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Impact of Breakfast Skipping on Functional Capacity and Productivity among Office Workers with Standard Working Hours (9 AM–5 PM)

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ABSTRACT

Breakfast skipping is a prevalent behavior among working adults, yet its impact on workplace productivity in 9–5 office workers remains underexplored. **Objectives:** To assess the prevalence of breakfast skipping and its association with productivity, cognitive function, and well-being in this population. **Methods:** A cross-sectional study was conducted among 540 full-time office workers. Data were collected via an online questionnaire assessing breakfast habits, self-rated productivity (World Health Organization Health and Work Performance Questionnaire (WHO-HPQ)), presenteeism, and energy levels. A subset (n=312) completed an objective psychomotor vigilance task (PVT). Habitual breakfast skipping was defined as skipping breakfast ≥3 workdays/week. Multivariable regression analyses adjusted for age, sex, sleep duration, and caffeine intake. **Results:** The prevalence of habitual breakfast skipping was 39%. The most common reasons were lack of time (63%) and absence of morning hunger (41%). Habitual skippers reported significantly lower morning productivity (mean score 6.2 vs. 7.4, p<0.001) and higher rates of presenteeism (28% vs. 14%, p=0.002) compared to regular consumers. They were also more likely to experience low energy before lunch (52% vs. 29%, odds ratio (OR)=2.45). Objectively, skippers demonstrated slower reaction times on the PVT (median 345 ms vs. 310 ms, p=0.010). These associations remained significant after adjusting for confounders. **Conclusions:** Breakfast skipping is common among office workers and is significantly associated with reduced productivity, increased fatigue, and poorer cognitive performance. Workplace wellness initiatives should prioritize promoting regular breakfast consumption to enhance employee health and organizational efficiency.

INTRODUCTION

Breakfast is often described as the most important meal of the day, providing essential nutrients that help maintain energy balance and cognitive function throughout the morning hours [1]. Despite this, breakfast skipping has become increasingly common among working adults, particularly those engaged in 9–5 office jobs, due to time constraints, long commutes, or weight-control motives [2]. This habit is of particular concern in populations with high mental and physical demands during the workday, where sustained concentration and energy are critical for productivity. A growing body of evidence suggests that breakfast consumption is positively associated with better cognitive performance, mood stability, and work efficiency [3]. For instance, studies show that adults who regularly consume breakfast demonstrate improved memory, attention, and problem-solving abilities compared to those who skip it [4, 5]. Conversely, breakfast omission has been linked to mid-morning fatigue, irritability, reduced physical activity, and increased caloric intake later in the day [6, 7]. Over the long term, habitual breakfast skipping is associated with higher risks of obesity, insulin resistance, hypertension, and cardiovascular disease [8, 9]. Although

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numerous studies have explored breakfast habits among adolescents and students, fewer have examined their impact on working adults who spend prolonged hours in sedentary, mentally demanding environments [10]. This gap is critical because workplace performance and long-term health outcomes directly affect both individual well-being and organizational productivity. Furthermore, the study intends to provide evidence-based recommendations for workplace health interventions that promote regular breakfast consumption to improve both individual health outcomes and organizational performance.

Despite growing evidence on the benefits of breakfast consumption, limited research has specifically examined the impact of habitual breakfast skipping on functional capacity, cognitive performance, and workplace productivity among full-time 9–5 office workers. Most prior studies focus on adolescents or students, leaving a critical gap in understanding how breakfast habits influence adult employees in cognitively demanding, sedentary work environments. Addressing this gap is essential to inform workplace health strategies and improve employee well-being and performance. This study aimed to assess the prevalence and underlying reasons for breakfast skipping among 9–5 workers, while also examining its immediate and long-term consequences. Specifically, it seeks to explore the short-term effects of breakfast omission on energy levels, concentration, and workplace productivity, alongside the potential long-term health risks, such as metabolic disorders and reduced overall well-being.

METHODS

This cross-sectional study collected original data from full-time office workers aged 18-60 in Lahore, Pakistan, from March to May 2024. A non-probability, convenience sampling method was employed. The sample size was calculated using the formula for estimating a single population proportion: $n = (Z^2 * P(1-P)) / d^2$. Assuming a 50% prevalence (P) of breakfast skipping (to maximize sample size), a 95% confidence level (Z = 1.96), and a 5% margin of error (d = 0.05), the minimum required sample size was 385. This study recruited 540 participants to account for potential non-response and to ensure sufficient power for subgroup analyses. A written informed consent was taken. Breakfast habits were categorized as daily consumption (0 days skipped), occasional skipping (1-2 days/week), or habitual skipping (≥3 days/week), defined as consuming ≥50 kcal within two hours of waking. A breakfast episode was objectively defined as consuming ≥50 kcal within two hours of waking to distinguish it from the consumption of very low-calorie beverages such as black coffee or tea.

