

## Original Research Article

# EFFECT OF SCREEN-TIME ON OBESITY: A CROSS-SECTIONAL STUDY

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## ABSTRACT

**Background:** The objective is to investigate the association between screen time and obesity among adults in Pakistan, focusing on the influence of device type, snacking habits, and fizzy drink consumption. Study design is a cross-sectional study. This study was conducted at Sindh Medical College (SMC), Jinnah Sindh Medical University Karachi for a period of one year from May 2024 to May 2025.

**Materials and Methods:** A questionnaire was administered to 162 adults aged 18-60 years, selected via simple random sampling. Individuals aged below 18 or above 60 years and metabolic diseases were excluded from the study. Data on screen time (mobile, PC, TV), BMI, snacking, and fizzy drink consumption were collected. SPSS Version 25 was used for the analysis. ANOVA and the Student's T-test were used for comparisons.

**Results:** Of the 162 participants, 14.8% were underweight, 35.2% had normal BMI, 25.3% were overweight, and 24.7% were obese. Mobile usage was predominant, with 28.4% exceeding 6 hours daily on weekdays and 35.8% on weekends. PC usage was moderate (23.5% at 3–4 hours on weekends), and TV viewing was balanced (33.3% at 1–2 hours weekdays). Participants between the ages of 18 and 25 reported considerably more mobile screen time ( $34.21 \pm 13.42$  hours per week,  $p < 0.001$ ) than older groups, whereas college students reported less use ( $22.18 \pm 11.61$  hours per week) than university students ( $p < 0.001$ ). Snack (46.9%) and fizzy drink (42%) consumption during screen time was less frequent than without screens (63% and 53.7%, respectively). No significant association was found between obesity, screen time, snacking, and fizzy drinks ( $p = 0.624$  for BMI categories).

**Conclusion:** No significant link was found between screen time or related dietary habits and obesity, though high mobile use among younger adults suggests a need for targeted interventions. Future research should use objective measures and longitudinal designs to clarify causality.

**Keywords:** Screen time, obesity, BMI, mobile usage, snacking.

## INTRODUCTION

When an individual's body mass index (BMI) exceeds 30 kg/m<sup>2</sup> or over, they are considered obese, a prevalent health problem.<sup>[1]</sup> A number of risk factors, including as a sedentary lifestyle, poor eating and sleeping habits, sugary beverage intake, and a lack of physical exercise, are responsible for obesity.<sup>[2]</sup> These elements collectively disrupt energy

balance, leading to excessive weight gain and associated complications such as cardiovascular diseases and diabetes.<sup>[2,3]</sup> Among these, screen time has increasingly been recognized as a contributing risk factor, defined as the total hours spent engaging with electronic devices for recreational or work-related purposes.<sup>[4]</sup> Watching television, playing video games, using computers, or engaging with portable electronics like tablets, smartphones, or

game consoles are examples of screen-based activities. Recent data indicate that screen time is notably elevated among adults, with global averages reaching approximately 6 to 11 hours daily.<sup>[5]</sup> This raises questions about potential differences in impact based on the type of screen activity, such as whether computer use exerts a similar influence on body weight compared to television viewing or video gaming.<sup>[5]</sup>

Several mechanisms link screen time to obesity, primarily through sedentary behavior that displaces physical activity and alters dietary habits. For example, prolonged television viewing often coincides with increased snack consumption, as individuals tend to eat mindlessly while distracted, leading to higher caloric intake from energy-dense foods.<sup>[6]</sup> Computer usage, particularly for gaming or browsing, similarly promotes prolonged sitting, reducing metabolic rate and contributing to fat accumulation.<sup>[6]</sup> Moreover, exposure to advertisements during screen time can encourage the intake of ultra-processed foods and fizzy drinks, which are high in sugars and fats, further tipping the energy balance toward weight gain.<sup>[7,8]</sup> These factors create a vicious cycle, where screen engagement not only limits exercise but also causes unhealthy eating behaviors.

