual ISE on depression was -0.3322, which is significant at the 10% level. However, the indirect effect was not significant, denoting that having intellectual ISE cannot reduce the probability of developing depression through work freedom. As presented in Column (2), when verifying the mediating effect of work income, the direct effect of intellectual ISE

decreased and produced a significant indirect effect, which accounts for 5.26% of the total effect. This means that work income plays an important role in reducing the likelihood of depression among those with intellectual ISE.

## Discussion

### Depression in intellectually and physically ISE people

The empirical results suggest heterogeneity in depression status between intellectually and physically ISE people. Those engaged in intellectual ISE were significantly less likely to report depressive symptoms than those with other non-ISE individuals and employees. In contrast, the relationship between being physically and ISE and having depression was not significant. This variability may stem from differences in the characteristics of both types of ISE.

Compared with physical ISE, those engaged in intellectual ISE showed three distinctive characteristics. First, the education level of intellectually ISE people was higher than that of physically ISE people. Intellectually ISE people tend to have higher barriers to entry. For example, writers, painters, photographers, lawyers, and other professionals have defined or potential barriers to entry. Second, intellectual ISE requires high levels of professionalism and innovation (Gartner, 1990; Hendry, 2004). Intellectual ISE includes occupations requiring high degrees of creativity and innovativeness. In contrast, physical ISE encompasses occupations that are somewhat less complex and more repetitive and procedural. Third, people with intellectual ISE may have more positive emotional needs, autonomy, and a stronger sense of adventure. Intellectually ISE people tend to passively choose self-employment after losing their organization-dependent jobs (Protas & Thompson, 2016). However, those engaged in physical ISE are more likely to be opportunity entrepreneurs. They actively choose self-employed occupations with which they fit (Bruk-Lee et al., 2009) and thus experience autonomy and satisfaction from self-employment (Lange, 2012).

Based on previous research findings, the three abovementioned traits may help reduce depression through two paths. First, higher education level and innovation may lead to higher economic income. Second, the freedom of self-employment can fit the psychological profile of those with intellectual ISE. However, the empirical results only support the first path.

### The mediating effects of income and work freedom

Three potential reasons explain how income is a mediating mechanism that decreases the risk of depression among

intellectually ISE people. First, income is a crucial indicator of occupational value (Bencsik & Chuluun, 2021) and can help intellectually ISE people realize their importance and become more confident. Only working and earning money in an occupation in which they are interested can make them fully appreciate the value of their work and confirm that they are pursuing the right path through self-employment.

Second, income can provide more material support for the diverse needs of intellectually ISE workers. Compared to physically ISE people, intellectually ISE persons have a wide range of needs, such as pursuing a higher quality of life, enhancing their professional skills, and increasing their social interactions. To fulfill these needs, they rely on income as a foundation of support.

Third, income is an essential influencing factor of job autonomy and coping with work stress (Bencsik & Chuluun, 2021). Specifically, income can increase labor autonomy by increasing time and asset control such as *when work is done*, *how to take control of work*, *how to use skills*, and *how to develop skills*. Further, income can help intellectually ISE people cope with higher work stress such as by using better technological tools to improve infrastructure and optimize working conditions, or promoting physical and mental health through increased spending on personal care.

The above conclusions are somewhat different from the inferences of SDT because according to SDT, those with ISE have a stronger need for autonomy, so the degree of work freedom may better meet their needs, thereby increasing their mental health. However, empirical results indicate that work freedom is not a mediating mechanism for several possible reasons.

First, although work freedom may be the origin of the choice to engage in intellectual ISE, it does not have sustained effects. Georgellis and Yusuf (2016) considered that self-employment's positive attributes (e.g., independence, autonomy, freedom) allow for people with self-employment to achieve higher job satisfaction in the early stages; however, as the expectation gap increases, job satisfaction declines.