Data were collected via an anonymous online questionnaire and optional objective cognitive tests. The questionnaire gathered sociodemographic data and used validated instruments, including the WHO-HPQ for productivity [11], the Cognitive Failures Questionnaire for subjective cognitive function [12], and the PSQI for sleep quality [13]. All self-report instruments were forward-translated to Urdu and back-translated to English by bilingual experts to ensure conceptual equivalence, and were piloted for clarity and cultural relevance. A 5-minute psychomotor vigilance task (PVT) provided an objective measure of attention [14]. Primary outcomes were self-rated productivity, objective attention, and morning alertness, analyzed using bivariate tests and multivariable regression models. Adjusted model controls for age, sex, sleep duration, and caffeine intake. Data were analyzed using (R 4.5.1). The normality of continuous data was formally assessed using the Shapiro-Wilk test. Based on the results of this test, which indicated a significant deviation from normality for key variables ($p<0.050$), independent samples t-tests were used for normally distributed data, and the Mann-Whitney U test was used for non-normally distributed data. Chi-square tests were used for categorical variables. To complement null hypothesis significance testing, effect sizes were calculated, including Cohen's d for continuous outcomes and risk differences for proportional outcomes, along with their 95% confidence intervals. A p-value of <0.050 was considered statistically significant.

RESULTS

The sample consisted of 540 working adults with a mean age of 31.4 years (SD = 7.8), indicating a relatively young to middle-aged cohort. The gender distribution was nearly balanced, with a slight majority of male participants (54%). The workforce was predominantly drawn from the Information Technology sector (28%), followed by Finance (21%) and Education (17%), reflecting a sample engaged in primarily sedentary, cognitively demanding professions (Table 1).

Table 1: Demographic Characteristics of Participants (n=540)

Characteristic	Category	Mean ± SD / (%)
Age	(Years), Mean (SD)	31.4 ± 7.8
Gender	Male	54%
	Female	46%
Industry	IT	28%
	Finance	21%
	Education	17%
	Government	15%
	Other	19%

The data reveal that breakfast skipping is a common practice within the studied workforce, with a notable finding that 73% of office workers skip breakfast at least

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once weekly. Furthermore, habitual skipping (≥3 days/week) was the most prevalent pattern, reported by 39% of the cohort, indicating a substantial proportion at potential risk for associated negative outcomes (Table 2).

Table 2: Breakfast Habits among Participants

Breakfast Habits	n (%)
Habitual Skipper (≥3 Days/Week)	211 (39%)
Occasional Skipper (1–2 Days/Week)	183 (34%)
Daily Consumer	146 (27%)

The reported effect sizes indicate that the associations are not only statistically significant but also substantively meaningful. The moderate-to-large Cohen's d values for productivity and sleep duration (d = 0.71 and d = 0.58, respectively), coupled with substantial risk differences for presenteeism and fatigue (14% and 23%), demonstrate that breakfast skipping has a clinically relevant impact on key functional outcomes. These findings confirm that the observed differences are practically significant beyond their statistical probability (Table 3).

Table 3: Key Outcomes by Breakfast Habit

Outcomes	Skippers (n=211)	Consumers (n=146)	p-value	Effect Size (95% CI)
Morning Productivity (WHO-HPQ), Mean ± SD	6.2 ± 1.8	7.4 ± 1.6	<0.001	Cohen's d = 0.71 (0.51 to 0.91)
Presenteeism (>50% Day Lost), n (%)	59 (28%)	20 (14%)	0.002	Risk Difference = 14% (6% to 22%)
Low Energy Before Lunch, n (%)	110 (52%)	42 (29%)	<0.001	Risk Difference = 23% (14% to 32%)
Sleep Duration (Hours), Mean ± SD[1]	6.2 ± 1.1	6.8 ± 1.0	0.040	Cohen

The objective PVT data reveal that habitual breakfast skippers exhibited significantly slower median reaction times (345 ms vs. 310 ms, p=0.010) and a three-fold higher rate of attention lapses (median of 3 vs. 1, p<0.001) compared to daily consumers. These findings provide robust evidence that skipping breakfast impairs fundamental cognitive processes like processing speed and sustained attention. This cognitive deficit objectively substantiates the subjects' reports of reduced productivity and increased presenteeism (Table 4).

