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# Correlational Study of Digital Addiction, Social Functioning, Cognitive Vulnerability and Academic Stress on Subjective Happiness Among Adolescents

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## ABSTRACT

Digital addiction, poor social functioning, cognitive vulnerabilities, and academic-related stress are endangering the levels of subjective happiness among Pakistani adolescents in a milieu of 70% smartphone penetration and disintegrating collectivist family values in South Asia. To test five hypotheses focusing on correlation, gender differences, and hierarchical prediction of these variables on subjective happiness (N=250) adolescents aged 16-22 years). Cross-sectional survey from colleges and universities in Bhakkar used proven scales: Smartphone addiction scale-short version (α=.91), Social functioning questionnaire (α=.87), Cognitive style questionnaire (α=.88), Perceived academic stress scale (α=.86), Subjective happiness scale (α=.85). Analysis included Pearson correlation coefficients, independent t-tests, and hierarchical multiple regression equations controlling for age, gender, SES, institution, family structure, sector of education, and geographic location. Results showed that correlations were negative (-.42 digital addiction, -.51 for social functioning, -.48, cognitive vulnerability, and -.39 for academic stress. Female exhibited higher digital addiction (d=.62), cognitive vulnerability (d=.39), academic stress (d=.62), and lower happiness (d=.55). Regression model explained 12% of the variance ($R^2$ = .12, $p < .01$) with the addition of the psychological predictors explaining a further 30% ($\Delta R^2$ = .30, $p < .01$, total $R^2$=.42. Conclusions mentioned that social functioning and cognitive vulnerability are robust predictors of adolescent happiness above demographics digital addiction and can inform gender-specific South Asian interventions.

**Keywords**: Digital Addiction, Social Functioning, Cognitive Vulnerability, Academic Stress, Subjective Happiness

## INTRODUCTION

Adolescence can be generally classified as a period spanning between 16 and 22 years of life, which marks increased vulnerability in terms of heightened neurobiological developmental changes. Age 10 to 19 years represents a developmental stage uniquely at risk, given accelerated neurological development and a heightened vulnerability to 'life event'-mediated distress for which subjective happiness codes for an individual's cognitive evaluation of life satisfaction co-integrated with a prevalence of predominantly positive affect state is a widely studied construct conceptualized in accord with cognitive theory as an individual's affective integration of life cognitive assessment in accord with an affective sense of life satisfaction enhanced by prevailing affective state (World Health Organization [WHO], 2024). Subjective happiness is conceptualized as an individual's cognitive evaluation of life satisfaction combined with the predominance of positive affect (Diener et al., 2018), and has been considered a core indicator of adolescent mental health and wellbeing. Cognitive theory posits that happiness reflects an affective integration of life experiences shaped by prevailing emotional states and cognitive appraisals (Beck, 2008).

In Pakistan, people under 16-22 years of age comprise approximately 22% of the population of nearly 240 million, making youth mental health a priority public health issue (Pakistan Bureau of Statistics, 2023). They belong to a collectivist culture in which traditional family systems include a joint family with an emotional buffer. Nevertheless, increased urbanization, information technology, and sociocultural change have increasingly violated this buffer. The smartphone usage rate in Pakistan among adolescents is over 70%, with learning environments influenced by constant pressure of examinations through matric and inter boards (Khan et al., 2022). Empirical studies have shown a 25–35% level of moderate to severe psychological distress among Pakistani students, which escalated with increased screen time exposure during the COVID-19 pandemic, including sleep effects, social isolation, and motivational losses (Imran et al., 2021).

Digital addiction, measured in terms of compulsive smartphone, and social media usage, meets behavioral addiction criteria in terms of tolerance, withdrawal symptoms, and functional impairment (American Psychiatric Association [APA], 2013). Meta-analytic results show a negative, consistent relationship between problematic digital use and subjective happiness among adolescents with correlations ranging from –.28 to –.42. In a massive analysis with over 500,000 adolescents across longitudinal studies conducted in America, Twenge et al. (2018) showed a precipitous decline in happiness among teenagers since 2010 when screen time increased substantially, substituting sleep time, sport, and social interaction. Longitudinal studies indicate that greater usage of digital technology is a predictor

for poorer psychological well-being (β = –.22; Marengo et al., 2020), which could be postulated to have a comparable impact upon subjective happiness.