Second, work freedom is a *double-edged sword* that brings freedom, but also stress and insecurity. Specifically, while intellectually ISE people have high levels of autonomy and flexibility, they are also subject to significant competition and survival pressures (Warr, 2018). This forces them to devote more time to work. They tend to face a more intense work pace (De Lange et al., 2003) and experience a more significant workload and stress (Buttner, 1992; Jamal, 1997). These factors can all negatively impact mood and even induce depression.

Third, self-employment in an emerging market system such as that in China, which is characterized by instability (Mandelman & Montes-Rojas, 2009). Intellectual ISE is not covered or is only partially covered by state social security due to a lack of organizational support. This means that

income is a significant source of stress for intellectually ISE people (Ferrie et al., 2001). Threats to income (Mandelman & Montes-Rojas, 2009) may have a more significant impact than work freedom on the association between depression and intellectual ISE.

In sum, intellectually ISE people are more *sensitive* to income than work freedom. This means that the promotional effect of autonomy-related needs on intellectually ISE people must be based on income security. As such, income is necessary for these individuals.

## Conclusions

As a flexible and growing type of occupation, self-employment accounts for a large number of workers and is supported and protected by the government. The depression status of this group affects not only the psychological health and quality of life of individual workers, but also their employment quality and even economic and social stability and development. Based on relevant prior research, this study empirically examined the influence of ISE on the depression status of workers in China using 2018 CLDS data and logit modeling. First, the results of the full-sample regression analysis showed that those engaged in ISE were less likely to experience depressive symptoms, and that the odds ratio of ISE people experiencing depression was 0.828 times higher than among non-ISE people and employees. This outcome was significant at the 5% level. Second, further categorization tests revealed that the odds ratio of depression was 0.717 times higher among intellectually ISE people than among non-ISE persons and employees, and the results were significant at the 10% level. However, the regression outcomes were not significant for physical ISE. Third, income served as a mediating mechanism affecting the association between depression and intellectual ISE, whereas work freedom did not.

The results have certain theoretical and practical significance. First, based on the perspective of classification and comparison, this study verified the depression status of those with intellectual and physical ISE, thereby providing

an empirical basis for debates in existing studies. Second, this study offers additional evidence supporting the mediating role of work freedom and income in the relationship between ISE and depressive symptoms. This finding contributes to a better understanding of the explanatory mechanism of SDT in relation to the connection between autonomy-related needs and psychological well-being. Finally, the policy implication is that it is necessary to increase the inclusiveness and support level of the social security and welfare system to alleviate the income insecurity of ISE. Moreover, special attention should be given to the psychological well-being of physically self-employed people, and the establishment of psychological assessment and support systems tailored to this group is warranted.

This study has three main limitations. First, the CLDS only details the classification of self-employed people in the 2018 data, which led us to examine the depression status of those with intellectual and physical ISE using cross-sectional data only. Therefore, the direction of the causal relationship between intellectual and physical ISE and depression cannot be judged based on the present study. Although it would be helpful to scrutinize this relationship using longitudinal data, to the best of our knowledge, no longitudinal survey using a more detailed classification of self-employment has been conducted in China. Thus, future longitudinal or experimental studies could be conducted using autonomous data collection. Second, the lack of data currently precludes the analysis of depression among those with ISE during the COVID-19 epidemic. The dangerous and long-term nature of the epidemic, combined with China's strict epidemic prevention policies, may have severely affected ISE people's work, life, and psychological state. Hence, a targeted study could be carried out after the relevant data are updated. Third, for the sake of article structure, this study did not analyze the heterogeneity of the depression status of ISE people. Future tests could determine whether this study's findings could be generalized to ISE in China among people with different demographic traits.

## Appendix

**Table 8** Center for Epidemiologic Studies Short Depression Scale (CES – D20)

Items:	Rarely or none of the time (< 1 day)	Some or a little of the time (1–2 days)	Occasionally or a moderate amount of the time (3–4 days)	Most or all of the time (5–7 days)
1. I was bothered by things that don't usually bother me				
2. I did not feel like eating; my appetite was poor				
3. I felt that I could not shake off the blues, even with the help of my family or friends				
4. I felt that I was not as good as most people				
5. I had trouble keeping my mind on what I was doing				
6. I felt depressed				
7. I felt everything I did was an effort				
8. I felt hopeful about the future				
9. I thought my life had been a failure				
10. I felt fearful				
11. My sleep was restless				
12. I was happy				
13. I talked less than usual				
14. I felt lonely				
15. People were unfriendly				
16. I enjoyed life				
17. I had crying spells				
18. I felt sad				
19. I felt that people disliked me				
20. I could not "get going."				

