



The nonlinear consequences of working hours for job satisfaction: The moderating role of job autonomy

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Abstract

Overwork is a common phenomenon worldwide. Although previous studies have found that long working hours can cause physical and mental health problems in employees, the nature of the relationship between working hours and job satisfaction remains little understood. We have theorised that there is a curvilinear association between working hours and job satisfaction, and tested this hypothesis. A total of 771 adult Chinese employees submitted self-reported measures of working hours, job satisfaction, and job autonomy. The results show that working hours have an inverted U-shaped association with job satisfaction. Work scheduling autonomy and decision-making autonomy moderate this relationship. Here we present our data and discuss their theoretical and practical implications.

Keywords Working hours · Job satisfaction · Job autonomy · Job demands-resources model

Introduction

The ‘996’ phenomenon is spreading in many industries in China. A ‘996’ work schedule is an unofficial schedule of working from 9 a.m. to 9 p.m., Monday through Saturday. Serving a company that encourages the ‘996’ work schedule usually means working at least 60 h per week. According to the Zhaopin’s (www.Zhaopin.com) survey of 11,024 white-collar employees in 2019, 17.18% of Chinese white-collar

workers said that their companies had implemented the ‘996’ work schedule, and 22.48% of employees were planning to follow the 996 trend in their companies (Survey Report on the Living Conditions of White-Collar Workers in 2019, 2019). Also, more than 80% of white-collar workers said that overtime was common at their workplace. On March 27, 2019, a topic entitled ‘996. The ICU’ spread over GitHub (996icu, 2019). ‘996. The ICU’ refers to ‘Work by “996”, sick in the ICU’, which is an ironic saying among Chinese programmers, suggesting that people who follow the ‘996’ work schedule risk getting into the intensive care unit (ICU). The topic was raised in order to resist the ‘996’ work schedule in internet companies. As the discussion unfolded, many business managers expressed their views. On April 12, 2019, Jack Ma, the founder of Alibaba, expressed his opinion of the ‘996’ work schedule in the internal communications of his company. He said that employees who work for these Chinese companies, such as Baidu, Alibaba, and Tencent, are happy to follow the ‘996’ work schedule. Many companies and employees have no opportunity to work by ‘996’ (Ma, 2019).

The ‘996’ working system is no longer exclusive to the internet industry, and is spreading to other industries (China Economic Network, 2019). Compared with the more usual work schedule of eight hours per day, the ‘996’ work schedule means longer working hours. People are expected to spend most of their waking time at work. This

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is controversial because managers and employees often have different attitudes towards work. Managers seek to maximise profit. They believe that the more hours employees work, the more profit they can bring in for the company. By this logic, if employees have the opportunity to work by the '996' schedule, their company makes a good profit, and they can expect a good salary – especially in a depressed economy. Thus, managers believe that, far from complaining about it, employees should value the '996' work schedule and find fulfilment in their work. However, employees feel otherwise about the '996' work schedule. According to the Zhaopin Survey of 2019, more than 70% people oppose the '996' work schedule. Among these people, 44.50% people do not support '996' work schedule because it makes a work-life balance impossible; 13.47% people do not support the '996' work schedule because it violates labour laws; and 11.98% people do not support the '996' work schedule because it damages physical and mental health (Survey Report on the Living Conditions of White-Collar Workers in 2019, 2019).

A review of extant work shows that there is no consensus regarding the relationship between working hours and job satisfaction (Bujacz et al., 2020). Some studies have found that long working hours could reduce job satisfaction (Brown & Rotundo, 2005; Kirkcaldy et al., 1997; Pouwels et al., 2008); however, other studies report the opposite (Hsu et al., 2019; Kodz et al., 2003; Spector et al., 2007; Wanger, 2017). Therefore, the main aim of this study is to explore the association between working hours and job satisfaction, especially considering a model based on an inverted U shape.

In order to increase employees' job satisfaction, some companies have begun to implement a flexible '996' schedule system. This means that employees are free to allocate their own time. Working from 9 a.m. to 9 p.m. is not absolutely required. Employees can go to their workplace or leave anytime between 9 a.m. and 9 p.m. (China Economic Network, 2019). As information and communication technologies develop, working models, such as home offices, online offices, and flexible work, are also rapidly transforming, especially in the time of the COVID-19 outbreak (Van Yperen et al., 2014; Wang et al., 2021; Wu & Zhou, 2020). Many famous companies, such as Google, Amazon, Apple, Twitter, and Facebook, plan to continue maintaining a flexible work schedule past COVID-19, including options such as working from home, telecommuting to work, and blended working, in order to increase their appeal to talented employees (Sherr, 2020). These transformations in working models give autonomy to employees. Increasing employees' job autonomy can improve their work enthusiasm and motivation, and thereby increase their work performance and job satisfaction (Hackman & Oldham, 1975). Therefore, the second aim of this study is to investigate possible situational influence factors for job satisfaction, especially the

moderating effect of job autonomy on the curve association between working hours and job satisfaction.

The contributions of this study are threefold. First, unlike previous studies, which oversimplified the picture and mainly focused on the negative linear relationship between working hours and job satisfaction, this study demonstrates the nonlinear effect of working hours on job satisfaction. Our framework responds to the recent calls for a paradigm shift to curve models in the field of management (Pierce & Aguinis, 2013). Second, while there is a rather extensive literature relating working hours to various psychological outcomes, the vast majority of these studies have been conducted in the North American and European countries (Lu, 2011). Different cultural values may mean that long working hours have a different meaning for each culture (Spector et al., 2004). In individualist cultures, people focus on personal achievement through work (Yang et al., 2000). However, in collectivist cultures, people focus more on their family's welfare (Yang et al., 2000). Born in a collectivism culture, the Chinese consider work more important than leisure because work contributes to their family's welfare (Redding, 1993). For example, the Chinese expect to work more hours than Canadians (Bu & McKeen, 2000). Furthermore, 18.75% people in China do support the '996' work schedule because it allows them to earn more money and rise in their company quickly (Survey Report on the Living Conditions of White-Collar Workers in 2019, 2019). Therefore, it is necessary to determine the maximum working hours acceptable to Chinese employees. In the current study, we provide empirical evidence for the critical points for the relationship between working hours and job satisfaction in the context of Chinese culture. Third, our study verifies the boundary conditions for the impact of job characteristics, especially job autonomy, on working hours and job satisfaction. By doing so, our study helps identify the circumstances where job autonomy can be most beneficial for relieving the negative effects of long working hours on employees' job satisfaction. The findings may help managers keep workers intrinsically motivated and satisfied with their jobs even when working long hours. Our study also helps better understand the task aspects of work that create positive work experiences (Parker, 2014).

Theory and Hypotheses

Working Hours and Job Satisfaction

Although it is often assumed that the more overtime hours people work, the more they dislike their work, the relationship between the length of working hours and job satisfaction has not been conclusively established (Bujacz et al., 2020). Some studies have indeed found that long working

hours were associated with lower job satisfaction (Brown & Rotundo, 2005; Kirkcaldy et al., 1997; Pouwels et al., 2008). Spector et al. (2004) also found in a cross-cultural setting that working hours were negatively related to job satisfaction among native English speakers, except for those born in China.

However, other studies do not support the negative association between working hours and job satisfaction. Some studies have found no significant positive or negative correlation between working hours and job satisfaction across different countries (Hsu et al., 2019; Spector et al., 2007). Other studies found that the length of working hours predicted job satisfaction positively (Kodz et al., 2003; Wanger, 2017). Some individuals feel happy even while working long hours (Akerstedt et al., 2002), especially well-educated people in highly paid managerial and professional positions (Hewlett & Luce, 2006), as well as women (Burke & Fiksenbaum, 2009). Fabian and Breunig (2019) found that employees with excessively long working hours were dissatisfied specifically with their hours, rather than with the work itself.

Based on these inconclusive findings, we hypothesised that the effects of working hours on job satisfaction may not follow a simple linear pattern. According to the job demands-resources (JD-R) model (Bakker & Demerouti, 2007), working conditions can be divided into two categories. One category is job demands, which are the physical, psychological, social, or organisational aspects of the job that require sustained physical and psychological (cognitive and emotional) effort. Job demands are therefore associated with certain physiological and psychological costs for the employee. The other category is job resources, which are the physical, psychological, social, or organisational aspects of the job that play a role in achieving work goals, reducing job demands, and stimulating personal growth, learning, and development (Bakker & Demerouti, 2007). Meta-analysis results suggest that high demands and low resources are associated with burnout (Alarcon, 2011). Longer working hours and time pressure fall under job demands, which force employees to invest a large amount of effort. Consequently, employees may experience high stress and burnout with no adequate recovery (Bakker & Demerouti, 2007; Demerouti et al., 2001).

Whether a job can bring benefits mainly depends on how it is designed (Van den Broeck & Parker, 2017). A well-designed job should be stimulating. Too little workload is usually harmful because it may induce negative feelings and boredom (MacDonald, 2003). On the other hand, work is necessary because it allows people to meet their material needs, such as food and housing. McKee-Ryan and Harvey (2011) found that some people prefer or need to work longer hours to obtain a larger paycheque or other intrinsic and extrinsic rewards. In some UK workplaces, manual workers consider long working hours beneficial, seeing

them as an opportunity to increase their earnings, at least in the short term. Managers and professional staff also benefit from long hours working through improved promotion prospects and/or greater job security (Kodz et al., 2003). When working hours are not too long and the workload is within the employees' capacity, work demands are tolerable for employees. As working hours increase, the job satisfaction may also increase due to higher earnings. However, a continued increase in working hours leads to a higher workload. When work demands exceed the employees' tolerance, the employees are likely to feel overload. High job demands, including a high workload, can lead to job burnout (Demerouti et al., 2001; Huang et al., 2016; Maslach et al., 2001). This likely reduces job satisfaction (Alarcon, 2011; Maslach et al., 2001).

