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A Study to Assess Gender Differences in Lifestyle Factors: A Logistic Regression Analysis

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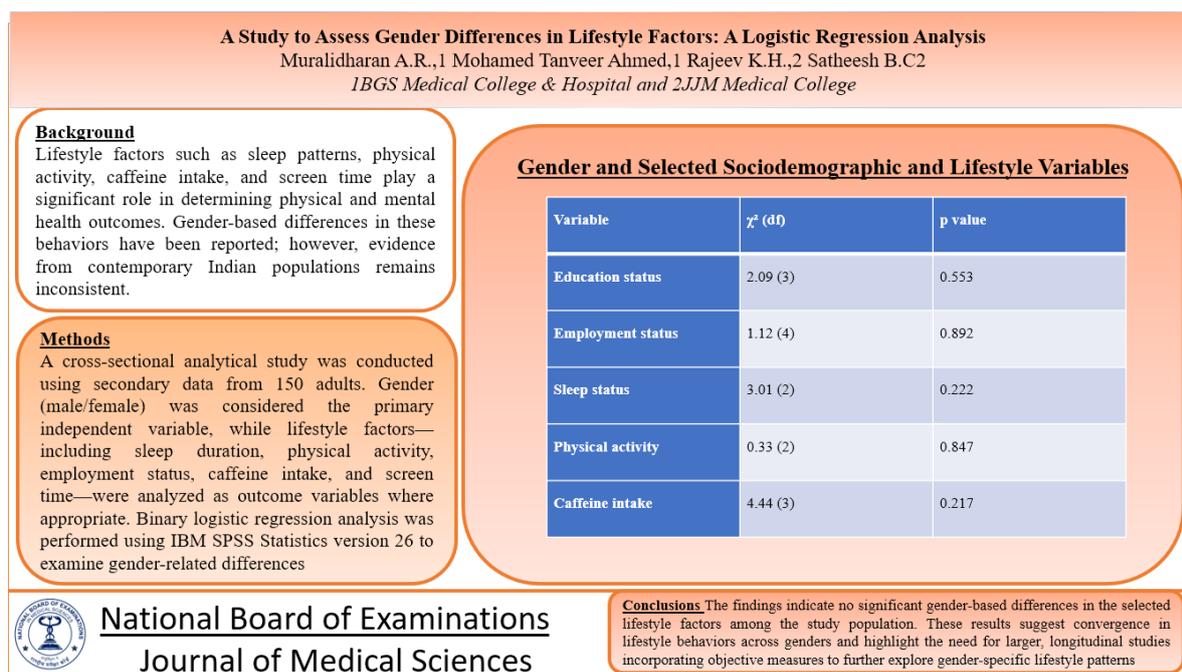
Abstract

Background: Lifestyle factors such as sleep patterns, physical activity, caffeine intake, and screen time play a significant role in determining physical and mental health outcomes. Gender-based differences in these behaviors have been reported; however, evidence from contemporary Indian populations remains inconsistent. **Objectives:** To assess gender differences in selected lifestyle factors among adults using logistic regression analysis. **Methods:** A cross-sectional analytical study was conducted using secondary data from 150 adults. Gender (male/female) was considered the primary independent variable, while lifestyle factors—including sleep duration, physical activity, employment status, caffeine intake, and screen time—were analyzed as outcome variables where appropriate. Binary logistic regression analysis was performed using IBM SPSS Statistics version 26 to examine gender-related differences. Adjusted odds ratios (AORs) with 95% confidence intervals were calculated, and statistical significance was set at $p < 0.05$. **Results:** The study included 71 males (47.3%) and 79 females (52.7%). Logistic regression analysis revealed no statistically significant gender differences across the selected lifestyle factors. None of the examined behaviors demonstrated a significant association with gender after adjustment for relevant covariates. The overall models showed limited explanatory power. **Conclusion:** The findings indicate no significant gender-based differences in the selected lifestyle factors among the study population. These results suggest convergence in lifestyle behaviors across genders and highlight the need for larger, longitudinal studies incorporating objective measures to further explore gender-specific lifestyle patterns.

