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ORIGINAL RESEARCH

The difference in work stress and physical and mental health between young adult male field and office workers

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Abstract

This study investigated the differences in physical and mental health and work stress between field and office workers. Although considerable research has examined the effects of work on physical and mental health individually, there remains a lack of clarity regarding potential disparities among different work types. A total of 83 participants comprising field (n = 42) and office workers (n = 41) were enrolled. We performed measurements based on work stress and physical and mental health. Specifically, we evaluated grip strength, gait speed, and the scores in the 30-s sit-to-stand test, timed up-and-go test, International Physical Activity Questionnaire, Center for Epidemiological Studies Depression scale, and World Health Organization Quality of Life assessment. This study identified that male field and office workers differed in muscle strength. Between the groups, significant differences were observed in grip strength (44.20 $\pm$ 6.12 and 39.63 $\pm$ 7.93; p = 0.015) and 30-s sit-to-stand test scores (20.37 $\pm$ 4.82 and 17.83 $\pm$ 4.17; p = 0.043). Among male participants, a significant association was observed between grip strength (robust model, β = 4.386, 95% confidence interval (CI): 0.705–8.067; adjusted model, β = 4.790, 95% CI: 1.134–8.446) and 30-s sit-to-stand test scores (robust model, β = 2.545, 95% CI: 0.086–5.005; adjusted model, β = 2.102, 95% CI: −0.378–4.581). In conclusion, muscle strength differed significantly according to the type of work performed by male individuals. Therefore, there is a need to develop and intervene in exercise programs for office workers.

Keywords

Field workers; Mental health; Office workers; Physical health; Work stress

1. Introduction

Globally, work is typically categorized into fieldwork and office work [1]. Fieldwork includes manual or on-site work, which may require individuals to perform in diverse weather conditions and operate heavy machinery in potentially risky environments. Office work is predominantly desk-based and involves tasks related to administration, management, or information processing [2]. Field and office work represent two distinct employment categories, each with different characteristics and requirements.

The average time that a worker spends at work is approximately 8 h [3]. Physical activity and sedentary time are strongly influenced by occupational tasks and the environment. Previous studies have suggested a correlation between high levels of physical activity and skeletal muscle strength [4]. In contrast, a sedentary lifestyle was related to inability to perform daily activities and poor skeletal muscle strength [5].

Work stress is a strong predictor of poor mental and physical health, as well as negative work attitudes and behaviors among employees [6, 7]. The stress experienced by the body has a detrimental effect on the skeletal muscles and their strength [8]. Physical activity is one of the most effective ways to prevent stress-induced mental illness [9]. Individuals who are more active tend to experience less anxiety and depression [10]. Furthermore, individuals living a sedentary lifestyle who participated in a new exercise program reported relief from their depressive symptoms [11].

However, there are conflicting claims concerning the physical activity and health of workers, such as the physical activity paradox [12]. Although, physical and mental health have been studied separately in relation to work, it remains unclear whether a difference exists between the types of work. Thus, in this study, we aimed to investigate the differences in physical and mental health and work stress between field and office workers.

2. Materials and methods

2.1 Study design and participants

Participants were enrolled in this study between March 2023 and June 2023. The participant flowchart is presented in Fig. 1. Office workers in Hadong-gun who had <10 years of experience were recruited. Of the 85 participants in Pusan National University Hospital, one was excluded because of leg injury (n = 1) and one declined evaluation (n = 1). Finally, 83 field (n = 42) and office workers (n = 41) were enrolled. The baseline characteristics differed between the field and office workers (Table 1). All methods were performed in accordance with the approved study plan, as well as with relevant guidelines and regulations.

2.2 Physical health

Participants' body mass index was measured using bioelectrical impedance analysis. An Inbody S10 (Inbody, Seoul, Korea) device was used to determine the body composition values. Grip strength was measured in kilograms using a hand dynamometer (TKK 5401, Takei Scientific Instruments, Tokyo, Japan) placed in the participant's dominant hand [13]. During the assessment, the participants stood in an upright position with their feet shoulder-width apart and their elbows fully extended, facing ahead. Gait speed was assessed according to the standard gait task protocol. The 7-m gait speed test comprised a 1.5-m acceleration and deceleration distance, with the gait speed measured exclusively during the 4-m walk segment [13]. During the 30-s sit-to-stand test, participants were instructed to sit and stand rapidly while crossing their arms over their chest [14]. The count was recorded. The timed up-and-go test involved a 3-m walkway, which was marked on a levelled surface using a cone. The participants were instructed to rise from the chair, move forward swiftly for a distance of 3 m, walk back, and resume their seated position [13]. The seconds were recorded. Physical activity and sedentary time were assessed using the Korean version of the International Physical Activity Questionnaire-short version (IPAQ-S) [15]. The structured items of the IPAQ-S provide separate scores for sedentary time, walking, and moderate-intensity and vigorous-intensity activities. Additionally, we performed moderate-to-vigorous physical activities.