Time is a limited resource for everyone. Longer working hours mean shorter recovery and leisure time, and vice versa. Leisure activities are defined as activities in which individuals participate during non-work time, such as physical exercise and socialising (Paggi et al., 2016). When participating in any kind of leisure activities, working adults can experience relaxation and mental disengagement from work (Kuykendall et al., 2020). According to the utility theory (Viner, 1925), employees need a trade-off between leisure and income from work in order to maximise utility. There is an optimised number of working hours where employee satisfaction reaches its highest point. Both below and above these optimal working hours, the probability of job satisfaction declines, due either to low income, or to limited leisure activities or high workload.

This suggests that with increasing working hours, the benefits for employees, such as income, increase slowly in a linear manner; however, the costs, such as burnout without adequate recovery or leisure time, tend to escalate rapidly, resulting in an inverted U-shape curve. Therefore, we propose the following hypothesis:

Hypothesis 1: There is an inverted U-shaped association between working hours and job satisfaction.

The Moderating Role of Job Autonomy

Hackman and Oldham (1976) propose a job characteristics model. They suggest that work should be designed to include five core job characteristics: skill variety, task identity, task significance, feedback, and job autonomy. Incorporating these intrinsic job-related characteristics can enrich employees' work experience, which is positively related to favourable psychological and behavioural outcomes (Humphrey et al., 2007). Job autonomy, one of the five job characteristics, is the degree of freedom given to employees in deciding on their own work schedules and procedures (Hackman & Oldham, 1976). Research has found that job autonomy

has a positive impact on employees' mental and physical health (Park & Jang, 2017; Van Dorssen-Boog et al., 2020). It increases employees' intrinsic motivation, engagement, and work performance (Nahrgang et al., 2010). It can also reduce employees' mental burnout, emotional exhaustion, and desire to change jobs (Zhou, 2020). More importantly, it has long been considered an effective management tool to increase job satisfaction (Humphrey et al., 2007; Thompson & Prottas, 2006; Zhao et al., 2020).

As an objective indicator of job demands, working hours are a major cause of work-related stress (Spector et al., 2007; Van Yperen et al., 2016). However, the inverted U-shaped association between working hours and job satisfaction could be moderated by job autonomy, which may flatten the curve. A flattening or a steepening occurs when the moderator affects the latent mechanisms in such a way that the overall shape of the observed relationship changes (Haans et al., 2016). According to the JD–R model, a lack of job resources is linked to disengagement from work (Demerouti et al., 2001). Job autonomy is one of the job resources that can help employees cope with job demands (Van Yperen et al., 2016) by allowing them to make their own decisions about when and how to respond to the demands (Gao & Jiang, 2019). Employees who have greater job autonomy are likely to feel more free from external constraints (Deci et al., 1989), to handle work stress better (Jiang et al., 2020; Schiff & Leip, 2019), and to experience less work burnout (Ahuja et al., 2007; Bakker et al., 2005), all of which also lead to higher job satisfaction (Yeh, 2015; Yucel, 2018).

At the first stage of the inverted U-shaped relationship, not enough workload results in boredom and demotivation (MacDonald, 2003). As job autonomy decrease, employees become less motivated and feel more bored. Their job satisfaction declines further. However, greater job autonomy can increase employees' intrinsic motivation and engagement, then job satisfaction increases. Therefore, job autonomy mitigates the positive relationship between working hours and job satisfaction.

At the second stage of the inverted U-shaped relationship, as working hours increase, employees have to expend more effort and energy in fulfilling their job requirements, even if income increases accordingly (Meijman & Mulder, 1998). When the workload outweighs the benefits of the higher income, both excessive job demands and deficient job resources are likely to decrease job satisfaction. When job autonomy is very low, employees have no freedom in how to deal with work tasks. However, with an increase in job autonomy, employees have more freedom to decide when, how, and where to perform their jobs (Kubicek et al., 2015). Therefore, job autonomy could counteract the physiological and psychological costs of long working hours (Kubicek et al., 2015). It can weaken the negative effect of working hours on job satisfaction. In brief, the curvilinearity of the

relationship between working hours and job satisfaction is likely to be weakened by job autonomy.

Based on the above analysis, we propose job autonomy as a salient variable that regulates the effect of working hours on employees' job satisfaction. We further propose that there would be an inverted U-shaped association between working hours and job satisfaction in low job autonomy contexts, but that the curvilinearity could be flattened with higher job autonomy. Thus, we predict the following:

Hypothesis 2: Job autonomy moderates the curvilinear association between working hours and job satisfaction in that the curvilinearity could be flattened with higher job autonomy.

Job autonomy consists of three main components: discretion in scheduling work tasks (work scheduling autonomy), making task-related decision (decision-making autonomy), and selecting work methods (work method autonomy) (Kubicek et al., 2015; Morgeson & Humphrey, 2006). All three components of job autonomy help employees better manage job demands by giving them the necessary resources to accomplish their tasks and goals (Karasek, 1979).

Work scheduling autonomy means that employees can arrange their work independently of the amount of work accomplished. Previous studies have found that work scheduling autonomy can mitigate the negative effects of time pressure on job satisfaction (Häusser et al., 2010). For example, if employees can decide on the order of work tasks based on the combination of urgency and importance (Morgeson & Humphrey, 2006), employee satisfaction increases. Wu and Zhou (2020) also found that flexible work schedules and teleworking increased job satisfaction among employees during the COVID-19 outbreak in China. Meta-analysis research also shows that flexible and compressed workweek schedules have positive effects on job satisfaction (Baltes et al., 1999). Thus, we predict the following:

Hypothesis 2a: Work scheduling autonomy moderates the curvilinear association between working hours and job satisfaction in that the curvilinearity could be flattened with higher work scheduling autonomy.

Decision-making autonomy means that employees can make their own decisions at work (Morgeson & Humphrey, 2006). This not only increases the employees' trust in the organisation (Gao et al., 2021), but also allows them to feel that their work makes a difference to the outcome. When employees feel that they are part of the organisation's decision-making, they feel more energetic, try their best to solve problems at work (Sia & Duari, 2018), and

feel more confident about their work (Al Mehrzi & Singh, 2016). Previous studies have found that decision latitude positively predicts job satisfaction (Warr, 1990). Thus, we predict the following:

Hypothesis 2b: Decision-making autonomy moderates the curvilinear association between working hours and job satisfaction in that the curvilinearity could be flattened with higher decision-making autonomy.

Work method autonomy occurs when employees are free to choose the methods they will use to complete their work (Breugh, 1985). Previous studies have found that work method autonomy was positively correlated with job satisfaction (Breugh, 1985, 1999; Morgeson & Humphrey, 2006). Thus, we predict the following:

Hypothesis 2c: Work method autonomy moderates the curvilinear association between working hours and job satisfaction in that the curvilinearity could be flattened with higher work method autonomy.

Method

Sample and Procedure

This study was approved by the ethics committee of the corresponding author's university. Participation was anonymous and voluntary to improve cooperation. To increase the number of responses, we conducted an internet-based survey and used the snowballing sampling method. The participants were recruited by the authors through their social relationship network of friends, colleagues, and schoolfellows, using networks such as WeChat groups, QQ groups, and WeChat circles of friends. Each participant received a compensation of 3 yuan/RMB. Informed consent was obtained from each participant by asking them to agree with statements describing the purpose of the study, the risks (or rather, lack thereof) and benefits of the research, and the confidential and voluntary nature of the study. The sample consisted of 771 workers (47.86% male, 52.14% female) from a variety of industries (e.g., retail trade, information technology, education, and financial and business consultancy). The mean age of the participants was 32.89 years ($SD = 9.41$ years), and ages ranged from 18 to 63 years. The educational level of the participants ranged from high school education or below to graduate degrees. The participants' work locations covered 30 provinces in China. Detailed demographic information for the sample is shown in Table 1.

Measures

Working Hours The number of hours worked was measured with a single item: respondents indicated how many hours they worked on a typical day.

Job Satisfaction Job satisfaction was measured using three items, rated on a 5-point scale developed by Hackman and Oldham (1980) (e.g., 'Overall, I am satisfied with my work'; 1 = strongly disagree, 5 = strongly agree). The scale has been translated and revised by Chinese researchers earlier (Shu & Liang, 2015). In this study, Cronbach's alpha for the three items was 0.87.

Job Autonomy Job autonomy was measured with nine items rated on a 5-point scale for job autonomy developed by Morgeson and Humphrey (2006). The scale has been translated and revised by Chinese researchers earlier (Xiao, 2020). It has three factors: work scheduling autonomy (e.g., 'The job allows me to decide in what order things are done on the job'; 1 = strongly disagree, 5 = strongly agree), decision-making autonomy (e.g., 'The job allows me to make a lot of decisions on my own'), and work method autonomy (e.g., 'The job allows me to make decisions about what methods I use to complete my work'). Cronbach's alpha for the work scheduling autonomy, decision-making autonomy, and work method autonomy items was 0.86, 0.88, and 0.84, respectively.

Control Variables Following previous studies (Burke & Fiksenbaum, 2009; Sawang et al., 2020; Thompson & Protas, 2006; Wu & Zhou, 2020), demographic variables, such as age, gender, education level, industry, and monthly work income, were measured and controlled for in the subsequent regression analysis for hypothesis testing.