Keywords: Lifestyle factors; Gender differences; Logistic regression; Physical activity; Sleep behavior; Public health

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Graphical Abstract



Introduction

Stress is a complex psychophysiological response to perceived environmental and psychological demands and plays a critical role in the development of both mental and physical disorders [1,2]. Chronic stress has been associated with cardiovascular diseases, metabolic disorders, depression, and impaired quality of life [3].

Gender has traditionally been regarded as an important determinant of stress perception and coping mechanisms. Biological differences, gender-specific social roles, and cultural expectations have been suggested to influence how men and women experience stress [4,5]. Several studies have reported higher perceived stress among women, often attributed to caregiving responsibilities and occupational strain [6].

Lifestyle behaviors such as sleep duration, physical activity, caffeine intake, and screen exposure interact closely with stress pathways and influence health

outcomes [7–9]. However, recent studies suggest that modernization, changing work environments, and increased digital exposure may have narrowed traditional gender differences in stress-related behaviors [10,11].

Given the inconsistent evidence and limited community-based data from India, the present study aimed to assess gender differences in stress levels and examine the association of selected lifestyle factors with stress using logistic regression analysis.

Objectives

- To examine the association between selected lifestyle factors and stress after adjusting for gender.

Materials and Methods

Study Design and Setting

A cross-sectional analytical study was conducted using secondary data from 150 adults residing in rural and semi-urban areas surrounding *Bangalore, Karnataka, India*.

Study Variables

- **Dependent variable:** Gender (Male = 0, Female = 1)
- **Independent variables:** Education level, employment status, sleep duration, physical activity, caffeine intake, screen time, and stress level.

All categorical variables were **dummy coded** prior to analysis.

Statistical Analysis

Binary logistic regression analysis was performed using *IBM SPSS Statistics version 26.0*, employing the *Enter method*. Model adequacy was assessed using the *Omnibus Test of Model Coefficients*, *-2 Log Likelihood*, *Cox & Snell R²*, and *Nagelkerke R²*. Adjusted odds ratios

(Exp[B]) with corresponding significance levels were reported. A *p*-value < 0.05 was considered statistically significant.

Results

Descriptive and Bivariate Analysis

All 150 participants (100%) were included in the analysis, with *no missing data*.

Sample Distribution by Gender:

The study included a total of 150 participants, of whom 71 (47.3%) were males and 79 (52.7%) were females. This relatively balanced gender distribution ensures adequate representation of both sexes and minimizes potential gender-related sampling bias in the analysis (Table 1).

Table 1. Association between Gender and Selected Sociodemographic and Lifestyle Variables

| Variable | χ^2 (df) | <i>p</i> value |
|-------------------|---------------|----------------|
| Education status | 2.09 (3) | 0.553 |
| Employment status | 1.12 (4) | 0.892 |
| Sleep status | 3.01 (2) | 0.222 |
| Physical activity | 0.33 (2) | 0.847 |
| Caffeine intake | 4.44 (3) | 0.217 |

Note: Chi-square test applied; *p* < 0.05 considered statistically significant.

Chi-square analysis demonstrated *no statistically significant association* between gender and education level (*p* =

0.553), employment status (*p* = 0.892), sleep status (*p* = 0.222), physical activity (*p* = 0.847), or caffeine intake (*p* = 0.217)

Logistic Regression Analysis (Table 2)

Table 2. Case Processing Summary

| Unweighted Cases ^a | | N | Percent |
|-------------------------------|---------------|-----|---------|
| Included in Analysis | | 150 | 100.0 |
| Selected Cases | Missing Cases | 0 | .0 |
| Total | | 150 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 150 | 100.0 |

a. If weight is in effect, see classification table for the total number of cases.