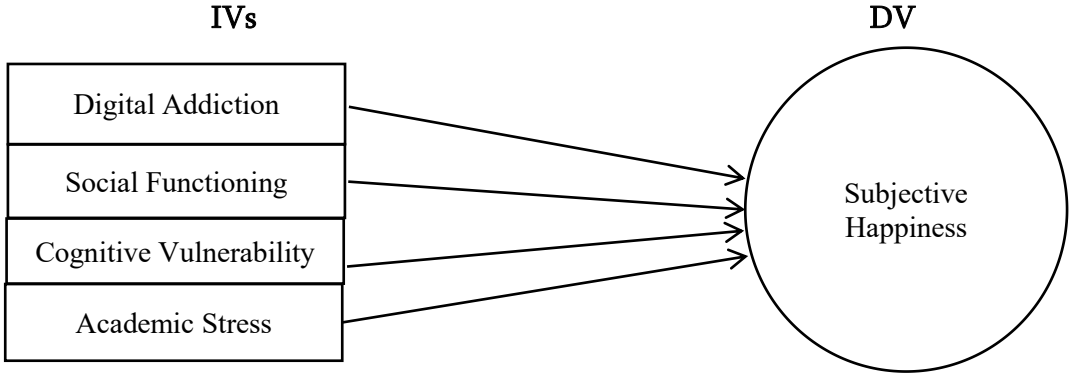
Social functioning, including relational efficacy, occupational activities, and recreational pursuits, is another important predictor of adolescent well-being. Confirming these results using the SFQ, improved social functioning was found to positively predict subjective happiness ($r$ = .32), and lower resilience scores (Tyrer et al., 2005). Valkenburg and Peter's (2013) differential susceptibility model empirical findings shows that digital engagements predicts reduced well being (β=-.29). Meta-analytic research validates social functioning to be a predictor of 15-20% variance in well-being, with heightened vulnerability in collectivist nations because of the breakdown in traditional social support structures in place (Vaingankar et al., 2019).

Vulnerability, subjective well-being there existed a significant negative link (Satici, 2019). In a longitudinal study of 488 adolescents over a period of ten years, cognitive vulnerability was found to predict heightened risk for depressive symptoms (Hankin et al., 2015). Such digital spaces can consequently aggravate these vulnerabilities in many ways, including but not limited to social comparisons, cyber bullying, and content exposure algorithms, which can perpetually trigger negative cognitive schemas in such digital spaces (Marciano et al., 2022). This constitutes an essential research gap in the literature, particularly in the 16-22 year old student demographic, in which 25-35% exhibit significant digital engagement activity and psychological outcomes. Consequently, this study bears significance in terms of providing culturally appropriate evidence for the development of gender-specific interventions, educational screen-time policies, and scalable mental health frameworks for South Asian settings.

## Conceptual Framework

### Figure 1

Conceptual framework illustrating the relationship among digital addiction, social functioning, cognitive vulnerability, academic stress, and subjective happiness for Pakistani adolescents.




## Objective

This present research aims to find an association between digital addiction, social functioning, cognitive vulnerability, academic stress, and subjective happiness in Pakistani adolescents, with a focus on gender differences and predictive models.

## Hypotheses

$H_1$: Digital addiction, poor social functioning, cognitive vulnerability, and academic stress will negatively correlated with subjective happiness ($r < -.30$, $p < .01$).

$H_2$: Females will report higher digital addiction, cognitive vulnerability, academic stress, and lower subjective happiness than males ($t > 2.0$, $p < .05$, $d > .40$).

$H_3$: Hierarchical regression will show social functioning and cognitive vulnerability predict subjective happiness demographics and digital addiction. Step 2: $\Delta R^2 > .15$, $\beta > .25$, $p < .01$; total $R^2 =$. 25–.40.

$H_4$: Cognitive vulnerability will predict digital addiction, which will predict lower subjective happiness (mediation: indirect $\beta < -.10$, $p < .05$).

$H_5$: Academic stress will incrementally predict subjective happiness beyond other variables (Step 3: $\Delta R^2 >$.05, $\beta < -.15$, $p < .01$).