Statistical Analysis

To test whether hours worked per day had a curvilinear association with job satisfaction, and whether the curvilinear association was moderated by job autonomy, we ran a series of hierarchical regressions in SPSS 26.0 according to the following equation (Chen et al., 2015; Cohen et al., 2003; Haans et al., 2016):

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 \quad (1)$$

As can be seen in square (1), Y is job satisfaction and X is hours worked per day. Haans et al. (2016) proposed that a quadratic relationship can be established in three steps. First, β_2 should be negative and significant. Second, if the relationship is an inverted U shape, the slope should be positive when X is at its lowest point (X_L), and

Table 1 Demographic Information for the Sample

Variables	Code	N	Per cent
Education	1 High school or below	89	11.54
	2 Three years of college education in a technical field	217	28.15
	3 Four-year undergraduate degree	372	48.25
	4 Graduate degree	93	12.06
Income	1 Under 3,000 yuan/RMB	152	19.71
	2 3,001–6,000 yuan/RMB	206	26.72
	3 6,001–9,000 yuan/RMB	145	18.81
	4 9,001–12,000 yuan/RMB	161	20.88
	5 Over 12,000 yuan/RMB	107	13.88
Industry	1 Manufacturing	94	12.19
	2 Financial	81	10.51
	3 Information technology, computer services, and software	82	10.64
	4 Internet or electronic commerce	81	10.51
	5 Education	127	16.47
	6 Wholesale and retail industry	75	9.73
	7 Transportation	57	7.39
	8 Building materials	69	8.95
	9 Petrochemical industry	53	6.87
	10 Other	52	6.74
Province	1 Anhui安徽	55	7.13
	2 Beijing北京	29	3.76
	3 Fujian福建	37	4.80
	4 Gansu甘肃	27	3.50
	5 Guangdong广东	79	10.25
	6 Guangxi广西	19	2.46
	7 Guizhou贵州	13	1.69
	8 Hainan海南	5	0.65
	9 Hebei河北	31	4.02
	10 Henan河南	25	3.24
	11 Heilongjiang黑龙江	24	3.11
	12 Hubei湖北	26	3.37
	13 Hunan湖南	28	3.63
	14 Jilin吉林	19	2.46
	15 Jiangsu江苏	38	4.93
	16 Jiangxi江西	27	3.50
	17 Liaoning辽宁	25	3.24
	18 Nei Monggol内蒙古	20	2.59
	19 Ningxia宁夏	8	1.04
	20 Qinghai青海	9	1.17
	21 Shandong山东	39	5.06
	22 Shanxi (山西)	29	3.76
	23 Shaanxi (陕西)	18	2.33
	24 Shanghai上海	20	2.59
	25 Sichuan四川	32	4.15
	26 Taiwan台湾	21	2.72
	27 Tianjin天津	19	2.46
	28 Xinjiang新疆	5	0.65
	29 Yunnan云南	2	0.26
	30 Zhejiang浙江	31	4.02
	31 Chongqing重庆	5	0.65
	32 Missing	6	0.78

negative when X is at its highest point (X_H). The slope at X_L is $\beta_1 + 2\beta_2X_L$. The slope at X_H is $\beta_1 + 2\beta_2X_H$. Third, the turning point of the quadratic relationship should be located within the X date range. The turning point for X is $-\beta_1/2\beta_2$.

$$Y = \beta_0 + \beta_1X + \beta_2X^2 + \beta_3XZ + \beta_4X^2Z + \beta_5Z \quad (2)$$

As shown in square (2), Z is job autonomy, β_0 is the intercept term, and β_1 – β_5 are the regression coefficients. If β_4 is significant, the interaction of squared X and Z is supported. Testing for flattening or steepening is equivalent to testing whether β_4 is significant. A flattening occurs for inverted U-shaped relationships when β_4 is positive. Conversely, a steepening occurs for inverted U-shaped relationships when β_4 is negative (Haans et al., 2016). Following the recommendations of Aiken et al. (1991), we centred all predictor variables on their grand means to reduce problems caused by multicollinearity before evaluating the regression equations.

Results

Discriminant Validity

To test the discriminant validity of the four constructs, a confirmatory factor analysis (CFA) was conducted using structural equation modelling and AMOS 26.0. The results suggest that the four-factor measurement model yields a better model fit ($\chi^2/df = 1.769$, $RMSEA = 0.032$, $SRMR = 0.025$, $CFI = 0.992$, $TLI = 0.989$, $GFI = 0.982$) than the two-factor model with the three factors of job autonomy combined into one ($\chi^2/df = 35.222$, $RMSEA = 0.211$, $SRMR = 0.135$, $CFI = 0.621$, $TLI = 0.528$, $GFI = 0.671$), and a better fit than the single-factor model ($\chi^2/df = 49.225$, $RMSEA = 0.250$, $SRMR = 0.156$, $CFI = 0.456$, $TLI = 0.335$, $GFI = 0.589$). These results suggest that our focal variables can be distinguished from one another (Hu & Bentler, 1999).

Common Method Variance Analysis

First, procedural techniques, including anonymity and reverse-scored methods, were used to control the common method variance (CMV) (Podsakoff et al., 2003). Second, we used explanatory factor analysis (Harman, 1976) and found that one factor accounts for 38.19% of the variance among all the items, which is below the accepted threshold of 40% (Williams et al., 1989). Third, we created a one-factor measurement model, which generated a poor fit index (Podsakoff et al., 2003). Thus, the study is not heavily affected by significant common method variance (Table 2).

Descriptive Information

The histograms of the main variables of working hours per day, work scheduling autonomy, decision-making autonomy, and work method autonomy are presented in Fig. 1. The descriptive statistics, including means, standard deviations, and zero-order correlations of the variables, are presented in Table 3.

There was a negative correlation between working hours per day and job satisfaction. There were also positive correlations among work scheduling autonomy, decision-making autonomy, work method autonomy, and job satisfaction.

Nonlinear Relationship Test

Hypothesis 1 predicted that working hours per day would have an inverted U-shaped relationship with job satisfaction. As shown in Table 4, Model 1 contained the control variables in column 2. In column 4, we added working hours per day (Model 2). Working hours per day ($\beta = -0.080$, $p < 0.001$) were significantly related with job satisfaction. In column 6, we added the squared item for working hours per day (Model 3). Haans et al.'s (2016) criteria are met: first, the regression coefficient of the squared item for working hours is negative and significant ($\beta = -0.027$, $p < 0.001$). Second, the slope is 0.361 ($p < 0.001$) when X is at its lowest point ($X_L = -8.419$). The slope is -0.611 ($p < 0.001$) when X is at its highest point ($X_H = 9.581$). Following Simonsohn (2018), we tested two regressions lines – one for low values of X, the other for high values of X – and verified that one slope is positive and the other, negative.¹ The average slope for low values of X is 0.19, $p < 0.0001$. The average slope for high values of X is -0.023 , $p < 0.0001$.² Third, the turning point for centred working hours is -1.741 . The 95% confidence interval of turning point based on the Fieller method is from -2.389 to -1.254 , which is within the working hours per day data range. Therefore, the level of job satisfaction is highest at 7.679 working hours per day. All these results show that the number of working hours per day has an inverted U-shaped relationship with job satisfaction.

We also used the Johnson–Neyman (J–N) technique (Miller et al., 2013) to analyse the region of significance for the curvilinear effect.³ The J–N plot (see Fig. 2) shows that when working hours per day are lower (specifically

¹ The app for running the two-lines test is available at <http://webstimate.org/twolines> ().

² The results are summarised in Figure, which is be found in the supplementary material.

³ Given the ease with which the fixed focal predictor was found, the 0th, 5th, 10th, 15th, 20th, 25th, 30th, 35th, 40th, 45th, 50th, 55th, 60th, 65th, 70th, 75th, 80th, 85th, 90th, 95th, and 100th percentiles of the focal predictor were used as these specified values.

Table 2 The Results of CFA($n = 771$)

	χ^2	df	χ^2/df	RMSEA	SRMR	CFI	TLI	GFI
Four-factor model	84.895	48	1.769	.032	.025	.992	.989	.982
Two-factor model	1866.780	53	35.222	.211	.135	.621	.528	.671
Single-factor model	2658.168	54	49.225	.250	.156	.456	.335	.589

(1) Four-factor model: decision-making autonomy, work scheduling autonomy, work method autonomy, job satisfaction; (2) Two-factor model: based on the four-factor model; combines decision-making autonomy, work scheduling autonomy, and work method autonomy into one factor; (3) Single-factor model: based on the four-factor model; combines the four construct variables into one factor; (4) RMSEA is the abbreviation of root mean square error of approximation; (5) SRMR is the abbreviation of standardised root mean square residual; (6) CFI is the abbreviation of comparative fit index; (7) TLI is the abbreviation of Tucker-Lewis index; (8) GFI is the abbreviation of goodness of fit index

under -2.352 units), the simple slope for working hours per day predicting job satisfaction was significantly positive, indicating that an increase in working hours per day would result in a statistically significant increase in job satisfaction. When working hours are between -2.352 and -1.241

units, an increase in working hours per day is not expected to have a significant effect on job satisfaction. However, when working hours per day are above -1.241 units, the simple slope for working hours per day predicting job satisfaction is significantly negative, indicating that an increase in working