2.3 Mental health and quality of life

Work stress was measured using the Korean Occupational Stress Scale, a 44-item scale. Each item is measured on a 4-point Likert scale ranging from 1 to 4 points. High scores correspond to high levels of occupational stress [16]. The Center for Epidemiological Studies Depression scale comprises 20 items, each rated on a 4-point scale from 0 to 3 points. The overall score ranges from 0 to 60 points, with a high score indicating a high risk of depression [17]. The World Health Organization (WHO) Quality of Life assessment comprises a 24-item self-administered survey categorized into four domains (physical, psychological, social relationships and environmental) and two items that assess individuals' perceptions of global quality of life and health status [18].

2.4 Statistical analysis

Statistical analyses were performed using SPSS for Windows (version 25, IBM Corp., Armonk, NY, USA). The characteristics of the study population are presented as means ± standard deviations (SDs) for continuous variables and as frequencies and proportions for categorical variables. The chi-square test was used for hypothesis testing, where appropriate. Furthermore, Pearson's correlation coefficient was used to evaluate the degree of correlation between variables. Student's *t*-tests were performed to compare the measures and physical function differences among the work patterns (Tables 1,2). This study investigated the relationship between work patterns (field and office workers) and objectively measured physical health indicators using multiple linear regression with adjusted covariates (*i.e.*, age, body mass index, alcohol consumption, and smoking habits) by sex (Fig. 2). The level of significance was set at $p < 0.05$.

3. Results

Table 1 displays the baseline characteristics based on work patterns in young adults. The mean (SD) ages of the field workers and office workers were 29.67 (3.83) and 30.44 (4.23) years, respectively (p = 0.385). Furthermore, 88.3% of the field workers and 56.1% of the office workers were male (p = 0.007). The body mass index, systolic blood pressure, and diastolic blood pressure were 24.12 (3.03) kg/m^2, 120.93 (15.77) mmHg, 73.71 (13.22) mmHg, respectively, for field workers and 23.91 (3.29) kg/m^2, 118.05 (15.97) mmHg, and 74.80 (10.88) mmHg, respectively, for office workers (all $p >$ 0.05).

A comparison of physical and mental health in terms of work patterns stratified by sex is displayed in Table 2. The physical health category differed significantly between male field and office workers. No significant differences were observed between the female field and office workers concerning grip strength (44.20 (6.12) and 39.63 (7.93) kg, respectively; p = 0.015) and 30-s sit-to-stand test scores (20.37 (4.82) and 17.83 (4.17), respectively; p = 0.043). The mental health category differed significantly between female field and office workers. The Korean Occupational Stress Scale scores demonstrated no significant differences between male field and office workers (27.55 (12.67) and 41.00 (9.84), respectively (p = 0.009)).

Associations between work patterns and the objectively assessed physical health measures according to sex are displayed in Fig. 2. Among male individuals, a significant association was observed between grip strength (robust model, β = 4.386, 95% confidence interval (CI): 0.705–8.067; adjusted model, β = 4.790, 95% CI: 1.134–8.446) and 30-s sit-to-stand test scores (robust model, β = 2.545, 95% CI: 0.086–5.005; adjusted model, β = 2.102, 95% CI: −0.378–4.581).

4. Discussion

We identified differences between field and office workers in terms of work stress and physical health. In particular, we observed differences in physical health according to the type of work.