**Author contributions** Conceptualization, Li He and Yongjie Chen; Methodology, Tianyi Yang; Software, Tianyi Yang; Validation, Tianyi Yang, Zixian Zhang and Jinxu Zhao; Formal analysis, Li He and Yongjie Chen; Investigation, Yongjie Chen; Resources, Jinxu Zhao; Data curation, Zixian Zhang; Writing—original draft preparation, Tianyi Yang, Zixian Zhang, Jinxu Zhao and Tianlan Liu; Writing—review and editing, Li He, Tianyi Yang, Zixian Zhang, Jinxu Zhao and Tianlan Liu; Visualization, Tianlan Liu; Supervision, Li He; Project administration, Yongjie Chen; Funding acquisition, Li He. All authors have read and agreed to the published version of the manuscript.

**Funding** This research was funded by National Social Science Foundation of China (Program No. 20CZZ012). The funding source was not involved in the preparation of the article.

**Data availability** The data used in this study was obtained by applying to the Center for Social Survey of Sun Yat-sen University [cssdata@mail.sysu.edu.cn]. Please contact the corresponding author if necessary. Email: heli@zuel.edu.cn.

### Declarations

**Ethics approval** Ethics approval for the study was granted by the Ethics Review Committee of Sun Yat-sen University, and all the participants provided signed informed consent at the time of participation. There is no need for additional ethics approval for the approved data users. The study was carried out in accordance with relevant guidelines and regulations.