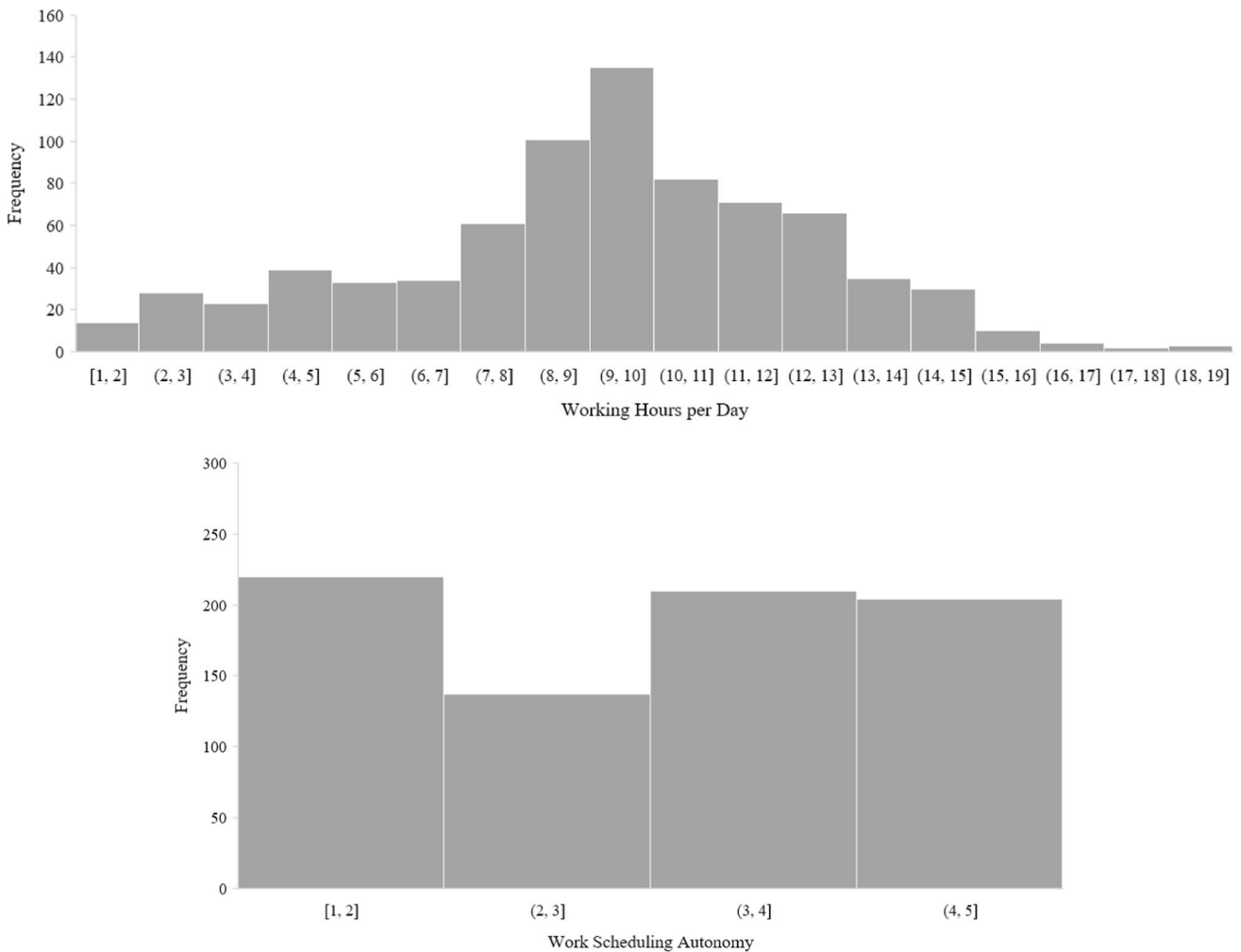


Fig. 1 The Histograms of the Main Variables of Working Hours per Day, Work Scheduling Autonomy, Decision-Making Autonomy, Work Method Autonomy, and Job Satisfaction

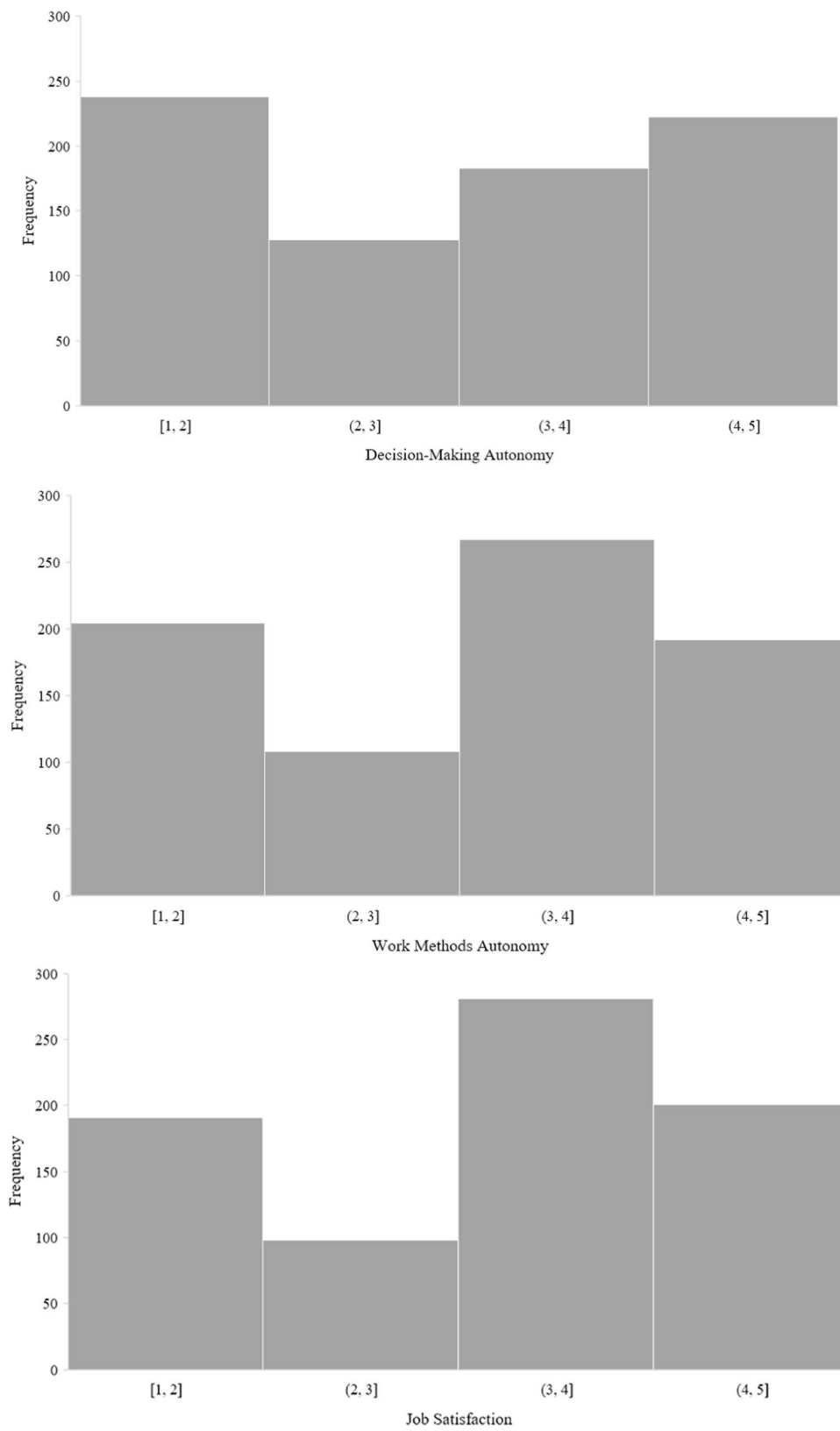


Fig. 1 (continued)

Table 3 Means, Standard Deviations, and Zero-Order Correlations ($n = 771$)

	1	2	3	4	5	6	7	8	9	10
1 Gender	1	-.153***	.128***	-.034	.006	-.079*	.071*	.085*	.063	.061
2 Age		1	-.284***	.311***	.117**	.335***	.024	-.007	.015	-.040
3 Education			1	.082*	-.059	-.130***	.086*	.089*	.051	.051
4 Income				1	-.040	.325***	.040	.062	.045	-.011
5 Industry					1	.065	.017	.010	.001	-.004
6 Working hours per day						1	-.102**	-.079*	-.058	-.206***
7 Work scheduling autonomy							1	.314***	.287***	.351***
8 Decision-making autonomy								1	.365***	.338***
9 Work method autonomy									1	.224***
10 Job satisfaction										1
<i>M</i>	1.521	32.895	2.608	2.825	5.005	9.420	3.153	3.125	3.222	3.306
<i>SD</i>	.500	9.406	.843	1.338	2.724	3.304	1.261	1.249	1.189	1.159

* $p < .05$; ** $p < .01$; *** $p < .001$. Gender: 1 = men; 2 = women. Education: 1 = high school or below; 2 = three years of college education in a technical field; 3 = four-year undergraduate degree; 4 = graduate degree. Income: 1 = under 3,000 yuan/RMB; 2 = 3,001–6,000 yuan/RMB; 3 = 6,001–9,000 yuan/RMB; 4 = 9,001–12,000 yuan/RMB; 5 = over 12,000 yuan/RMB. Industries: 1 = manufacturing; 2 = financial; 3 = information technology, computer services, and software; 4 = internet or electronic commerce; 5 = education; 6 = wholesale and retail industry; 7 = transportation; 8 = building materials; 9 = petrochemical industry; 10 = others

hours per day would result in a statistically significant decrease in job satisfaction. In sum, all these results show that Hypothesis 1 is supported. As shown in Fig. 3, as working hours per day increase, job satisfaction first increases, then reaches a maximum, and then decreases.