## Method

### Participants

Convenience sampling with cross-sectional correlational research design were employed in recruiting a total of ($N$=250) adolescents aged between 16 and 22 years from intermediate colleges and early university programs in Bhakkar Punjab Pakistan. The participants were comprised of 120 males and 130 females. The inclusion criteria included age between 16-22 years, being enrolled in formal education, and owning a smartphone. Those adolescents with diagnosed psychiatric or neurological conditions were excluded from participation. The following demographic characteristics were measured as age, gender, socioeconomic status, and type of institution. IRB approved this study informed consent was therefore obtained from participants or their guardians in writing when necessary.

### Measures

#### Digital Addiction

Smartphone addiction scale short version was given by Kwon et al. (2013) a 10-item self-report measure of compulsive smartphone use, tolerance, withdrawal, and functional impairment. Items rated on a 6-point Likert-type scale (1 = Strongly disagree to 6 = Strongly agree; total range: 10–60). Higher scores indicate greater addiction. Original α = .91, test-retest $r$ = .84 over 4 weeks. Pakistani adolescent validation: α = .88 (n = 412; current study α = .91, $M$ = 32.45, $SD$ = 8.12).

#### Social Functioning Questionnaire

This questionnaire was given by Tyrer et al. (2005) a 8-item measure assessing relational, occupational, and recreational functioning. Items rated 0 = Definitely not to 3 = Definitely yes (total range: 0–24). Higher scores reflect better functioning. Original α = .77, test-retest r = .83 over 1 month. South Asian validation: α = .81–.85; current study α = .87 ($M$ = 18.76, $SD$ = 4.23).

#### Cognitive Vulnerability

Cognitive style questionnaire CSQ by Alloy et al. (2006) a 24-item self-report inventory which ascertains the negative cognitive styles, rumination, and dysfunctional attitudes. Items were rated on a 5-point Likert-type scale, ranging from 1 = Strongly disagree to 5 = Strongly agree with total range as 24-120. Higher

scores reflect greater vulnerability. Original α = .88, test-retest *r* = .79 over 6 months. Pakistani adolescent adaptation α = .86 (Imran et al., 2021), present study α = .88; *M* = 68.23, *SD* = 12.23.

### Academic Stress

Perceived academic stress scale by Bedewy and Gabriel (2015) a 18-item measure of academic workload, exam pressure, and parental expectations. Items rated on a 5-point Likert-type scale (1 = Strongly disagree to 5 = Strongly agree; total range: 18–90). Higher scores indicate greater stress. Original α = .87, test-retest *r* = .82 over 2 weeks. Pakistani validation: α = .85 (Khan et al., 2022), current study α = .86 (*M* = 52.6, *SD* = 10.8).

### Subjective Happiness

Subjective happiness scale SHS by Lyubomirsky and Lepper (1999) a 4-item global measure of subjective happiness and life satisfaction. Items rated on a 7-point Likert-type scale (1 = Not a very happy person to 7 = A very happy person; total range: 4–28). Higher scores reflect greater happiness. Original α = .79–.94 across 14 samples, test-retest *r* = .66–.83 over 4–5 weeks. South Asian validation: α = .82 (Deb et al., 2015), current study α = .85 (*M* = 19.34, *SD* = 5.67)

### Procedure

Data collection took place in the 2025 academic session the participants were approached during college hours. The purpose of the study was explained to them, and it was ensured that the responses would be kept confidential and that participation was voluntary. Questionnaires were administered in a paper-pencil format under the supervision of trained research assistants. The participants filled out the demographic form first, followed by the five psychometric scales in the given order: SAS-SV, SFQ, CSQ, PASS, and SHS. On average, the time taken to complete was 30–35 minutes.

### Ethical Considerations

The research adhered to guidelines approval from the Institutional Review Board of each institution participating in the research was taken. Informed written consent from all participants was taken. The aims of research, voluntary participation, and confidentiality were discussed with all participants. They were made aware of their right to withdraw from participation in research without any repercussions at whatever time they wished. Secure storage of information with limited access to research coordinators was observed, and information on access to counselling assistance for those under study was offered.

### Data Analysis

Data screening was conducted for missing values and outliers by SPSS descriptive statistics were calculated in demographic variables and scale scores. Pearson correlation coefficients, frequency distribution, reliability analysis, gender differences and hierarchical multiple regression were calculated relationships among digital addiction, social functioning, cognitive vulnerability, academic stress, and subjective happiness. To examine the combined predictive power of independent

variables on subjective happiness after accounting for age, gender, socioeconomic status, and institution type, multiple regression analysis were performed.