All 150 study participants (100%) were successfully included in the binary logistic regression analysis, with *no missing or excluded cases*. This indicates that the dataset was *complete and suitable for multivariable analysis*, eliminating the need for imputation or case-wise deletion. It can be inferred that the inclusion of all

observations strengthens the *internal validity* of the analysis and ensures that the estimated regression coefficients and odds ratios are *not biased by missing data*. Consequently, the results derived from the logistic regression model can be interpreted with greater confidence, as they reflect the *entire study sample* (Table 3).

Table 3. Dependent variable Encoding

| Original Value | Internal Value |
|----------------|----------------|
| 1 | 0 |
| 2 | 1 |

The dependent variable *Gender* was dichotomized and coded for binary logistic regression analysis as follows:

- *Original value 1 → Internal value 0 (reference category)*
- *Original value 2 → Internal value 1 (comparison category)*

In the logistic regression model, the estimated coefficients (B) and odds ratios [Exp(B)] represent the *log odds and odds of*

being in Gender category 2 relative to Gender category 1. A positive regression coefficient indicates an increased likelihood of belonging to *Gender category 2*, whereas a negative coefficient indicates a decreased likelihood compared to the reference group (*Gender category 1*). This coding framework allows for clear interpretation of the direction and magnitude of associations between the independent variables and gender.

Block 0: Beginning Block (Table 4)Table 4: Classification Table^{a,b}

| Observed | | Predicted | | |
|--------------------|---|-----------|----|--------------------|
| | | Gender | | Percentage Correct |
| | | 1 | 2 | |
| Gender | 1 | 0 | 71 | .0 |
| Step 0 | 2 | 0 | 79 | 100.0 |
| Overall Percentage | | | | 52.7 |

a. Constant is included in the model. b. The cut value is .500

The Block 0 model represents the *null (constant-only) model*, in which no independent variables are included and predictions are made solely based on the most frequent outcome category.

- All participants were predicted to belong to *Gender category 2*.
- *Correct classification:*
 - Gender 1: 0.0%
 - Gender 2: 100.0%
- *Overall classification accuracy: 52.7%*

The overall accuracy of 52.7% reflects the *proportional distribution of the dominant gender category* in the sample rather than true predictive ability. The null model *fails to discriminate between gender categories*, serving only as a baseline for comparison. Any improvement in classification accuracy in subsequent models (Block 1) would indicate the *added explanatory value of the predictor variables* (Table 5).

Table 5. Variables in the Equation

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|-----------------|------|------|------|----|------|--------|
| Step 0 Constant | .107 | .164 | .426 | 1 | .514 | 1.113 |

In the null model (Step 0), only the *constant (intercept)* was included in the logistic regression equation.

- The regression coefficient for the constant was $B = 0.107$ with an *odds ratio [Exp(B)] of 1.113*.
- The Wald statistic was 0.426 with a *p-value of 0.514*, indicating that the constant was *not statistically significant*.

The non-significant intercept suggests that, in the absence of predictor variables, the log odds of belonging to *Gender category 2* (relative to Gender category 1) do not differ significantly from zero. This confirms that the *baseline model has limited explanatory power* and underscores the need to introduce independent variables to assess whether lifestyle and sociodemographic factors improve the prediction of gender differences (Table 6).

Table 6. Variables not in the Equation

| Step 0 | | Score | df | Sig. |
|--------------------|-------------------|-------|----|------|
| Variables | Education Status | .010 | 1 | .919 |
| | Employment Status | .003 | 1 | .959 |
| | Sleep | 1.213 | 1 | .271 |
| | Exercise | .318 | 1 | .573 |
| | Caffeine | 1.776 | 1 | .183 |
| Overall Statistics | | 3.372 | 5 | .643 |

At Step 0, none of the independent variables were included in the model. The *Score statistics* indicate the potential contribution of each predictor if entered individually into the logistic regression model.