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

**Competing interests** None.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Allan, B. A., Dexter, C., Kinsey, R., & Parker, S. (2018). Meaningful work and mental health: Job satisfaction as a moderator. *Journal of Mental Health, 27*(1), 38–44. <https://doi.org/10.1080/09638237.2016.1244718>
- Andersson, P. (2008). Happiness and health: Well-being among the self-employed. *The Journal of Socio-Economics, 37*(1), 213–236. <https://doi.org/10.1016/j.socec.2007.03.003>
- Annink, A., Gorgievski, M., & Den Dulk, L. (2016). Financial hardship and well-being: A cross-national comparison among the European self-employed. *European Journal of Work and Organizational Psychology, 25*(5), 645–657. <https://doi.org/10.1080/1359432X.2016.1150263>
- Bakker, A. B., Demerouti, E., De Boer, E., & Schaufeli, W. B. (2003). Job demands and job resources as predictors of absence duration and frequency. *Journal of Vocational Behavior, 62*(2), 341–356. [https://doi.org/10.1016/S0001-8791\(02\)00030-1](https://doi.org/10.1016/S0001-8791(02)00030-1)
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Beland, L. P., Fakorede, O., & Mikola, D. (2020). Short-term effect of COVID-19 on self-employed workers in Canada. *Canadian Public Policy, 46*(1), 66–81. <https://doi.org/10.3138/cpp.2020-076>
- Bencsik, P., & Chuluun, T. (2021). Comparative well-being of the self-employed and paid employees in the USA. *Small Business Economics, 56*(1), 355–384. <https://doi.org/10.1007/s11187-019-00221-1>
- Benz, M., & Frey, B. S. (2008). Being independent is a great thing: Subjective evaluations of self-employment and hierarchy. *Economica, 75*(298), 362–383. <https://doi.org/10.1111/j.1468-0335.2007.00594.x>
- Binder, M., & Coad, A. (2013). Life satisfaction and self-employment: A matching approach. *Small Business Economics, 40*(4), 1009–1033. <https://doi.org/10.1007/s11187-011-9413-9>
- Blanchflower, D. G. (2000). Self-employment in OECD countries. *Labour Economics, 7*(5), 471–505. [https://doi.org/10.1016/S0927-5371\(00\)00011-7](https://doi.org/10.1016/S0927-5371(00)00011-7)
- Bond, F. W., & Bunce, D. (2001). Job control mediates change in a work reorganization intervention for stress reduction. *Journal of Occupational Health Psychology, 6*(4), 290–302. <https://doi.org/10.1037/1076-8998.6.4.290>
- Bruk-Lee, V., Khoury, H. A., Nixon, A. E., Goh, A., & Spector, P. E. (2009). Replicating and extending past personality/job satisfaction meta-analyses. *Human Performance, 22*(2), 156–189. <https://doi.org/10.1080/08959280902743709>
- Buttner, E. H. (1992). Entrepreneurial stress: Is it hazardous to your health? *Journal of Managerial Issues, 4*(2), 223–240.
- Clark, C., Myron, R., Stansfeld, S., & Candy, B. (2007). A systematic review of the evidence on the effect of the built and physical environment on mental health. *Journal of Public Mental Health, 6*(2), 14–27. <https://doi.org/10.1108/17465729200700011>
- Cole, D. C., Ibrahim, S., Shannon, H. S., Scott, F. E., & Eyles, J. (2002). Work and life stressors and psychological distress in the Canadian working population: A structural equation modelling approach to analysis of the 1994 National Population Health Survey. *Chronic Diseases in Canada, 23*(3), 91–99.
- De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2003). “The very best of the millennium”: Longitudinal research and the demand-control-(support) model. *Journal of Occupational Health Psychology, 8*(4), 282–305. <https://doi.org/10.1037/1076-8998.8.4.282>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.
- Fairlie, R. (2020). The impact of COVID-19 on small business owners: Evidence from the first 3 months after widespread social-distancing restrictions. *Journal of Economics & Management Strategy, 29*(4), 727–740. <https://doi.org/10.1111/jems.12400>
- Ferrie, J. E., Shipley, M. J., Marmot, M. G., Martikainen, P., Stansfeld, S. A., & Smith, G. D. (2001). Job insecurity in white-collar workers: Toward an explanation of associations with health. *Journal of Occupational Health Psychology, 6*, 26–42. <https://doi.org/10.1037/1076-8998.6.1.26>
- Gartner, W. B. (1990). What are we talking about when we talk about entrepreneurship? *Journal of Business Venturing, 5*, 15–28. [https://doi.org/10.1016/0883-9026\(90\)90023-M](https://doi.org/10.1016/0883-9026(90)90023-M)
- Gatz, J. L., Tyas, S. L., St. John, P., & Montgomery, P. (2005). Do depressive symptoms predict Alzheimer's disease and dementia? *The Journals of Gerontology: Series A, 60*(6), 744–747. <https://doi.org/10.1093/gerona/60.6.744>
- Gentzler, A. L., Palmer, C. A., Ford, B. Q., Moran, K. M., & Mauss, I. B. (2019). Valuing happiness in youth: Associations with depressive symptoms and well-being. *Journal of Applied Developmental Psychology, 62*, 220–230. <https://doi.org/10.1016/j.appdev.2019.03.001>
- Georgellis, Y., & Yusuf, A. (2016). Is becoming self-employed a panacea for job satisfaction? Longitudinal evidence from work to self-employment transitions. *Journal of Small Business Management, 54*, 53–76. <https://doi.org/10.1111/jsbm.12292>
- Gevaert, J., et al. (2018). What's up with the self-employed? A cross-national perspective on the self-employed's work-related mental well-being. *SSM-Population Health, 4*, 317–326. <https://doi.org/10.1016/j.ssmph.2018.04.001>
- Hechavarría, D. M., Terjesen, S. A., Ingram, A. E., Renko, M., Justo, R., & Elam, A. (2017). Taking care of business: The impact of culture and gender on entrepreneurs' blended value creation goals. *Small Business Economics, 48*, 225–257. <https://doi.org/10.1007/s11187-016-9747-4>
- Hendry, J. (2004). Cultural confusions of enterprise and the myth of the bureaucratized entrepreneur. *The International Journal of Entrepreneurship and Innovation, 5*, 53–57. <https://doi.org/10.5367/0000000477291378>
- Hessels, J., Rietveld, C. A., & Van der Zwan, P. (2017). Self-employment and work-related stress: The mediating role of job control and job demand. *Journal of Business Venturing, 32*(2), 178–196. <https://doi.org/10.1016/j.jbusvent.2016.10.007>
- Hundley, G. (2001). Why and when are the self-employed more satisfied with their work? *Industrial Relations: A Journal of Economy and Society, 40*(2), 293–316. <https://doi.org/10.1111/0019-8676.00209>