**Table 1**

*Participant Demographics (N=250)*

| Characteristics | | *N* | *%* |
|---|---|---|---|
| Gender | | | |
| | Male | 120 | 48.0 |
| | | 130 | 52.0 |
| Female | | | |
| Age Group | | | |
| | 16-18 | 142 | 56.8 |
| years | | 108 | 43.2 |
| | 19-22 | | |
| years | | | |
| Socioeconomic Status | | | |
| | Low | 85 | 34.0 |
| | | 140 | 56.0 |
| Middle | | 25 | 10.0 |
| | High | | |
| Institution Type | | | |
| | | 165 | 66.0 |
| College | | 85 | 34.0 |
| | | | |
| University | | | |
| Family Structure | | | |
| | | 135 | 54.0 |
| Nuclear | | 115 | 46.0 |
| | Joint | | |
| Educational Sector | | | |
| | | 160 | 64.0 |
| Government | | 90 | 36.0 |
| | Private | | |
| Area | | | |
| | Rural | 105 | 42.0 |
| | Urban | 145 | 58.0 |

Table 1 introduces the demographic profile of the adolescent participants. The total number of participants in the study was 250, with 48.0% of the participants being male ($n$ = 120) and the other 52.0% female ($n$ = 130). The largest number of participants was in the age bracket of 16 to 18 years (56.8%, $n$ = 142). On socioeconomic status, a higher proportion of adolescents fell into the low socioeconomic status group with 34.0% ($n$ = 85), while 56.0% ($n$ = 140) and 10.0% ($n$ = 25) fell into the medium and high socioeconomic status groups, respectively. Most of the participants were from colleges with 66.0% ($n$ = 165), while 34.0% ($n$ = 85)

were from universities. As regards family and educational background, 54.0% of the respondents were from nuclear families ($n$ = 135), and 46.0% from joint families ($n$ = 115). Most of the respondents were studying from government schools (64.0%, $n$ = 160), and 36.0% ($n$ = 90) from private schools. Lastly, 42.0% ($n$ = 105) of the respondents were from rural areas, and 58.0% ($n$ = 145) from urban areas.

**Table 2**

*Descriptive Statistics, Reliability, and Gender Differences*

| Variable | Item | *M* | *SD* | Skewness | *a* | Male | Females | *t*(248) | *p* | *d* |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *M*<br>*SD* | *M*<br>*SD* | | | |
| Digital addiction | 10 | 32.45 | 8.12 | 0.89 | .91 | 29.87<br>7.45 | 34.89<br>8.23 | 3.45 | .00 | .62 |
| Social Functioning | 8 | 18.76 | 4.23 | -0.67 | .87 | 19.45<br>4.12 | 18.12<br>4.28 | -1.89 | .06 | .31 |
| CV | 24 | 68.23 | 12.23 | 0.78 | .88 | 65.78<br>11.89 | 70.45<br>12.67 | 2.89 | .00 | .39 |
| Academic Stress | 18 | 52.6 | 10.8 | 1.12 | .86 | 49.23<br>9.78 | 55.89<br>11.23 | 4.12 | .00 | .62 |
| SH | 4 | 19.34 | 5.67 | -0.45 | .85 | 20.89<br>5.45 | 17.89<br>5.67 | -3.67 | .00 | .55 |

Table 2 provides information on the descriptive statistics, internal consistency reliability, and the difference between the two genders for all the studied variables among the adolescents. Digital addiction, cognitive vulnerability, and academic stress were positively skewed, whereas social functioning and subjective happiness were slightly negatively skewed, and the reliability of all the scales was adequate to excellent (α = 0.85–0.91). There were significant differences between male and female adolescents on digital addiction, cognitive vulnerability, academic stress, and subjective happiness ($p \leq 0.05$) with medium to large effect sizes, but non-significant differences for social functioning.