In column 8, we added work scheduling autonomy, decision-making autonomy, work method autonomy, the interactive item of working hours per day with work scheduling autonomy, decision-making autonomy, and work method autonomy in Model 4. The results show that the interactive items of working hours per day and work scheduling autonomy ($\beta = 0.020$, $p < 0.05$) were significantly related with job satisfaction. However, the interactive items of working hours per day and decision-making autonomy ($\beta = 0.017$, $p = 0.072$), and the interactive items of working hours per day and work method autonomy ($\beta = -0.004$, $p = 0.646$) were not significantly related to job satisfaction. To test Hypothesis 2, we entered the interactive items of squared working hours per day and job autonomy (including work scheduling autonomy, decision-making autonomy, and work method autonomy) into Model 5 in column 10. The results show that the interactive items of squared working hours per day and work scheduling autonomy ($\beta = 0.006$, $p < 0.01$), and the interactive items of squared working hours and decision-making autonomy ($\beta = 0.008$, $p < 0.001$) are significantly positively related to job satisfaction. Thus, Hypotheses 2a and 2b are supported. However, the interactive items of squared working hours per day and work method autonomy ($\beta = -0.000$, $p = 0.853$) could not predict job satisfaction. Thus, Hypothesis 2c is not supported.

We performed additional analyses to test Hypothesis 2a and 2b, and examined the simple slopes of the regression

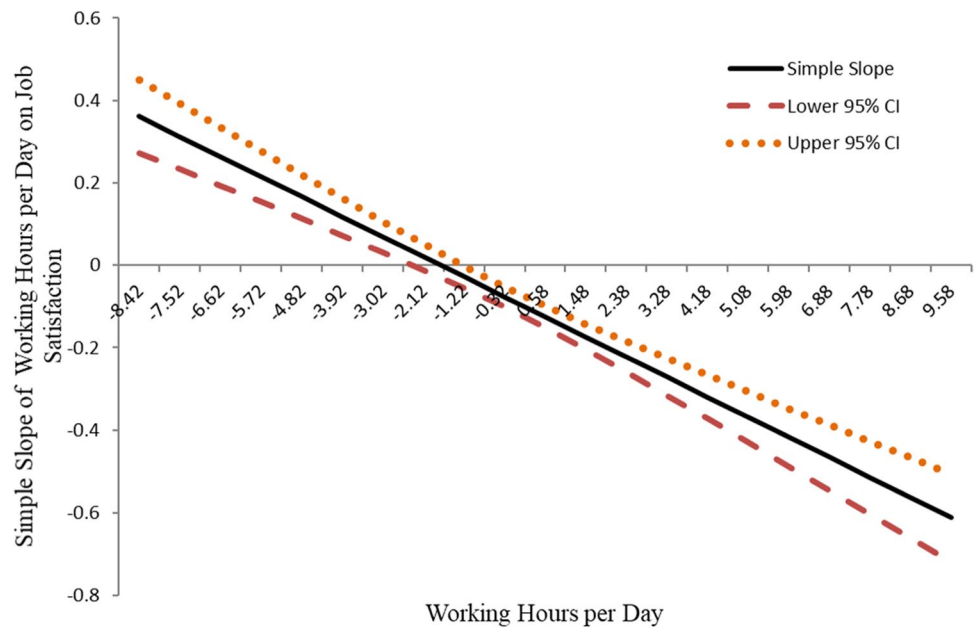
lines corresponding to all possible combinations of different frequency levels of squared working hours per day with high and low levels of work scheduling autonomy and decision-making autonomy (Aiken et al., 1991). Following Miller et al.'s (2013) procedure, three J–N plots, shown in Figs. 4A, 4B, and 4C, present the results when either work scheduling autonomy or decision-making autonomy has been fixed at -1.0 standard deviation, its mean, and $+1.0$ standard deviation. The three J–N plots capture how the quadratic effect of working hours per day changes with different levels of work scheduling autonomy (Miller et al., 2013). As shown in Fig. 4A, when work scheduling autonomy is low (-1.0 standard deviation), an increase in working hours per day is expected to increase job satisfaction for individuals with few working hours per day (< -2.761 units), and to decrease job satisfaction for those with many working hours per day (> -1.059 units). An increase in working hours per day does not change job satisfaction for those with working hours between -2.761 and -1.059 units. As shown in Fig. 4B, when work scheduling autonomy is held at its mean, we see that an increase in working hours per day is expected to increase job satisfaction for individuals with few working hours per day (< -2.322 units), and to decrease job satisfaction for those with many working hours per day (> -0.618 units). An increase in working hours per day does not change job satisfaction for those whose working hours range from -2.322 to -0.618 units. As shown in Fig. 4C, when work scheduling autonomy is high ($+1.0$ standard deviation), we see that an increase in working hours per day is expected to increase job satisfaction for individuals with few working hours per day (< -3.266 units), but not for those with hours above this threshold. Figure 5 presents

Table 4 Unstandardised Regression Coefficients of the Moderating Effect of Job Autonomy

Variables	Model 1	95% CI	Model 2	95% CI	Model 3	95% CI	Model 4	95% CI	Model 5	95% CI
Intercept	3.074***	[2.528, 3.619]	2.791***	[2.248, 3.333]	3.556***	[3.025, 4.086]	3.859***	[3.367, 4.351]	3.851***	[3.367, 4.335]
Gender	.128	[-.039, .294]	.114	[-.049, .277]	.071	[-.083, .224]	.019	[-.123, .162]	.027	[-.113, .167]
Age	-.002	[-.012, .008]	.004	[-.006, .014]	-.000	[-.009, .009]	-.003	[-.011, .006]	-.004	[-.013, .004]
Education	.052	[-.051, .156]	.027	[-.075, .128]	-.010	[-.106, .086]	-.058	[-.146, .031]	-.039	[-.127, .049]
Income	-.008	[-.074, .058]	.044	[-.023, .111]	-.015	[-.078, .049]	-.029	[-.088, .030]	-.042	[-.100, .016]
Industry	-.000	[-.031, .030]	.004	[-.026, .034]	.001	[-.027, .029]	-.003	[-.029, .023]	.000	[-.025, .025]
Working hours per day			-.080***	[-.106, -.053]	-.094***	[-.119, -.068]	-.063***	[-.087, -.039]	-.044**	[-.069, -.019]
Working hours per day ²					-.027***	[-.032, -.021]	-.020***	[-.025, -.016]	-.016***	[-.021, -.010]
Work scheduling autonomy							.210***	[.150, .270]	.146***	[.074, .217]
Decision-making autonomy							.191***	[.129, .253]	.113**	[.039, .186]
Work method autonomy							.045	[-.020, .109]	.049	[-.030, .128]
Working hours per day × work scheduling autonomy							.020*	[.003, .038]	.031**	[.013, .049]
Working hours per day × decision-making autonomy							.017	[-.001, .035]	.025**	[.006, .043]
Working hours per day × work method autonomy							-.004	[-.023, .014]	-.001	[-.020, .018]
Working hours per day ² × work scheduling autonomy									.006**	[.003, .010]
Working hours per day ² × decision-making autonomy									.008***	[.004, .011]
Working hours per day ² × work method autonomy									-.000	[-.004, .004]
Adjusted R ²	.000		.041		.155		.283		.308	
F	.952		6.532***		21.091***		24.399***		22.404***	
ΔF	.952		34.224***		103.198***		23.835***		9.987***	
ΔR ²	.006		.043		.113		.133		.027	

p* < .05; *p* < .01; ****p* < .001. Gender: 1 = men; 2 = women. Education: 1 = high school or below; 2 = three years of college education in a technical field; 3 = four-year undergraduate degree; 4 = graduate degree. Income: 1 = under 3,000 yuan/RMB; 2 = 3,001–6,000 yuan/RMB; 3 = 6,001–9,000 yuan/RMB; 4 = 9,001–12,000 yuan/RMB; 5 = over 12,000 yuan/RMB. Industries: 1 = manufacturing; 2 = financial; 3 = information technology, computer services, and software; 4 = internet or electronic commerce; 5 = education; 6 = wholesale and retail industry; 7 = transportation; 8 = building materials; 9 = petrochemical industry; 10 = others. Bootstrapping sample is 1,000

Fig. 2 Johnson–Neyman Plot of the Region of Significance for the Simple Slope of Working Hours per Day on Job Satisfaction



the shape of the quadratic effect of working hours per day depending on the level of work scheduling autonomy. With higher work scheduling autonomy, the U-shaped curve of job satisfaction is less affected by the squared working hours. Conversely, when work scheduling autonomy is low, the relationship between working hours per day squared and job satisfaction is more obvious. Figure 6 shows the three-dimensional plot of the predicted value of job satisfaction in the given scenario. Hence, Hypothesis 2a is further verified.