Evidence also highlights this association. A meta-analysis investigated screen use and central obesity found that the waist circumferences of the individuals who spent the most time on screens were noticeably greater than those of those who spent the least amount of time on screens.<sup>[9]</sup> In the United States, a large-scale study involving adults revealed that Overweight and obesity were significantly correlated with combining excessive screen time with little exercise, with participants exceeding recommended limits showing elevated BMI risks.<sup>[10]</sup> In Pakistan, gaps persist where most studies focus on the association of screen time with obesity only among children. For example, a cross-sectional study in Pakistan found no direct association between increased screen time and obesity risk factors among adults.<sup>[11]</sup> While childhood obesity links to screen time are more established, adult-specific data remains scarce. This study aims to examine the association between screen time and obesity among adults in Pakistan, incorporating factors such as snacking habits, TV and PC usage, and fizzy drink consumption.

## MATERIALS AND METHODS

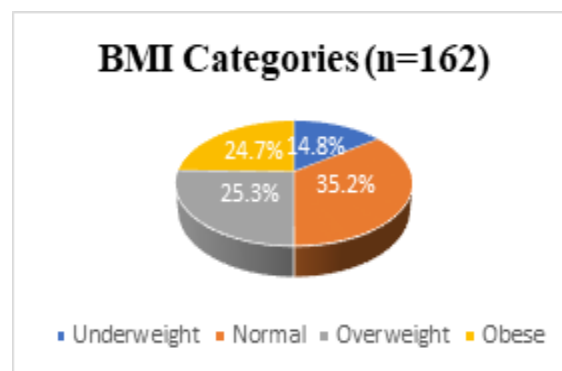
A questionnaire was developed to gather data from both genders aged 18 to 60 years. Participants'

informed written consent was required before any questionnaires were sent. To determine the appropriate sample size, we utilized the OpenEpi calculator and calculated a sample of 162 participants. Simple random sampling was employed to select participants. Individuals below 18 years or above 60 years were excluded in this study.

The data was analyzed using SPSS Version 25. To provide demographic insights, we used frequency and percentage summaries for qualitative characteristics like gender, education level, and occupation. Standard deviations were used to quantify quantitative data, including age, BMI, and the number of hours spent in front of a screen each day. Mean screen time across dichotomous variables, such as gender or obesity status (obese vs. non-obese) were compared using the Student's t-test. The differences in mean screen time among multiple categories of demographic variables were evaluated using ANOVA.

## RESULTS

A total of 162 participants were included in the study. Of these, 14.8% were underweight, while 35.2% had a normal BMI. A notable portion of the respondents were either overweight (25.3%) or obese (24.7%), indicating that nearly half of the study population had a BMI above the normal range. [Figure 1]



**Figure 1: Distribution of BMI Categories Among Study Respondents (n=162)**

Mobile phone usage was highest among all screen types, especially on weekends, where (n = 58, 35.8%) of respondents reported using it for more than six hours daily. On weekdays, (n = 46, 28.4%) also exceeded six hours of mobile screen time. PC usage remained moderate, with (n = 38, 23.5%) using it for 3–4 hours on weekends. TV viewing was relatively balanced, with (n = 54, 33.3%) participants watching 1–2 hours daily. [Table 1]

**Table 1: Distribution of Respondents According to Screen Time Across Devices on Weekdays and Weekends (n = 162)**

| Variable                    | Frequency (n) | Percentage (%) |
|-----------------------------|---------------|----------------|
| <b>PC Usage on Weekdays</b> |               |                |
| None                        | 38            | 23.5           |
| Less than 1 hour/day        | 24            | 14.8           |
| 1–2 hours/day               | 36            | 22.2           |
| 3–4 hours/day               | 32            | 19.8           |