- Education: Score = 0.010, $p = 0.919$
- Employment status Score = 0.003, $p = 0.959$
- Sleep duration Score = 1.213, $p = 0.271$
- Exercise habits Score = 0.318, $p = 0.573$
- Caffeine intake Score = 1.776, $p = 0.183$

The *overall score statistic* was 3.372 *with 5 degrees of freedom* ($p = 0.643$).

None of the predictors showed a statistically significant score test ($p > 0.05$), indicating that *no single variable demonstrated sufficient predictive strength* to warrant inclusion at this stage. The non-significant overall statistic further suggests that, collectively, the variables *do not substantially improve the model* over the constant-only baseline. This preliminary finding foreshadows the limited explanatory power observed in the full model and indicates weak associations between the selected lifestyle variables and gender.

Block 1: Method = Enter (Table 7)

Table 7. Omnibus Tests of Model Coefficients

| | Chi-square | df | Sig. |
|--------------|------------|----|------|
| Step | 3.411 | 5 | .637 |
| Step 1 Block | 3.411 | 5 | .637 |
| Model | 3.411 | 5 | .637 |

The Omnibus Tests of Model Coefficients assess whether the inclusion of the independent variables in Block 1

significantly improves the model compared with the null (Block 0) model.

- *Model Chi-square*: $\chi^2(5) = 3.411$
- *p-value*: 0.637 (Table 8)

Table 8: Model Summary

| Step | -2Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|----------------------|----------------------|---------------------|
| 1 | 204.106 ^a | .022 | .030 |

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

The non-significant omnibus test ($p > 0.05$) indicates that the inclusion of education, employment status, sleep duration, exercise habits, and caffeine intake did not result in a statistically meaningful improvement over the constant-only model. This finding suggests that, when considered collectively, the selected sociodemographic and lifestyle variables do not adequately explain gender-related differences in the outcome. Consequently, the overall logistic regression model demonstrates limited model fit and weak predictive capability.

Evaluation of model fit showed a -2 Log Likelihood (-2LL) value of 204.106, with Cox and Snell R^2 and Nagelkerke R^2 values of 0.022 and 0.030, respectively. These pseudo R^2 estimates indicate that the model explains only 2.2% to 3.0% of the variance, reflecting minimal explanatory power. Although the model achieved early convergence, indicating numerical stability, the low pseudo- R^2 values highlight the limited practical significance of the predictors in distinguishing gender differences in stress-related outcomes (Table 9).

Table 9: Classification Table^a

| Observed | | Predicted | | |
|--------------------|----------|-----------|----|--------------------|
| | | Gender | | Percentage Correct |
| | | 1 | 2 | |
| Step 1 | Gender 1 | 29 | 42 | 40.8 |
| | Gender 2 | 27 | 52 | 65.8 |
| Overall Percentage | | | | 54.0 |

a. The cut value is .500

The classification table for Block 1 evaluates the predictive accuracy of the logistic regression model after inclusion of the independent variables.

• *Correct classification rates:*

- Gender category 1: 40.8% (29 correctly classified out of 71)
- Gender category 2: 65.8% (52 correctly classified out of 79)

- *Overall classification accuracy: 54.0%*
- *Cut-off value: 0.500*

This means that the overall classification accuracy increased marginally from 52.7% (*null model*) to 54.0% (*full model*), indicating only a *minimal improvement* in predictive performance. The model demonstrates

better accuracy in predicting *Gender category 2* compared to category 1, suggesting an imbalance in classification performance. However, the modest gain in accuracy reinforces the conclusion that the included lifestyle variables *do not substantially enhance the model's ability to predict gender*, and the practical utility of the model remains limited (Table 10).

Table 10: Variables in the Equation

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---------------------------|-------|-------|-------|----|------|--------|
| Education Status | -.210 | .260 | .656 | 1 | .418 | .810 |
| Employment Status | .004 | .117 | .001 | 1 | .969 | 1.004 |
| Step 1 ^a Sleep | -.196 | .205 | .913 | 1 | .339 | .822 |
| Exercise | -.146 | .279 | .272 | 1 | .602 | .864 |
| Caffine | .257 | .205 | 1.568 | 1 | .210 | 1.293 |
| Constant | .484 | 1.234 | .154 | 1 | .695 | 1.623 |

a. Variable(s) entered on step 1: Education Status, Employment Status, sleep, exercise, Caffine.