The three J–N plots shown in Figs. 7A, 7B, and 7C capture how the quadratic effect of working hours

per day changes with different levels of decision-making autonomy (Miller et al., 2013). As shown in Fig. 7A, when decision-making autonomy is low (–1.0 standard deviation), an increase in working hours per day is expected to increase job satisfaction for individuals with few working hours per day (< –2.243 units), but to decrease job satisfaction for those with many working hours per day (> –0.817 units). An increase in working hours per day does not change job satisfaction for those whose working hours are between –2.243 and –0.817 units. As

Fig. 3 Relationship between Working Hours and Job Satisfaction

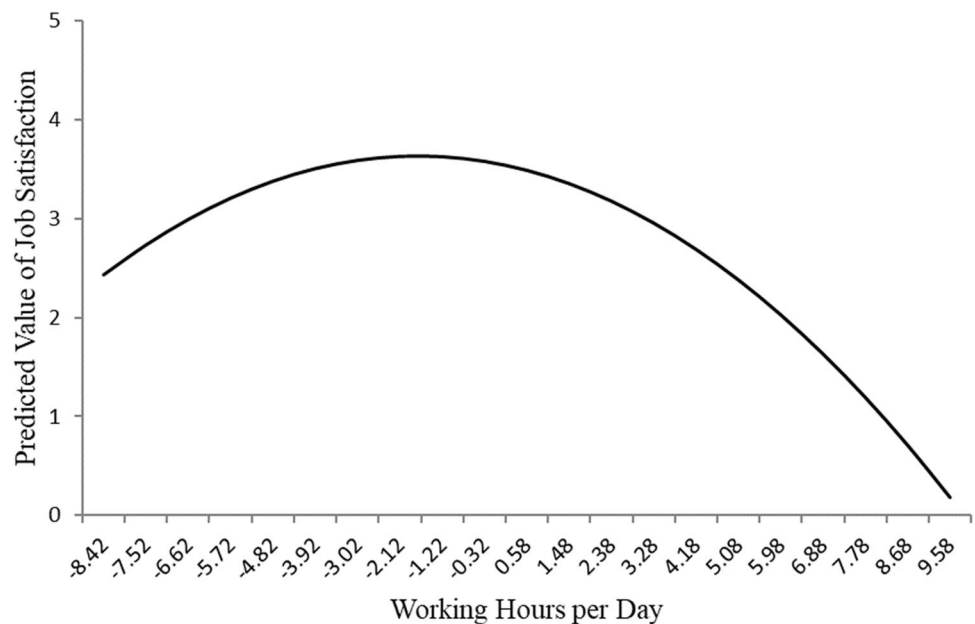


Fig. 4 **A** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at a Low Value (–1 Standard Deviation) of Work Scheduling Autonomy across the Range of Working Hours per Day. **B** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at the Average Value (0) of Work Scheduling Autonomy across the Range of Working Hours per Day. **C** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at a Low Value (+1 Standard Deviation) of Work Scheduling Autonomy across the Range of Working Hours per Day

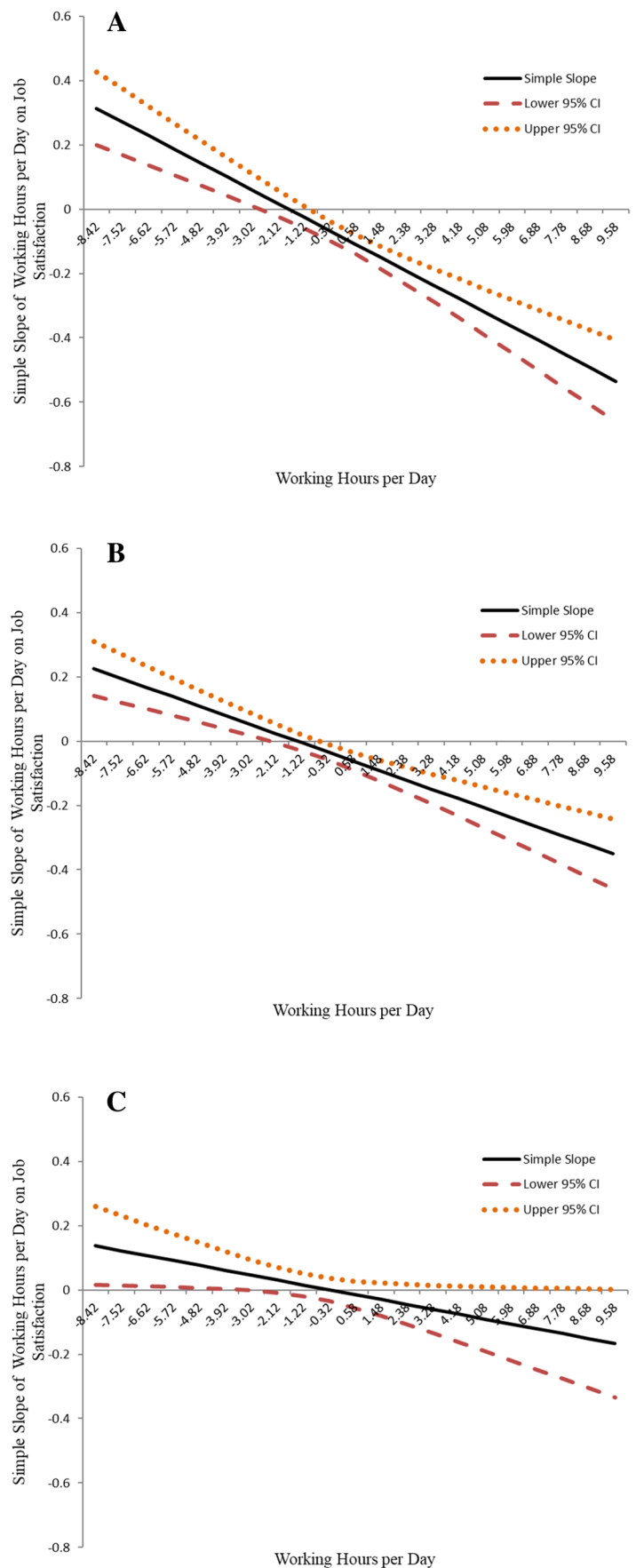


Fig. 5 Relationship between Working Hours and Job Satisfaction as a Function of Work Scheduling Autonomy

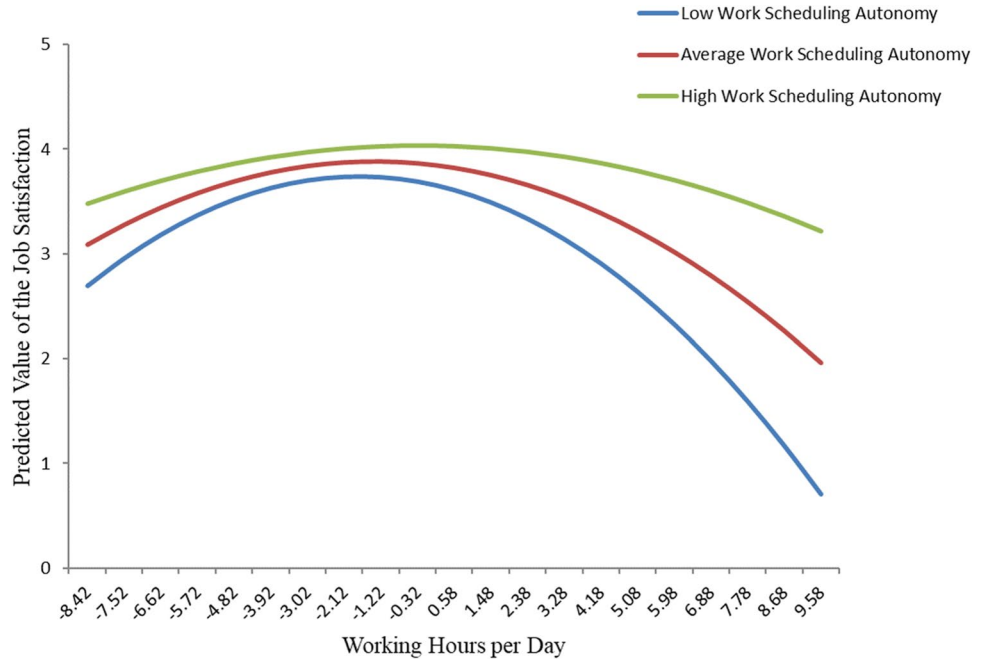
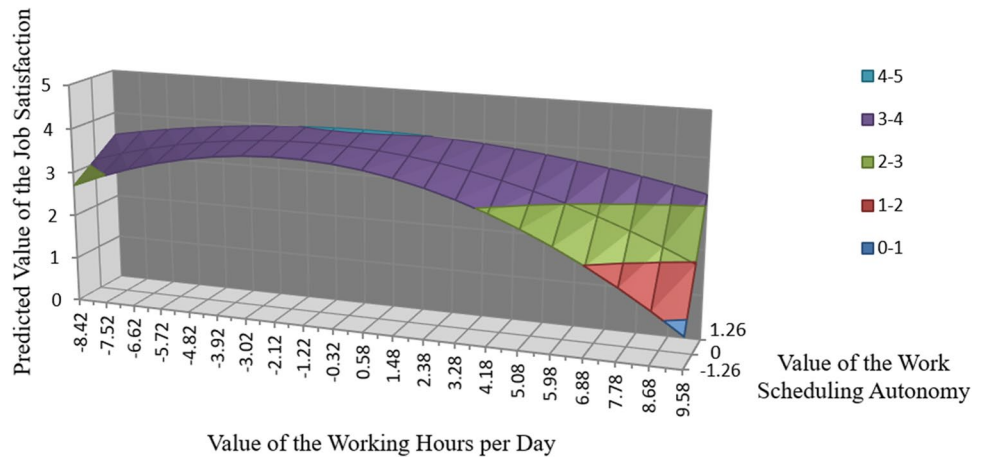


Fig. 6 The Three-Dimensional Plot of the Predicted Value of Job Satisfaction When There Is a Significant Interaction of Working Hours per Day² × Work Scheduling



shown in Fig. 7B, when decision-making autonomy is held at its mean, an increase in working hours per day is expected to increase job satisfaction for individuals with few working hours per day (< -2.322 units), but to decrease job satisfaction for those with many working hours per day (> -0.618 units). An increase in working hours per day does not change job satisfaction for those whose working hours range from -2.322 to -0.618 units. As shown in Fig. 7C, when decision-making autonomy is high ($+1.0$ standard deviation), an increase in working hours per day does not affect

job satisfaction. Figure 8 presents the shape of the quadratic effect of working hours per day depending on the level of decision-making autonomy. With higher decision-making autonomy, the U-shaped curve of job satisfaction is less affected by working hours per day squared. The relationship between working hours per day squared and job satisfaction is nonlinear only when decision-making autonomy is low. Figure 9 shows the three-dimensional plot of the predicted value of job satisfaction in the given scenario. Hence, Hypothesis 2b is further verified.