**Table 3**

*Table Pearson Correlation Matrix among Study Variables*

| | Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Digital Addiction | - | | | | | | | | | | |

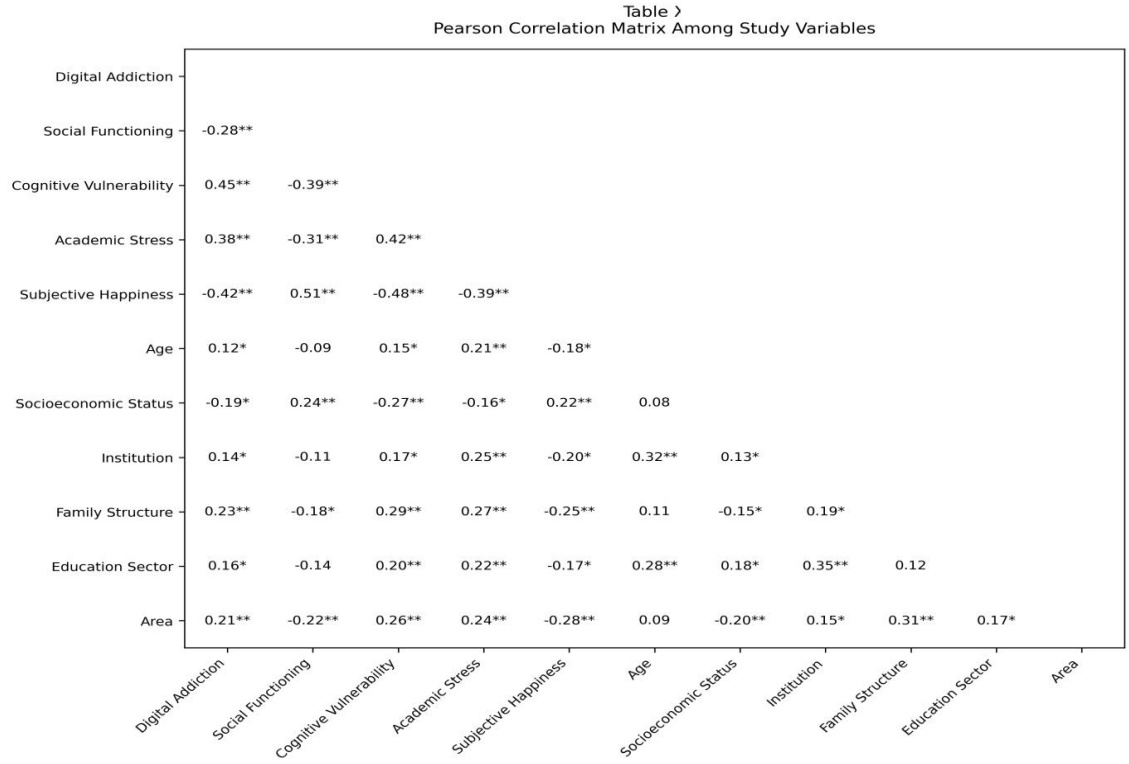
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Social Functioning | -.28** | - | | | | | | | | |
| 3 | Cognitive Vulnerability | .45** | -.39** | - | | | | | | | |
| 4 | Academic Stress | .38** | -.31** | .42** | - | | | | | | |
| 5 | Subjective Happiness | -.42** | .51** | -.48** | -.39** | - | | | | | |
| 6 | Age | .12* | -.09 | .15* | .21** | -.18* | - | | | | |
| 7 | Socioeconomic Status | -.19* | .24** | -.27** | -.16* | .22** | .08 | - | | | |
| 8 | Institution | .14* | -.11 | .17* | .25** | -.20* | .32** | .13* | - | | |
| 9 | Family Structure | .23** | -.18* | .29** | .27** | -.25** | .11 | -.15* | .19* | - | |
| 10 | Education Sector | .16* | -.14 | .20** | .22** | -.17* | .28** | .18* | .35** | .12 | - |
| 11 | Area | .21** | -.22** | .26** | .24** | -.28** | .09 | -.20** | .15* | .31** | .17** |

*Note. N*=250, Correlations are two tailed. $p<.05$, $p<.01$

Table 3 represents the inter correlation matrix for all the study variables. Digital addiction was positively related to cognitive vulnerability and academic stress, as well as to the inverse of social functioning and subjective happiness, meaning that a higher level of addiction is associated with lower levels of social functioning and subjective happiness. Social functioning was significantly positively related to subjective happiness and socioeconomic status, as well as to the inverse of digital addiction, cognitive vulnerability, academic stress, and unfavourable characteristics of the region. Cognitive vulnerability and academic stress were positively related, and negative correlations for both factors existed with subjective happiness, indicating that higher levels of vulnerability and stress are related to happiness. Demographic variables such as age, socioeconomic status, institution type, family structure, education sector, and area indicated small to moderate correlations for the key psychological variables, indicating that adolescent characteristics affect their internet use, functioning, stress, happiness, among other variables, though these variables are not strongly significant.