No difference was observed in physical activity levels and

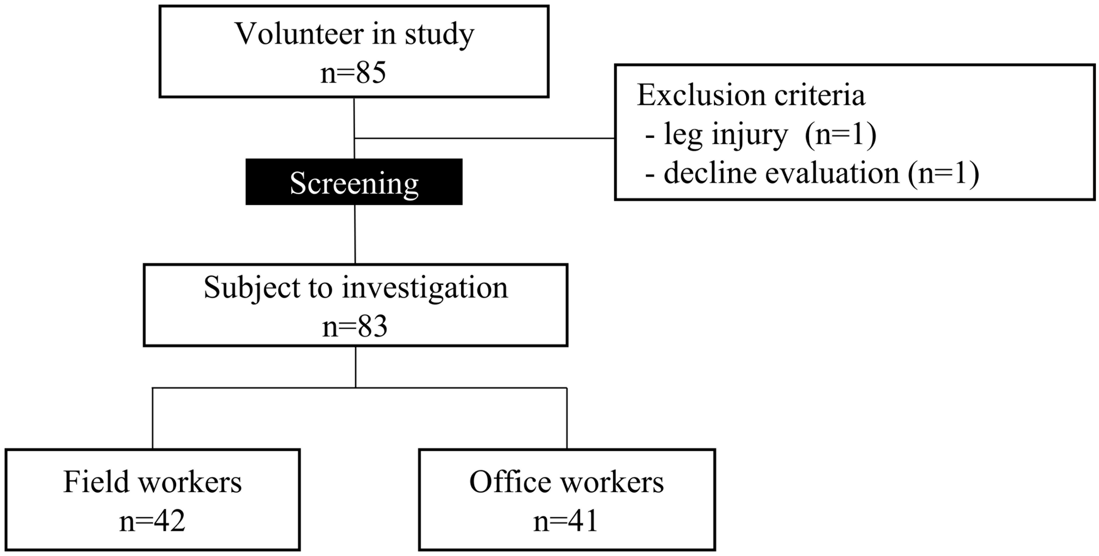

FIGURE 1. Flow diagram of study enrollment.

TABLE 1. Baseline characteristics based on work pattern in young adults.

Variables	Overall (n = 83)	Field workers (n = 42)	Office workers (n = 41)	diff	*p*
Male (%)	58 (69.9)	35 (83.3)	23 (56.1)		0.007
Alcohol consumes (%)	64 (77.11)	31 (73.81)	33 (80.49)		0.120
Smoking habitual (%)	16 (19.3)	12 (28.6)	4 (9.8)		0.360
Age (years)	30.05 ± 4.02	29.67 ± 3.83	30.44 ± 4.23	−1.52	0.385
Height (cm)	170.98 ± 7.70	172.90 ± 6.93	169.02 ± 8.04	2.70	0.021
Weight (kg)	70.66 ± 12.97	72.48 ± 12.45	68.80 ± 13.37	1.90	0.199
BMI (kg/m^2)	24.01 ± 3.15	24.12 ± 3.03	23.91 ± 3.29	−0.09	0.764
SBP (mmHg)	119.51 ± 15.84	120.93 ± 15.77	118.05 ± 15.97	1.05	0.411
DBP (mmHg)	74.25 ± 12.06	73.71 ± 13.22	74.80 ± 10.88	−1.03	0.683

BMI, body mass index; DBP, diastolic blood pressure; diff, mean difference; SBP, systolic blood pressure.

TABLE 2. The comparison of physical and mental health across different work patterns based on sex.

Variables	Male		*p*	Female		*p*
	Field Workers (n = 35)	Office workers (n = 23)		Field Workers (n = 7)	Office Workers (n = 18)	
Physical health category						
BMI (kg/m^2)	24.91 ± 2.61	25.02 ± 2.84	0.883	20.64 ± 2.86	22.39 ± 3.17	0.213
Grip strength (kg)	44.20 ± 6.12	39.63 ± 7.93	0.015	25.73 ± 2.84	21.85 ± 5.20	0.075
Gait speed (s)	3.18 ± 0.48	3.12 ± 0.28	0.554	3.10 ± 0.72	3.22 ± 0.40	0.597
30 s sit-to-stand (count)	20.37 ± 4.82	17.83 ± 4.17	0.043	17.86 ± 3.08	17.05 ± 4.14	0.645
TUG (s)	6.17 ± 0.73	6.24 ± 0.59	0.723	6.42 ± 0.64	6.29 ± 0.57	0.627
MVPA (min/week)	244.86 ± 200.74	319.57 ± 342.78	0.299	175.71 ± 207.43	225.56 ± 268.38	0.664
Sedentary time (min/week)	384.17 ± 209.30	410.00 ± 188.43	0.628	458.57 ± 102.05	562.11 ± 189.96	0.187
Mental health category						
KOSS (point)	39.08 ± 12.14	40.33 ± 10.25	0.679	27.55 ± 12.67	41.00 ± 9.84	0.009
CES-D (point)	10.89 ± 5.91	12.08 ± 6.36	0.460	5.71 ± 3.90	8.58 ± 4.66	0.161
WHOQOL (point)	72.50 ± 10.70	71.74 ± 8.92	0.775	78.45 ± 8.10	71.69 ± 8.35	0.077