Fig. 7 **A** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at a Low Value (–1 Standard Deviation) of Decision-Making Autonomy across the Range of Working Hours per Day. **B** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at the Average Value (0) of Decision-Making Autonomy across the Range of Working Hours per Day. **C** Johnson–Neyman Plot of the Simple Slope of Working Hours per Day on Job Satisfaction at a High Value (+1 Standard Deviation) of Decision-Making Autonomy across the Range of Working Hours per Day

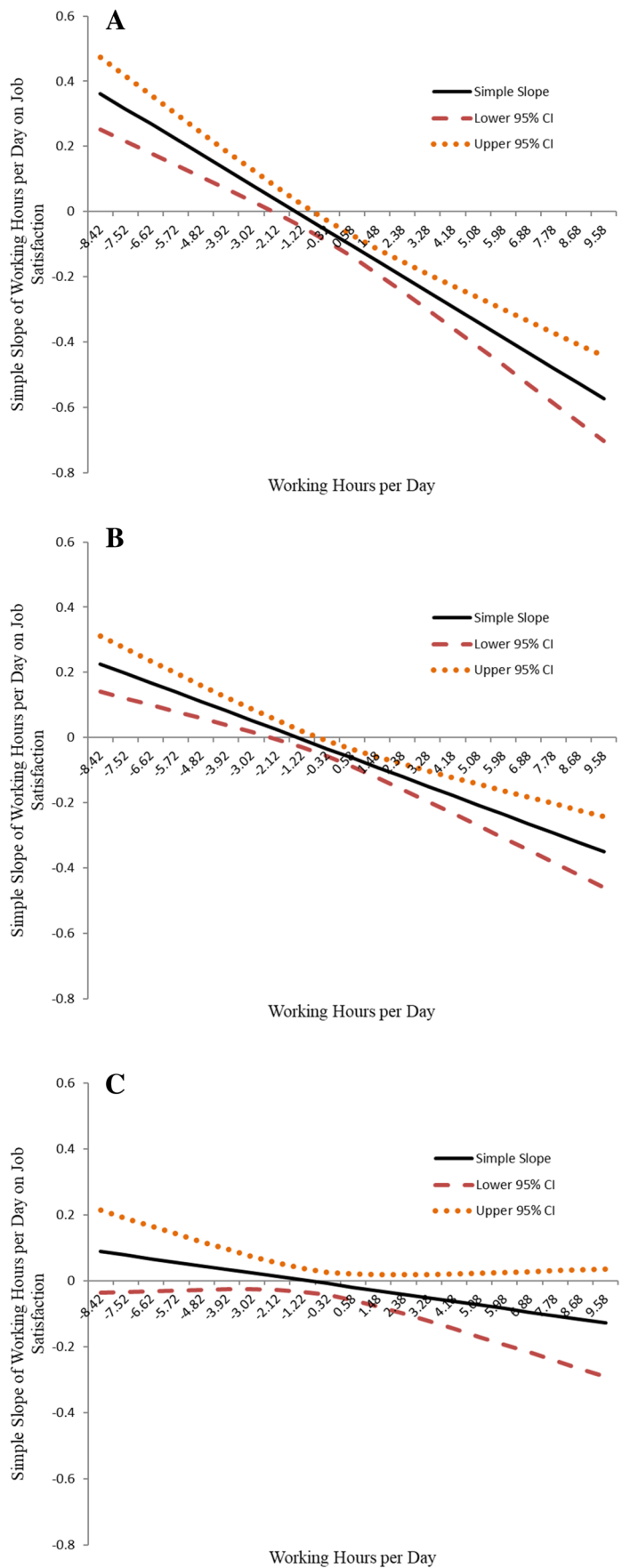


Fig. 8 Relationship between Working Hours and Job Satisfaction as a Function of Decision-Making Autonomy

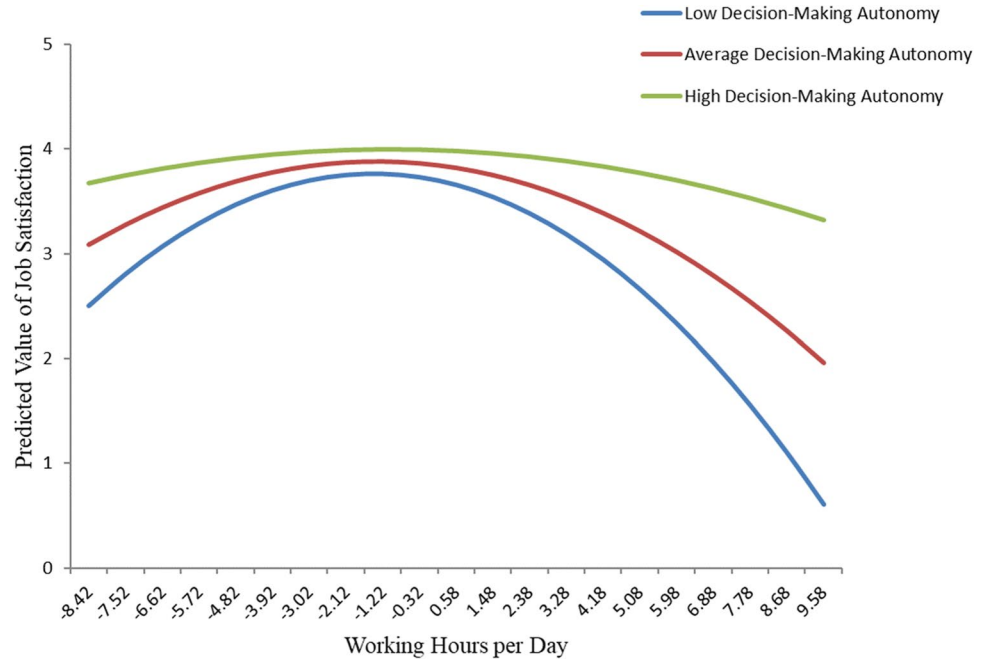
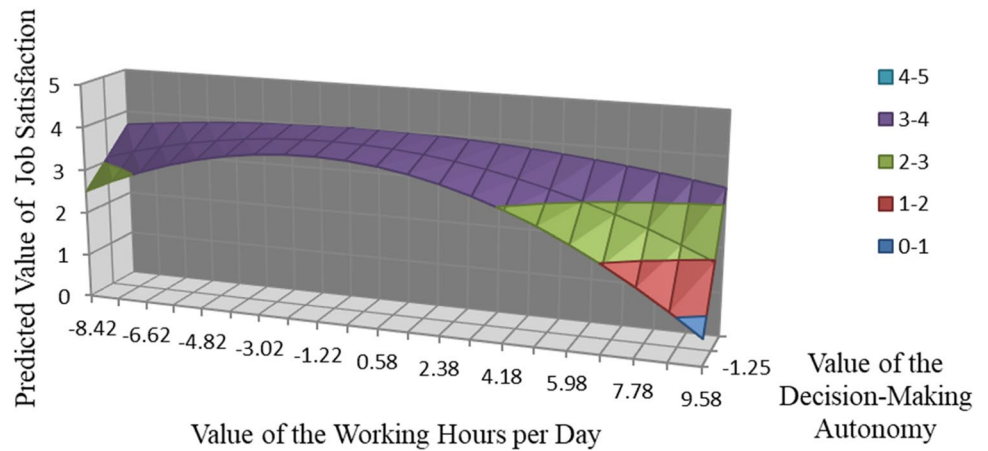


Fig. 9 The Three-Dimensional Plot of the Predicted Value of Job Satisfaction When There Is a Significant Interaction of Working Hours per Day² × Decision-Making Autonomy



Discussion

The central goal of this research was to understand the nonlinear association between working hours and job satisfaction, as well as the moderating effect of job autonomy on this curvilinear relationship. Specifically, there is an inverted U-shaped association between working hours and job satisfaction. At the beginning, job satisfaction shows a slow upward trend with increasing working hours. At this stage, work brings the workers a certain amount of labour remuneration and solves their survival and development problems, such as the need for clothing, food, housing, travel, and other material things (Hagler et al., 2016). When working hours reach the optimal point, job satisfaction also reaches its highest level. Then, as working hours continue to increase past this point, job satisfaction takes

a downward turn. These results are consistent with those from previous studies (X. T. Wang et al., 2017). We have also attempted to determine the optimal working hours, and found that this was approximately eight hours. This result is consistent with the existing labour law in China, which stipulates that ‘the daily working time should not exceed eight hours, and the general daily overtime should not exceed one hour.’