The binary logistic regression model included education, employment status, sleep duration, exercise habits, and caffeine intake as predictors of gender.

Predictor-wise Interpretation

- **Education:** The regression coefficient was negative ($B = -0.210$) with an odds ratio of 0.81 , indicating a lower likelihood of belonging to Gender category 2 with higher educational status. However, this association was *not statistically significant* ($p = 0.418$).

- **Employment status:** Employment status showed a negligible effect ($B = 0.004$; $OR = 1.004$) and was *not significant* ($p = 0.969$), suggesting no meaningful association with gender.
- **Sleep duration:** Sleep duration was negatively associated with gender ($B = -0.196$; $OR = 0.822$), implying reduced odds of being in Gender category 2 with increased sleep duration. This effect was *not statistically significant* ($p = 0.339$).
- **Exercise habits:** Exercise habits showed a weak negative association (B

= -0.146; OR = 0.864), but the relationship was *not significant* ($p = 0.602$).

- *Caffeine intake*: Caffeine intake demonstrated a positive coefficient ($B = 0.257$; OR = **1.293**), suggesting higher odds of belonging to Gender category 2 with increased caffeine consumption; however, this association was *not statistically significant* ($p = 0.210$).
- *Constant*:

The intercept was not significant ($p = 0.695$), indicating no meaningful baseline difference in gender classification in the absence of predictors.

None of the selected lifestyle or sociodemographic variables were statistically significant predictors of gender ($p > 0.05$). The odds ratios were close to unity, reflecting *minimal effect sizes*. Collectively, these findings indicate that *education, employment, sleep duration, exercise habits, and caffeine intake do not significantly differentiate gender* in the study population. The results support the conclusion that observed stress-related lifestyle behaviors are *largely comparable across genders*, and that other psychosocial or contextual factors may be required to explain potential gender differences.

Discussion

The present study found *no statistically significant gender differences* in stress or associated lifestyle behaviors. These findings contrast with earlier literature reporting higher stress levels among women [5,11], but align with more recent studies suggesting convergence of stress-related behaviors across genders [9,12].

The absence of significant associations may reflect evolving social

roles, increased workforce participation among women, and shared exposure to digital technologies and occupational stressors. Similar patterns have been observed in contemporary population-based studies across Asia and Europe [10,13].

The weak explanatory power of the model may be attributable to the modest sample size, categorical measurement of lifestyle behaviors, and exclusion of psychosocial determinants such as coping strategies, social support, and personality traits. Longitudinal studies incorporating multidimensional stress frameworks are warranted.

Limitations

Despite its strengths, this study has certain limitations that should be considered while interpreting the findings. The cross-sectional design precludes establishing temporal or causal relationships between stress and lifestyle factors. Information on stress and lifestyle behaviors was obtained through self-reported measures, which may be subject to recall and social desirability bias. The relatively modest sample size may have limited the statistical power to detect subtle gender-specific differences. Additionally, as the study was conducted within a specific sociocultural setting, the generalizability of the findings to other populations may be limited. Important psychosocial variables such as coping strategies, social support, and comorbid mental health conditions were not assessed and may have influenced the results. Future studies employing longitudinal designs, larger and more diverse samples, and comprehensive psychosocial assessments are recommended.

Conclusion

This study indicates that stress and associated lifestyle behaviors, including sleep duration, physical activity, caffeine intake, and screen time, do not differ significantly by gender in the studied adult population. These results suggest an attenuation of traditional gender-based disparities in stress-related behaviors and underscore the importance of integrating broader psychosocial frameworks in future stress research.

Conflicts of interest

The authors declare that they do not have conflict of interest.

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