Table 4: Psychomotor Vigilance Task (PVT) Results by Breakfast Habit Group (n=312)

PVT Metric	Daily Consumers (n=146)	Habitual Skippers (n= 135)	p-value
Reaction Time (ms), Median (IQR)	345 (300-410)	310 (280-350)	0.010
Number of Lapses (≥500 ms), Median (IQR)	3 (1-6)	1 (0-3)	<0.001

The regression analysis confirms that while factors like shorter sleep explain part of the negative association, skipping breakfast itself has a strong and independent detrimental effect. After adjustment, habitual skippers still showed a clinically meaningful drop in productivity and were over twice as likely to experience morning fatigue. This underscores that promoting breakfast consumption can directly enhance employee well-being and performance, beyond other lifestyle factors (Table 5).

Table 5: Unadjusted and Adjusted Associations of Breakfast Skipping with Key Outcomes

Outcome	Model	Effect Estimate (95% CI)	p-Value
Morning Productivity (WHO-HPQ Score)	Unadjusted	β = -1.2 (95% CI: -1.5 to -0.9)	<0.001
	Adjusted*	β = -0.8 (95% CI: -1.1 to -0.5)	<0.001
Morning Fatigue (Low Energy before Lunch)	Unadjusted	OR = 2.45 (95% CI: 1.65 to 3.65)	<0.001
	Adjusted*	OR = 2.1 (95% CI: 1.3 to 3.4)	<0.010

DISCUSSION

Habitual breakfast skipping was prevalent among office workers and demonstrated a significant, dose-response association with lower self-reported productivity, greater presenteeism, and increased morning fatigue. These findings are consistent with international evidence and controlled trials showing breakfast improves cognitive performance [15, 16]. The objective measure of poorer psychomotor vigilance [17] and systematic review evidence [18] strongly corroborate these results. Our findings are strongly supported by a growing body of recent literature. A meta-analysis by Gwin and Leidy concluded that breakfast consumption significantly improves subjective alertness and aspects of cognitive performance compared to skipping, directly aligning with our observations on energy and productivity [18]. Furthermore, a study demonstrated that changes in breakfast habits were associated with changes in self-rated health and depressive symptoms in Korean adults, providing temporal support for a potential causal link that our cross-sectional design can infer but not confirm [19]. The objective cognitive deficits study observed via the PVT is particularly telling. Research by Yoshizaki *et al.* similarly found that breakfast skipping was associated with slower reaction times and higher mental fatigue in Japanese workers, especially those with poor sleep quality, underscoring the cross-cultural validity of this effect and its interaction with other lifestyle factors [20]. The physiological mechanisms underlying these effects are likely multifaceted. Breakfast consumption helps restore glycogen stores and maintain stable blood glucose levels after an overnight fast, which is critical for optimal brain function [21]. Skipping breakfast can lead to metabolic stress and an increase in cortisol, potentially exacerbating feelings of stress and impairing higher-order cognitive processes like attention and executive function [22]. This metabolic disruption provides a plausible biological pathway for the increased irritability, fatigue, and

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reduced concentration reported by habitual skippers in our study. The study also found breakfast skipping was linked to shorter sleep duration, a correlation supported by research on meal timing and circadian rhythms [23]. Emerging evidence suggests that meal timing acts as a zeitgeber (synchronizer) for peripheral clocks, influencing sleep-wake cycles. A study by McHill *et al.* found that caloric intake timing was associated with circadian phase and sleep duration, suggesting that the habit of skipping breakfast may be part of a broader pattern of circadian misalignment that negatively impacts both sleep and daytime functioning [24]. Importantly, caffeine intake did not compensate for the deficits, echoing findings that breakfast offers unique cognitive benefits over caffeine alone [25]. This underscores that the nutritional components of a meal provide sustained energy and neurochemical precursors that a stimulant cannot replicate.

This study's cross-sectional design limits the ability to establish causality between breakfast skipping and reduced productivity or cognitive performance. Additionally, self-reported measures may be subject to recall bias. Future research should include longitudinal or intervention studies to confirm causal relationships and explore the effectiveness of workplace programs promoting regular breakfast consumption, as well as investigate the role of meal composition and timing in enhancing functional outcomes.

CONCLUSIONS

This study demonstrates that breakfast skipping is a common behavior among 9–5 workers and is significantly associated with reduced self-reported productivity, increased fatigue, and poorer cognitive performance, as objectively measured by slower psychomotor vigilance reaction times. These findings emphasize that breakfast consumption plays a crucial role in sustaining cognitive efficiency and energy levels during work hours. Workplace wellness initiatives should therefore prioritize promoting regular breakfast consumption to enhance employee well-being and organizational performance.

Authors' Contribution

Conceptualization: MI, IF
Methodology: MI
Formal analysis: MI
Writing and Drafting: IF
Review and Editing: IF, MI

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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