|                                 |    |      |
|---------------------------------|----|------|
| 5–6 hours/day                   | 18 | 11.1 |
| More than 6 hours/day           | 14 | 8.6  |
| <b>PC Usage on Weekends</b>     |    |      |
| None                            | 30 | 18.5 |
| Less than 1 hour/day            | 22 | 13.6 |
| 1–2 hours/day                   | 34 | 21.0 |
| 3–4 hours/day                   | 38 | 23.5 |
| 5–6 hours/day                   | 22 | 13.6 |
| More than 6 hours/day           | 16 | 9.9  |
| <b>TV Usage on Weekdays</b>     |    |      |
| None                            | 28 | 17.3 |
| Less than 1 hour/day            | 42 | 25.9 |
| 1–2 hours/day                   | 54 | 33.3 |
| 3–4 hours/day                   | 25 | 15.4 |
| More than 5 hours/day           | 13 | 8.0  |
| <b>TV Usage on Weekends</b>     |    |      |
| None                            | 24 | 14.8 |
| Less than 1 hour/day            | 38 | 23.5 |
| 1–2 hours/day                   | 49 | 30.2 |
| 3–4 hours/day                   | 28 | 17.3 |
| 5–6 hours/day                   | 15 | 9.3  |
| More than 6 hours/day           | 8  | 4.9  |
| <b>Mobile Usage on Weekdays</b> |    |      |
| Less than 1 hour/day            | 14 | 8.6  |
| 1–2 hours/day                   | 22 | 13.6 |
| 3–4 hours/day                   | 38 | 23.5 |
| 5–6 hours/day                   | 42 | 25.9 |
| More than 6 hours/day           | 46 | 28.4 |
| <b>Mobile Usage on Weekends</b> |    |      |
| Less than 1 hour/day            | 10 | 6.2  |
| 1–2 hours/day                   | 16 | 9.9  |
| 3–4 hours/day                   | 34 | 21.0 |
| 5–6 hours/day                   | 44 | 27.2 |
| More than 6 hours/day           | 58 | 35.8 |

A greater number of participants reported consuming snacks (n = 102, 63.0%) and fizzy drinks (n = 87, 53.7%) without screen-time compared to those who consumed them with screen-time (snacks: n = 76, 46.9%; fizzy drinks: n = 68, 42.0%). The

consumption of fizzy drinks and snacks and fizzy drinks while using a screen did not turn out to be a significant contributor to obesity. In fact, snack consumption was more frequent even in the absence of screen exposure. [Table 2]

**Table 2: Frequency of Snack and Fizzy Drink Consumption with and without Screen-Time (n = 162)**

| Consumption Pattern   | With Screen-Time | Without Screen-Time |
|-----------------------|------------------|---------------------|
| Consumes snacks       | 76 (46.9%)       | 102 (63.0%)         |
| Consumes fizzy drinks | 68 (42.0%)       | 87 (53.7%)          |

Respondents between the ages of 18 and 25 (n = 92) had the greatest mean mobile screen time of any age group (34.21 ± 13.42 hours/week), which was substantially greater than that of other age groups (p

< 0.001). Additionally, individuals who were enrolled in college had considerably less mobile screen time (22.18 ± 11.61 hours/week) than university students (p < 0.001). [Table 3]

**Table 3: Association Between Mean Mobile Screen Time and Demographic Characteristics Among Respondents (n = 162)**

102)

| Characteristics        | n   | Mean Mobile Screen Time ± SD (hrs/week) | P-Value |
|------------------------|-----|-----------------------------------------|---------|
| <b>BMI Categories</b>  |     |                                         |         |
| Underweight            | 24  | 26.45 ± 14.72                           | 0.624   |
| Normal                 | 57  | 28.32 ± 13.85                           |         |
| Overweight             | 41  | 25.78 ± 12.94                           |         |
| Obese                  | 40  | 29.61 ± 13.27                           |         |
| <b>Age Categories</b>  |     |                                         |         |
| 18–25 years            | 92  | 34.21 ± 13.42                           | <0.001* |
| 26–35 years            | 40  | 27.13 ± 12.78                           |         |
| 36–45 years            | 20  | 22.89 ± 11.54                           |         |
| 46–60 years            | 10  | 20.43 ± 10.83                           |         |
| <b>Education Level</b> |     |                                         |         |
| College                | 55  | 22.18 ± 11.61                           | <0.001* |
| University             | 107 | 32.74 ± 13.08                           |         |