BMI, body mass index; CES-D, Center for Epidemiological Studies Depression; KOSS, Korean Occupational Stress Scale; MVPA, moderate-to-vigorous physical activity; TUG, timed up and go; WHOQOL, World Health Organization Quality of Life Assessment.

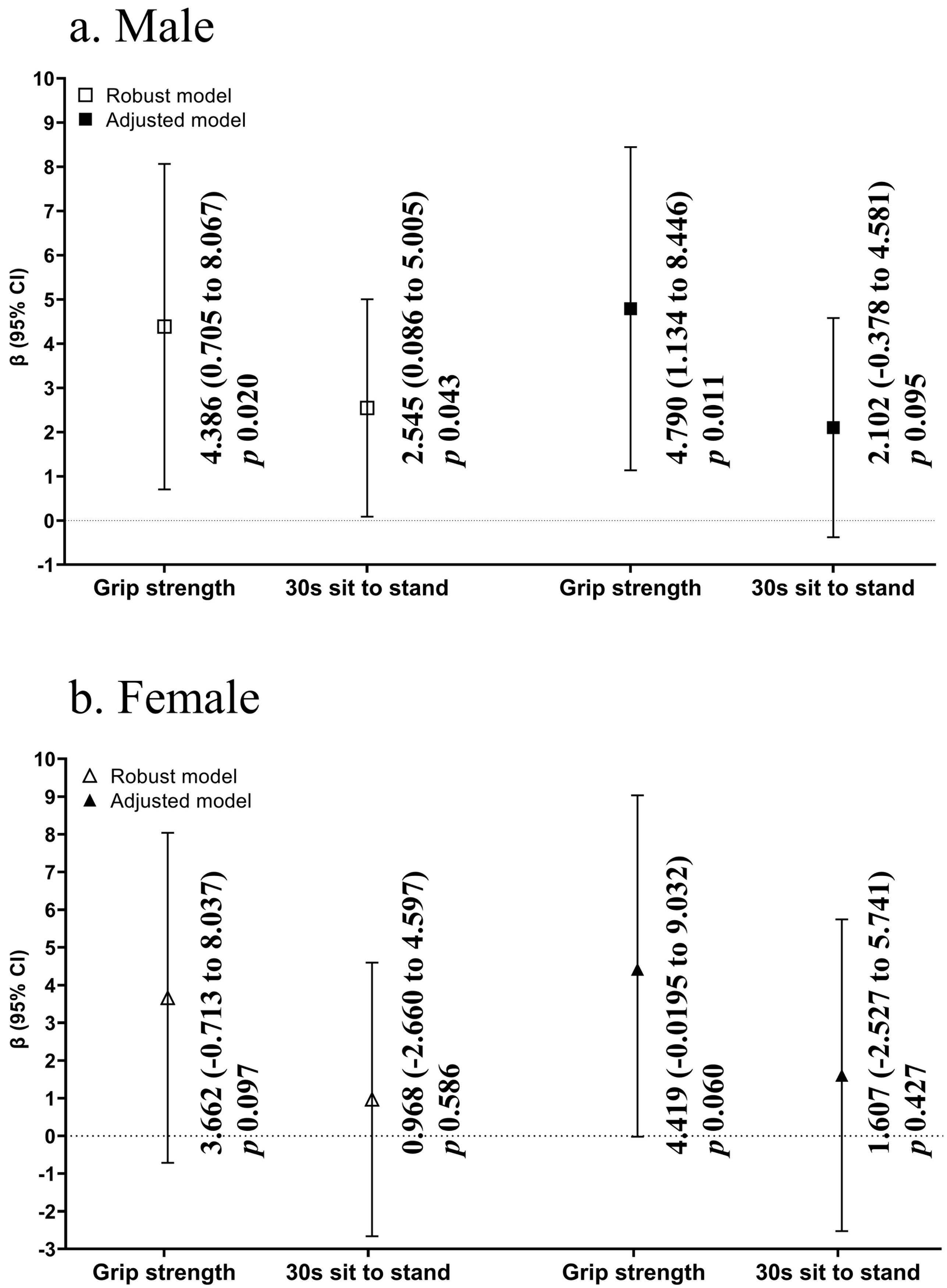

FIGURE 2. Association between work pattern and objectively assessed grip strength and 30-s sit-to-stand based on gender. β, regression coefficients for standardized; CI, confidence interval. Adjusted model by Age, body mass index, alcohol consumption, smoking habit.

sedentary behavior according to the type of work. This result differed from that of a previous study. Since the onset of the coronavirus disease 2019 (COVID-19) pandemic, exercise has been recommended in every country, and many reports have been published on its importance [19]. During the quarantine period in the early phase of the COVID-19 outbreak in China, adults experienced a rise in screen time surpassing 4 h/day [20]. Furthermore, opportunities for outdoor physical activity were restricted. Therefore, home exercise was recommended for health purposes [21]. In this study, we assessed physical activity through surveys; therefore, we could not determine when most people engaged in moderate-to-vigorous physical activity. Utilizing an accelerometer, considered the standard method for monitoring physical activity, is imperative for accurate and prospective tracking [22].

Male workers exhibited differences in upper and lower limb strength, regardless of the amount of physical activity. Handgrip strength correlates with the strength of other muscles and serves as a reliable indicator of overall strength [23]. The health benefits of physical activity are well documented. The WHO recommends at least 150 min/week of moderate-intensity physical activity for adults [24]. The amount of physical activity in both groups was higher than that recommended by the WHO. Although it has been reported that engaging in physical activity at work does not improve health condition [25], our results demonstrated that field workers had relatively high muscle strength. Office workers are underrepresented compared to those in studies that have demonstrated grip strength in Koreans by age [26]. As a result of manual labor or operating heavy machinery outdoors, physical labor has been identified to affect aerobic performance and muscular strength [27]. The implication indirectly posits the necessity for engaging in exercises specifically designed to enhance muscle strength rather than moderate physical activity, suggesting the need for guidelines on muscle strength training for office workers.