- Hytti, U., Kautonen, T., & Akola, E. (2013). Determinants of job satisfaction for salaried and self-employed professionals in Finland. *The International Journal of Human Resource Management*, 24(10), 2034–2053. <https://doi.org/10.1080/09585192.2012.723023>
- Hyytinen, A., & Ruuskanen, O. P. (2007). Time use of the self-employed. *Kyklos*, 60(1), 105–122. <https://doi.org/10.1111/j.1467-6435.2007.00361.x>
- Ilyashova, G., Makhova, L., Trifonov, P., & Khimmataliev, D. (2021). Self-employment trends amid the pandemic. *Business and Society Review*. <https://doi.org/10.1111/basr.12221>
- Jamal, M. (1997). Job stress, satisfaction, and mental health: An empirical examination of self-employed and non-self-employed Canadians. *Journal of Small Business Management*, 35(4), 48–57.
- Jang, J. (2017). The emergence of freelancer cooperatives in South Korea. *Annals of Public and Cooperative Economics*, 88(1), 75–89. <https://doi.org/10.1111/apce.12143>
- Judge, T. A., Locke, E. A., Durham, C. C., & Kluger, A. N. (1998). Dispositional effects on job and life satisfaction: The role of core evaluations. *Journal of Applied Psychology*, 83(1), 17–34. <https://doi.org/10.1037/0021-9010.83.1.17>
- Kapoor, D., Singh, J., Bhalla, A., & Sharma, P. (2019). Entrepreneurial behavior of self-employed ones: A comparative analysis. *Think India Journal*, 22(14), 16839–16851.
- Karlson, K. B., Holm, A., & Breen, R. (2012). Comparing regression coefficients between same-sample nested models using logit and probit: A new method. *Sociological Methodology*, 42, 286. <https://doi.org/10.1177/0081175012444861>
- Krueger, N. F., & Brazeal, D. V. (1994). Entrepreneurial potential and potential entrepreneurs. *Entrepreneurship Theory and Practice*, 18(3), 91–104. <https://doi.org/10.1177/104225879401800307>
- Lange, T. (2012). Job satisfaction and self-employment: Autonomy or personality? *Small Business Economics*, 38(2), 165–177. <https://doi.org/10.1007/s11187-009-9249-8>
- Lewinsohn, P. M., Seeley, J. R., Roberts, R. E., & Allen, N. B. (1997). Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging*, 12(2), 277–287. <https://doi.org/10.1037/0882-7974.12.2.277>
- Mandelman, F. S., & Montes-Rojas, G. V. (2009). Is self-employment and micro-entrepreneurship a desired outcome? *World Development*, 37(12), 1914–1925. <https://doi.org/10.1016/j.worlddev.2009.05.005>
- Nordenmark, M., Vinberg, S., & Strandh, M. (2012). Job control and demands, work-life balance and wellbeing among self-employed men and women in Europe. *Vulnerable Groups & Inclusion*, 3(1), 18896. <https://doi.org/10.3402/vgi.v3i0.18896>
- OECD. (2017). *The missing entrepreneurs 2017: Policies for inclusive entrepreneurship*. OECD Publishing. Retrieved from <https://doi.org/10.1787/43c2f41c-en>. Accessed 19 Nov 2022.
- OECD. (2022). *Self-employment rate (indicator)*. OECD Publishing. Retrieved from <https://doi.org/10.1787/fb58715e-en>. Accessed 19 Nov 2022.
- Otsuka, K., & Kato, S. (2000). Relationship between diagnostic subtypes of depression and occupation in Japan. *Psychopathology*, 33(6), 324–328. <https://doi.org/10.1159/000029166>
- Parasuraman, S., & Simmers, C. A. (2001). Type of employment, work-family conflict and well-being: A comparative study. *Journal of Organizational Behavior*, 22(5), 551–568. <https://doi.org/10.1002/job.102>