\*Significant at p < 0.05

Non-obese females reported slightly higher mean mobile screen time (30.84 ± 15.92 hrs/week)

compared to obese females, while obese males had slightly higher mean screen time (26.98 ± 13.55

hrs/week) than non-obese males. No statistically significant differences in mean mobile screen time between obese and non-obesity groups were seen

across all other demographic characteristics. [Table 4]

**Table 4: Comparison of Mean Mobile Screen Time (hrs/week) between Obese and Non-Obese Groups across various demographics**

| Variable                                           | Mean Mobile Screen Time $\pm$ SD (hrs/week) |                   | P-Value |
|----------------------------------------------------|---------------------------------------------|-------------------|---------|
|                                                    | Obese                                       | Non-Obese         |         |
| <b>Gender</b>                                      |                                             |                   |         |
| Female                                             | 28.73 $\pm$ 13.10                           | 30.84 $\pm$ 15.92 | 0.552   |
| Male                                               | 26.98 $\pm$ 13.55                           | 24.95 $\pm$ 14.48 | 0.482   |
| <b>Age Group</b>                                   |                                             |                   |         |
| 18–25 years                                        | 30.42 $\pm$ 12.67                           | 34.85 $\pm$ 13.25 | 0.072   |
| 26–35 years                                        | 28.95 $\pm$ 14.71                           | 29.84 $\pm$ 14.12 | 0.864   |
| 36–45 years                                        | 21.74 $\pm$ 11.96                           | 22.31 $\pm$ 12.87 | 0.911   |
| 46–60 years                                        | 21.28 $\pm$ 9.87                            | 20.12 $\pm$ 14.25 | 0.943   |
| <b>Physical Activity</b>                           |                                             |                   |         |
| No                                                 | 26.13 $\pm$ 14.65                           | 35.21 $\pm$ 13.94 | 0.058   |
| Yes                                                | 27.96 $\pm$ 13.21                           | 26.78 $\pm$ 15.32 | 0.573   |
| <b>Snack Consumption with Screen Time</b>          |                                             |                   |         |
| No                                                 | 28.10 $\pm$ 11.25                           | 27.34 $\pm$ 14.65 | 0.881   |
| Yes                                                | 27.23 $\pm$ 14.41                           | 28.04 $\pm$ 16.32 | 0.721   |
| <b>Snack Consumption without Screen Time</b>       |                                             |                   |         |
| No                                                 | 24.82 $\pm$ 11.77                           | 24.16 $\pm$ 15.09 | 0.879   |
| Yes                                                | 28.51 $\pm$ 13.62                           | 29.06 $\pm$ 16.05 | 0.815   |
| <b>Fizzy Drink Consumption with Screen Time</b>    |                                             |                   |         |
| No                                                 | 29.23 $\pm$ 12.08                           | 28.62 $\pm$ 15.02 | 0.799   |
| Yes                                                | 24.35 $\pm$ 14.45                           | 26.32 $\pm$ 17.21 | 0.521   |
| <b>Fizzy Drink Consumption without Screen Time</b> |                                             |                   |         |
| No                                                 | 29.51 $\pm$ 12.16                           | 27.53 $\pm$ 15.49 | 0.438   |
| Yes                                                | 24.96 $\pm$ 13.94                           | 28.10 $\pm$ 16.43 | 0.309   |

## DISCUSSION

This study aimed to explore the association of screen time with obesity among adults. On weekdays, 23.5% of participants used mobiles for 3-4 hours, but this increased on weekends, where 35.8% exceeded six hours. This trend matches global data showing mobiles as the main screen source due to their ease of use for social media and entertainment. For example, Kaewpradit et al. note that adults worldwide spend about 3 hours and 46 minutes on mobiles daily, similar to our weekday averages.<sup>[12]</sup> However, our weekend figures are higher, likely because weekends in Pakistan offer more free time, contrasting with a United States study where total screen time hits 6 hours and 40 minutes but spreads more evenly across devices like computers.<sup>[10]</sup> In our group, PC use was lower, with 22.2% at 1-2 hours on weekdays and a slight drop on weekends, suggesting PCs are mostly for work here, unlike in wealthier countries where weekends boost PC gaming.