Meanwhile, female workers did not exhibit significantly different physical function. However, there was a significant difference in work stress. Low job quality has a greater potential to harm mental health than underemployment [28]. In addition, the proportion of irregular workers among Korean women is high, indicating a high level of job instability [29]. Income is not always as crucial as job security and independence. This is especially true in many developing nations. The response that people have to expectations and pressures at work that exceed their knowledge, skills, or abilities to handle is known as work-related stress [30]. In the current lockdown and general remote work environment owing to the pandemic, in addition to the constant presence of children or adults, household responsibilities are likely to fall primarily on women. This results in added burden for women [31]. It is important to note that this phenomenon is restricted to office workers.

Our study had some limitations. First, we could not determine when most participants engaged in moderate-to-vigorous physical activity. In future research, assessing physical activity using accelerometers is important. Second, there is no significant decline in physical or mental performance in relatively young adults, but it can be the onset of health conditions in the upcoming years. Future research should include comparisons with older workers. Third, the sample size was relatively small and comprised of young adults. Thus, the generalizability of the findings to other populations is limited. Follow-up studies with a larger sample size and a higher proportion of female participants should be conducted.

5. Conclusions

In conclusion, muscle strength differed significantly according to the type of work performed by male individuals. This study was performed in young adults, without any issues with muscle strength. However, whether this will change in the future remains unknown. Therefore, there is a need to develop and intervene in exercise programs for office workers.

ABBREVIATIONS

CI, confidence interval; IPAQ-S, International Physical Activity Questionnaire-short version; SD, standard deviation; WHO, World Health Organization.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

GMK and JIL—performed the majority of experiments and wrote the manuscript; HJC—designed the study and corrected the manuscript; YKS—participated in the collection of the human material; JHP, BK, DYK, BHH and HC—served as scientific advisors and participated in the collection of human material.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was reviewed and approved by the Research Ethics Committee of the Pusan National University Hospital (2301-015-122). Informed consent was obtained from all participants on enrollment.

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Not applicable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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