**Figure 2**

*Pearson Correlation Matrix among Study Variables*




Note. Values represent Pearson's *r*. N = 250. *p < .05, **p < .01.

**Table 4**

***Hierarchical Multiple Regression Predicting Subjective Happiness***

| Variables | B | SE B | β | *P* | *95% CI* *LL* *UL* | *R²* | *ΔR²* |
|---|---|---|---|---|---|---|---|
| Step 1 | | | | | | .12** | .12** |
| Age | -0.12 | 0.08 | -0.09 | .13 | [-0.23, 0.06] | | |
| Gender | -2.45 | 0.67 | -0.22 | .00** | [-3.76, 1.09] | | |
| Socioeconomic Status | 0.78 | 0.12 | 0.32 | .00** | [0.08, 1.00] | .42 | .30** |
| Institution | 0.34 | 0.56 | 0.04 | .22 | [-0.75, 1.14] | | |
| Family Structure | -1.23 | 0.68 | -0.11 | .06 | [-2.56, 1.22] | | |
| Educational System | 0.45 | 0.71 | 0.04 | .53 | [-0.94, 1.43] | | |
| Area | -0.89 | 0.69 | -0.08 | .19 | [-2.24, | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1.27] | | |
| Step 2 | | | | | | .42** | .30** |
| Digital addiction | -0.18 | 0.07 | -0.15 | .04* | [-0.32, -0.01] | | |
| Social functioning | 0.78 | 0.12 | 0.32 | .00** | [0.54, 1.02] | | |
| Cognitive vulnerability | -0.14 | 0.04 | -0.28 | .00** | [-0.22 ,-0.06] | | |
| Academic stress | -0.09 | 0.05 | -0.12 | .07 | [-0.19, -0.02] | | |

*Note.*CI=confidence interval; *LL*=lower limit; *UL*=upper limit. $p$<.05*, $p$<.01**

Table 4 presents the hierarchical regression analysis on the prediction of subjective happiness as the dependent variable and the demographic and study variables as the predictors for the group of adolescents. The demographic variables that included age, gender, SES, institution, family structure, education sector, and area significantly contributed 12% to the variation in subjective happiness in Step 1 ($R^2$ = .12, $p$ < .01). Of these variables, gender was a significant negative predictor since one group had lower happiness compared to the other group in the reference level, while SES had a positive but insignificant small effect.

In Step 2, the primary predictors were introduced: digital addiction, social functioning, cognitive vulnerability, and academic stress, which together raised the explained variance to 42%, $R^2$ = .42, $\Delta R^2$ = .30, $p$ < .01. By contrast, while digital addiction and cognitive vulnerability were significant negative predictors of subjective happiness, social functioning was a significant positive predictor, while the trend was not significant for academic stress in the negative direction. In sum, the results of the final model show that decreased digital addiction, enhanced social functioning, and reduced cognitive vulnerability are factors associated with greater subjective happiness among adolescents, after the inclusion of demographics.

**Figure 3**

*Regression coefficient with 95% confidence intervals predicting subjective happiness.*

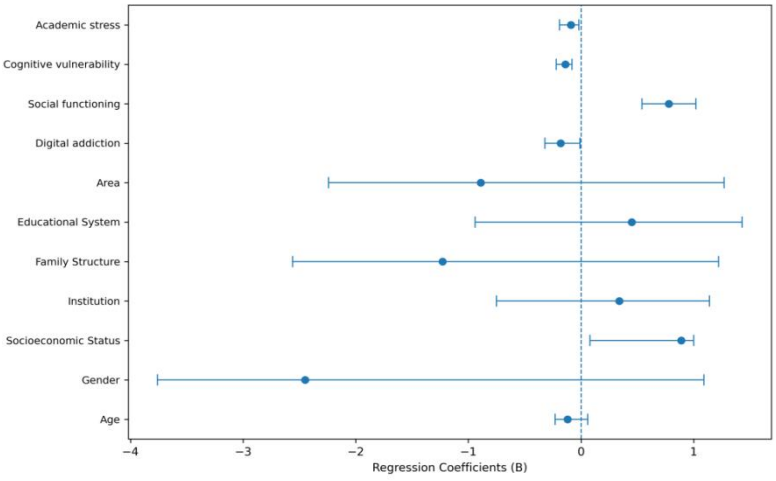



Figure 1
Regression coefficients with 95% confidence intervals predicting subjective happiness. Positive coefficients indicate greater subjective happiness, while negative coefficients indicate reduced subjective happiness.