- Parslow, R. A., Jorm, A. F., Christensen, H., Rodgers, B., Strazdins, L., & D'Souza, R. M. (2004). The associations between work stress and mental health: A comparison of organizationally employed and self-employed workers. *Work & Stress*, 18(3), 231–244. <https://doi.org/10.1080/14749730412331318649>
- Patzelt, H., & Shepherd, D. A. (2011). Negative emotions of an entrepreneurial career: Self-employment and regulatory coping behaviors. *Journal of Business Venturing*, 26(2), 226–238. <https://doi.org/10.1016/j.jbusvent.2009.08.002>
- Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M. R., & Rahman, A. (2007). No health without mental health. *The Lancet*, 370(9590), 859–877. [https://doi.org/10.1016/S0140-6736\(07\)61238-0](https://doi.org/10.1016/S0140-6736(07)61238-0)
- Prottas, D. J., & Thompson, C. A. (2016). Stress, satisfaction, and the work-family interface: A comparison of self-employed business owners, independents, and organizational employees. *Journal of Occupational Health Psychology*, 11(4), 366–378. <https://doi.org/10.1037/1076-8998.11.4.366>
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385–401. <https://doi.org/10.1177/014662167700100306>
- Rietveld, C. A., Van Kippersluis, H., & Thurik, A. R. (2015). Self-employment and health: Barriers or benefits? *Health Economics*, 24(10), 1302–1313. <https://doi.org/10.1002/hec.3087>
- Schonfeld, I. S., & Mazzola, J. J. (2015). A qualitative study of stress in individuals self-employed in solo businesses. *Journal of Occupational Health Psychology*, 20(4), 501–513. <https://doi.org/10.1037/a0038804>
- Sošová, M. S., Timková, V., Dimunová, L., & Mauer, B. (2021). Spirituality as a mediator between depressive symptoms and subjective well-being in older adults. *Clinical Nursing Research*, 30(5), 707–717. <https://doi.org/10.1177/1054773821991152>
- Stansfeld, S. A., Rasul, F. R., Head, J., & Singleton, N. (2011). Occupation and mental health in a national UK survey. *Social Psychiatry and Psychiatric Epidemiology*, 46(2), 101–110. <https://doi.org/10.1007/s00127-009-0173-7>
- Stephan, U., & Roesler, U. (2010). Health of entrepreneurs versus employees in a national representative sample. *Journal of Occupational and Organizational Psychology*, 83(3), 717–738. <https://doi.org/10.1348/096317909X472067>
- Vanhove-Meriaux, C., Martinet, G., & Ferrand, C. (2020). Adaptation and validation of the French Psychological Need Frustration Scale for older adults. *Ageing International*, 45(1), 99–117.
- Wang, R., Xue, D., Liu, Y., Chen, H., & Qiu, Y. (2018). The relationship between urbanization and depression in China: The mediating role of neighborhood social capital. *International Journal for Equity in Health*, 17, 105. <https://doi.org/10.1186/s12939-018-0825-x>
- Warr, P. (2018). Self-employment, personal values, and varieties of happiness-unhappiness. *Journal of Occupational Health Psychology*, 23(3), 388–401. <https://doi.org/10.1037/ocp0000095>
- Webster, F. A. (1977). Entrepreneurs and ventures: An attempt at classification and clarification. *Academy of Management Review*, 2(1), 54. <https://doi.org/10.2307/257605>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.