Television viewing in our study showed a relatively low profile, with 13.6% watching less than one hour on weekdays and 23.5% on weekends, and a quarter abstaining entirely. This is consistent with recent shifts observed in South Asian populations, where traditional TV consumption has declined in favor of on-demand mobile content, as evidenced by Rehman et al.'s study on screen addiction among Pakistani university students, which found TV usage comprising only a minor portion of total screen time.<sup>[13]</sup> Mobile usage stood out as the most intensive, with 23.5% reporting 3-4 hours on weekdays and

35.8% exceeding 6 hours on weekends, surpassing PC and TV times. A study by Rahim et al. among young adults similarly found high mobile screen time correlating with elevated BMI, attributing it to constant accessibility and multitasking that displaces physical activity.<sup>[14]</sup> The pronounced weekend spike in mobile use, from 28.4% to 35.8% over 6 hours, is consistent with international findings of relaxed routines leading to extended scrolling, which may increase obesity risks through sleep disruption and increased snacking.<sup>[15]</sup>

In this study, participants aged 18–25 years exhibited the highest mean mobile screen time at 34.21  $\pm$  13.42 hours per week, significantly exceeding other age groups. This points to the fact that younger adults engage more heavily with digital devices due to social connectivity and entertainment needs. This observation is consistent with findings of Ejaz et al., who reported that younger participants, particularly those aged 21–25 years, demonstrated elevated smartphone usage, potentially attributable to greater digital adaptability and social engagement demands.<sup>[16]</sup> Similarly, a Thai study reported that younger age was associated with a higher likelihood of excessive digital screen time, with an adjusted odds ratio of 0.79 per additional year of age.<sup>[12]</sup> However, this pattern contrasts with a cross-sectional analysis of healthy young adults, where age showed no significant association with screen time or cognitive outcomes within a narrow age range (mean 21.55 years).<sup>[17]</sup>

The absence of a significant relationship between mobile screen time and body mass index categories

in this cohort is noteworthy. This finding diverges from a meta-analysis involving 393,743 women in low- and middle-income countries, which demonstrated that mobile device use elevated the odds of overweight or obesity by 2.72, mediated by sedentary lifestyles.<sup>[18]</sup> Comparable associations have been noted in Pakistani university students, where average daily screen time of 5.85 hours correlated with diminished physical activity and adverse health outcomes, including mental distress.<sup>[19]</sup>

In our study, the consumption of snacks and fizzy drinks during screen time did not emerge as a significant contributor to obesity. However, several studies present contrasting findings. Hicks et al. reported that higher screen time correlates with increased intake of beverages and snacks, highlighting the need for further research to clarify their impact on BMI.<sup>[20]</sup> Similarly, Shqair et al.'s systematic review of 19 articles identified a link between snack consumption and screen time, noting that these foods are also cariogenic, posing additional health risks.<sup>[21]</sup> Additionally, Rocha et al. observed among Brazilian adolescents that ultra-processed food consumption was higher among those accustomed to eating while using screens, supporting the association between screen-based eating habits and unhealthy dietary patterns.<sup>[22]</sup>

There are some limitations of this study. First, the study relied on self-reported screen time and dietary habits, which may introduce recall bias and under- or overestimation of actual behaviors. Second, the cross-sectional design limits causal inferences. Furthermore, the sample size of 162 participants limits generalizability to broader Pakistani populations.

## CONCLUSION

This study found no significant association between screen time, snack or fizzy drink consumption, and obesity among Pakistani adults, despite high mobile screen time, particularly among younger participants. These findings highlight the need for context-specific interventions to address digital habits. Future research should employ objective measures, such as device tracking, and longitudinal designs to establish causality.

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