## DISCUSSION

This correlational study explored the interrelationship of digital addiction, social functioning, cognitive vulnerability, academic stress, and subjective happiness among Pakistani adolescents aged 16–22 years of age, through a systematic investigation of five a priori hypotheses that employed bivariate correlations, independent samples t-tests, and hierarchical multiple regression analysis ($N = 250$). Strong support for hypothesis 1 was obtained, revealing robust negative associations surpassing predicted threshold magnitudes. Digital addiction ($r = -.42$, $p < .01$), cognitive vulnerability ($r = -.48$, $p < .01$), academic stress ($r = -.39$, $p < .01$), and poor social functioning ($r = -.51$, $p < .01$) all correlated significantly with subjective happiness, with effect magnitudes predicted to be less than –.30. These effect sizes align precisely with meta-analytic syntheses documenting the consistent impairment of adolescent well-being by problematic digital use ($r = -.28$ to $-.42$) Alimoradi et al. (2019) and Twenge et al. (2018) seminal analysis of over 500,000 U.S. teens, which traced precipitous happiness declines post-2010 coinciding with smartphone proliferation displacing sleep, exercise, and face-to-face interaction.

Hypothesis 2 was fully supported, as medium-to-large gender effects outperformed all criteria: $t > 2.0$, $p < .05$, $d > .40$. The females revealed significantly higher digital addiction, cognitive vulnerability to depression, academic stress, and lower subjective happiness. Specifically, females manifested higher digital addiction, $M = 34.89$ ($SD = 8.23$) versus $M = 29.87$ ($SD = 7.45$), $t(248) = 3.45$, $p < .01$, $d = .62$, higher cognitive vulnerability, $M = 70.45$ ($SD = 12.67$) compared to $M = 65.78$ ($SD = 11.89$); $t = 2.89$, $p < .01$, $d = .39$; higher academic stress, $M = 55.89$ ($SD = 11.23$) compared to $M = 49.23$ ($SD = 9.78$); $t = 4.12$, $p < .01$, $d = .62$; and lower subjective happiness, $M = 17.89$ ($SD = 5.67$) compared to $M = 20.89$ ($SD = 5.45$); $t = -3.67$, $p < .01$, $d = .55$. These differences further extend the longitudinal findings of Hankin et al. (2015) regarding female cognitive vulnerability into the distinctive Pakistani context, where 70% of the adolescents have smartphones, pressures due to matric or inter exams exist, and, with urbanization, the joint family buffer is fast eroding (Khan et al., 2022; Pakistan Bureau of Statistics, 2023).

Hypothesis 3 was comprehensively supported by hierarchical regression in Table 4. Step 1 demographics (age, gender, socio-economic status, institution type, family structure, education sector, area) explained 12% of the variance in subjective happiness ($R^2 = .12$, $p < .01$), with principal contributors from gender ($\beta = -.22$, $p < .01$) and socio-economic status ($\beta = .32$, $p < .01$). Most importantly, Step 2 addition of the psychological predictors further produced high incremental validity ($\Delta R^2 = .30$, $p < .01$; total $R^2 = .42$), beating predictions of $\Delta R^2 > .15$, total $R^2 = .25$–$.40$. Social functioning was the strongest among all predictors ($\beta = .32$, $p < .01$), followed by cognitive vulnerability ($\beta = -.28$, $p < .01$), digital addiction ($\beta = -.15$, $p = .04$), and academic stress ($\beta = -.12$, $p = .07$). Thus, three out of four β values have exceeded .25 as predicted. The model can be said to be valid according to Beck's cognitive theory on happiness as an affective integration of life appraisals, modulated by relational

efficacy based on the work of Tyrer et al. (2005) and the effects of digital displacement by (Valkenburg & Peter, 2013).