We also found that job autonomy did moderate the inverted U-shaped association between working hours and job satisfaction. According to the basic tenets of the JD–R model (Bakker & Demerouti, 2007), it is not high demands per se, but high demands combined with a lack of job resources (such as job autonomy) that undermine desirable work outcomes such as job satisfaction. This suggests that job autonomy could buffer the negative effects of long

working hours on job satisfaction. Specifically, we found that work scheduling autonomy and decision-making autonomy moderate the association between working hours and job satisfaction. Therefore, as job resources, work scheduling autonomy and decision-making autonomy can improve overall job satisfaction.

However, we did not find that work method autonomy moderated the relationship between working hours and job satisfaction. One possible reason is that the job tenure is not high enough in the sample. Previous research found that the correlation between work method autonomy and job satisfaction was not significant in low-tenure samples. However, the correlation was significant in high-tenure samples (Denton & Kleiman, 2001). Another possible reason is that many organisations have a set of fixed workflows and methods for employees to use in their work in order to ensure efficiency. Empirical evidence shows that perceived job autonomy varies with occupation; for example, entrepreneurs are more likely to report high job autonomy than other professionals (Benz & Frey, 2008). On the other hand, programmers in many companies are asked to use a uniform coding language in their work; assembly line workers in manufacturing enterprises are often asked to use specific sequences of steps to complete their tasks. Doctors must follow rigorous treatment protocols to treat diseases. Eriksson-Zetterquist et al.'s (2009) qualitative study found that employees using an e-business system to make purchases strictly followed the automated workflow, with limited work method autonomy. Therefore, work method autonomy may not be practicable in some industries, and the effect of method autonomy on employee satisfaction may appear insignificant because of this. In Charlie Chaplin's masterpiece *Modern Times*, humans become parts of a machine and have no autonomy at all in deciding how to do their work (B. Wang et al., 2021). At last, according to the JD-R model, different job resources can buffer for different job demands (Bakker et al., 2005). Therefore, buffering the detrimental effects of working hours may require specific job resources. Work method autonomy doesn't work in this context.

Theoretical Contributions

This research makes several theoretical contributions.

Unlike previous studies, which consider only the simple linear relationship between working hours and job satisfaction, our study adds an extra data point and provides initial evidence for the inverted U-shaped curvilinear effect of working hours on job satisfaction. Our results align with recent calls for a paradigm shift to curve models in the field of management (Pierce & Aguinis, 2013). In addition, most of the previous studies concerning working hours and various psychological outcomes have been conducted in North American and European countries (Lu, 2011). We, on the

other hand, provide theoretical evidence of the positive and negative effects of working hours on job satisfaction among Chinese employees. For these employees, neither too-long nor too-short hours are conducive to job satisfaction. The best working hours for Chinese employees are about eight hours per day. Therefore, this study enriches the scholarship about working hours and job satisfaction by providing a different demographical perspective.

Our study also verifies the boundary conditions for the impact of job characteristics, especially job autonomy, on working hours and job satisfaction. As a positive job resource, job autonomy can help buffer the negative effects of long working hours on job satisfaction. In particular, work scheduling autonomy and decision-making autonomy play important roles in moderating the relationship between working hours and job satisfaction. Therefore, this study elucidates when job autonomy can be most beneficial for relieving the negative effects of long working hours on employees' job satisfaction. It also helps us better understand how work characteristics shape positive work experiences.

Practical Implications

As Jack Ma implied, companies support the '996' phenomenon or long working hours because they can bring greater productivity and profit. Although productivity and profit are very important goals for managers, employee job satisfaction should not be neglected either. Previous studies show that more satisfied workers are more productive (Bellet et al., 2020), and that longer hours do not increase productivity (Collewet & Sauermaun, 2017). Our study, on the other hand, has found that both too-long and too-short hours are detrimental to employees' job satisfaction. Managers should set an eight-hour work schedule and avoid excessive overtime. This is optimal for employees' job satisfaction.

To create an enjoyable workplace, managers should pay close attention to the characteristics of the job and to how these characteristics may also improve employees' job satisfaction (Jiang et al., 2020). In particular, managers should consider job autonomy. Our results emphasise the importance of job autonomy for the satisfaction of workers. Working hours and working time arrangements are key working conditions. Employees experience greater job satisfaction if they are able to determine and organise their working hours themselves and to work autonomously. To improve satisfaction while maintaining longer hours, managers should try to design a resource-rich work environment and to allow employees sufficient autonomy. To relieve the negative effects of long working times, managers can introduce greater scheduling flexibility. The shift away from the fixed eight hours a day, five days a week schedule also reflects an increased desire for autonomy and job control among younger workers, who often value work-life balance as a

goal in itself (Kuron et al., 2015). Flexible work schedules and high decision-making autonomy increase employees' satisfaction with work. Our study suggests that managers can increase job satisfaction by increasing job autonomy, particularly work scheduling autonomy and decision-making autonomy.

Limitations and Future Research

Several limitations need to be addressed in future research.

First, although the independent variable in our study was the objective number of working hours per day, our data were collected at a single point in time from a single source. This may entail a risk of common method variance (CMV). We also cannot make causal inferences among the research variables. To avoid or minimise CMV, future studies should consider using experimental and longitudinal designs to verify the proposed model. Furthermore, given that the data used in this study are collected using internet-based random sampling, the results are not necessarily representative or generalisable to the Chinese population. Future studies should adopt a hierarchical sampling approach to expand the sample size and improve sample representation.

Second, we only measured the working hours per day. Weekly working hours should also be considered as a control variable when conducting the model test, because people can, for example, work intensively for two days and then rest for three days. Because time preference denotes a preference for present over future utility (Frederick et al., 2002; Ifcher & Zarghamee, 2011), future studies should consider the influence of employees' preferred working hours on job satisfaction.

Third, the measurement of job satisfaction in our study was a single dimension. However, job satisfaction involves many distinct aspects of the job, such as total pay, job security, the work itself, the hours worked, and the flexibility available to balance work and non-work commitment (Wooden & Warren, 2004). It would be good to collect data on different components of job satisfaction in the future.

Fourth, future studies should investigate what kind of psychological mechanisms related to job autonomy regulate the relationship between working hours and job satisfaction, such as job crafting (Zhao et al., 2020) and thriving at work (Spreitzer et al., 2005). Previous studies have found that job crafting could mediate the effect of job autonomy on employees' satisfaction (Zhao et al., 2020). Employees who have more freedom in their job are more likely to craft their jobs (Wrzesniewski & Dutton, 2001), which allows them to fulfil their personal needs and leads to positive work experiences (Berg et al., 2010). Furthermore, when employees have decision-making autonomy, they feel more energetic and are more likely to thrive at work (Sia & Duari, 2018). They are also better able to overcome mental stress and

maintain their well-being (Parker et al., 2006). Future studies should consider the other possible mediating mechanisms between working hours and job satisfaction.

Fifth, we did not consider other factors that may have moderated the curvilinear relationship between working hours and job satisfaction. For example, workaholic individuals, who are likely to work long hours, may not value leisure activities for recovery, leading to more strain and more conflicts between work and family, which may harm these employees' well-being (Karapinar et al., 2020). Therefore, workaholics make it look like long hours are more harmful to satisfaction than they really are. Workaholics may also play an important moderating role in the relationship between working hours and job satisfaction. Another possible moderator is working time mismatch (the discrepancy between actual and desired working hours), which also influences employees' job satisfaction (Pagan, 2017). Workers experiencing a working time mismatch are more likely to report lower levels of job satisfaction than those who actually work their preferred hours (Pagan, 2017). Future studies should explore the moderating effects of these individual variables.

Last but not the least, because the moderating effect of method autonomy on employee satisfaction was not significant, future research needs to further test the influence of method autonomy by differentiating types of workers, job tenure, and industries. Furthermore, organisational managers often consider flexible work arrangements less appropriate for lower-level employees, who have clear project deadlines and are closely supervised, than for professional and managerial staff (Hill et al., 2004). Thus, even though flexible arrangements may be company-wide, employees in certain job classifications often cannot benefit from them (Putnam et al., 2014). Furthermore, work (re)designs vary because certain types of jobs (e.g., web developer, writer/editor) are inherently more flexible than others (e.g., manufacturing), and because firm characteristics (e.g., size, culture) also affect organisational needs (Halliday et al., 2018). Therefore, future research should consider the moderating role that job classifications, job tenure, and types of workers may play in the influence of work method autonomy on job satisfaction.

Conclusion

When managers pursue greater productivity and profit for the company through a '996' work schedule, they must also consider employees' job satisfaction. Our findings support the existence of an inverted U-shaped relationship between working hours and job satisfaction. As working hours increase, job satisfaction first increases, then reaches a peak, and then declines. Furthermore, we demonstrate that when

employees have some degree of job autonomy, especially work scheduling autonomy and decision-making autonomy, the negative effects of long working hours can be mitigated. Managers could provide more job resources for employees by increasing job autonomy and improving their job satisfaction even while maintaining longer hours. We hope that the practical implications of this study will convince managers of the importance of appropriate working hours for job satisfaction and of the critical role of job autonomy in work design.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12144-021-02463-3>.

Authors' Contributions All the authors have made substantial, direct, and intellectual contribution to the work, including designing the research, writing, and revising the manuscript before it was submitted for publication.

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Declarations

Ethical Approval All participants in current studies consented to participate, and the project was approved through the Department of Psychology Ethics Committee, Tsinghua University, China.

Original Data Link https://osf.io/fe3vk/?view_only=a49436fff21a498982200a700ce388c7

Conflict of Interest The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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