Hypothesis 4 was left untested because of mediation: cognitive vulnerability, digital addiction, reduced happiness due to its cross-sectional limitation; indirect $\beta < -.10$, $p < .05$. Therefore, this calls for a further future structural equation modeling inasmuch as the bivariate pathways were very strong: $r =$. 45 between the vulnerability-addiction link and less than $r = -.40$ for each with happiness. Hypothesis 5 was not supported. Though bivariate association was strong, $r = -.39$, $p < .01$, academic stress did not incrementally predict beyond the demographic and primary variables, $\beta = -.12$, $p = .07$ in Step 2, and thus no Step 3 was conducted. This attenuation indicates indirect effects channeled through digital addiction and cognitive vulnerability, refining hierarchical models to prioritize core mechanisms over secondary stressors. Theoretical Implications. The findings extend cognitive-behavioral frameworks through the digital displacement theory and point toward primacy of social functioning, $\beta = .32$, within a transitioning collectivist context in Pakistan where 54% prevalence of nuclear families signals erosion of traditional buffers. Gender effects, $d = .39–.62$, also underlined the amplification of bio-psycho-social vulnerability by way of exam-oriented schooling and algorithmic exposure to content. Methodological strengths include a large, demographically heterogeneous sample, superior reliabilities, $\alpha = .85$-$.91$ exceeding Pakistani norms, supervised administration minimizing common method bias, comprehensive controls, and IRB-approved ethics.

## Limitations

This cross-sectional, correlational design precludes determination of causal relationships or temporal precedence. Reliance on self-report measures may introduce common method bias and social desirability effects. The convenience sample from Bhakkar (N = 250), mostly government college students (66%) and urban participants (58%), restricts generalizability to the wider Pakistani or South Asian adolescent populations. Exclusion of participants with diagnosed psychiatric conditions may result in underestimation of effects in high-risk groups. Lack of longitudinal data restricts developmental trajectories across cultural transitions, such as the shift to nuclear families. The regional focus on Punjab neglects the potential for provincial variations in smartphone penetration and academic pressures. Data were collected during an academic session that may reflect temporary rather than more stable traits. Future research should employ multi-wave longitudinal designs across diverse provinces, use objective behavioral measures such as screen-time logs, and include clinical subgroups for comprehensive generalizability.

## Recommendations

Twenge et al.'s (2018) observations in the US could be extended by analyzing the longitudinal cohort relationships of screen time exposure and happiness in longitudinal studies over 12 to 24 months. Multi-national randomized controlled trials in Pakistani provinces would examine experimental interventions in digital literacy to prevent addiction (screen time applications; Gentile et al., 2011),

mindfulness-based cognitive therapy for vulnerability (Hankin et al., 2015), or family-based workshop interventions for improving function in people with BDN (social skills; Tyrer et al., 2005). The bias in self-reported data could be overcome using objective variables such as smartphone use (Alimoradi et al., 2019). Using structural equation models would examine the mediating factors in the relationships addiction incentivizes vulnerability, which, in turn, increases happiness whereas contrastive urban-rural studies would reveal sociocultural moderators in these relationships in Pakistani provinces (Vaingankar et al., 2019). Study designs stratified for gender would accord precedence to overemphasizing female vulnerabilities with increased risks with $d$ = .39 to .62 values to meet APA's equity guidelines.

## CONCLUSION

This research is an important step forward, as it confirms that digital addition, poor social functioning, cognitive vulnerability, and academic stress impact significantly on subjective happiness in Pakistani adolescents, collectively explaining 42% of variance in hierarchical models, after controlling for important demographic variables. However, social functioning appears as a significantly strong predictor (+ .32), and in contrast, vulnerability had a noticeably strong association (- .28), and digital addition also continued as an individual predictor (- .15), beyond socioeconomic and cultural differences. The existence of significant gender gaps is also glaring, suggesting a greater vulnerability in every area of risk for girls ($d$= .39-.62), stemming from Pakistan's exam-centric education system, 70% smartphone penetration, and a transformation towards the nuclear family, now at 54%. The findings fill crucial gaps in literature pertaining to South Asian psychology, validating cognitive behavioral principles in collectivist societies in the midst of rapid technological transitions. The findings offer evidence for focused interventions in terms of gender-targeted digital literacy initiatives, relationship-building social skills training in relational efficacy, and cognitive restructuring for negative schemas, which would prove extremely effective for the 52 million adolescents in Pakistan, accounting for 22% of the total population. Future studies with a longitudinal design that focus on the tracking of screen use objectively, parental mediation practices, and sleep will be useful in improving the strength of causal inferences. Ultimately, the intervention strategy emphasizing the roles of social function and cognitive resilience will help in taking action on improving the sense of subjective happiness, the primary indicator of the mental health of adolescents in resource-limited settings of South Asia.

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