

Internet Use and Mental Health: Evidence from a Global Panel of 189 Countries

Bianca Cavalcanti

Federal University of Rio de Janeiro.
Rio de Janeiro, RJ, Brazil

Pedro Hemsley

Federal University of Rio de Janeiro.
Rio de Janeiro, RJ, Brazil

Flavio Moraes

Getulio Vargas Foundation, Brazilian School of Public and
Business Administration, Rio de Janeiro, Brazil

ABSTRACT

This paper examines the relationship between internet use and mental health outcomes, focusing on anxiety and depression across 189 countries from 1990 to 2017. Using fixed effects panel regressions, we find a positive and statistically significant association between internet penetration and anxiety prevalence, with evidence of diminishing marginal effects. For depression, the results are less consistent, with significance only in specific model specifications. Robustness checks using lagged internet penetration and alternative model specifications reinforce the main findings. The results highlight the potential mental health costs of increased internet use, particularly in low-income countries where the effects are most pronounced. These findings underscore the need for policy interventions to promote healthy internet usage and mitigate potential negative mental health impacts.

Keywords: Internet Use; Mental Health; Anxiety; Depression.

JEL codes: I12, I18, I31

INTRODUCTION

The rapid expansion of the internet has transformed human interactions, social behavior, and access to information. While these changes have brought undeniable benefits, there is growing concern about the potential mental health costs associated with internet use. Anxiety and depression, the two most prevalent mental disorders worldwide, have seen rising incidence rates in recent decades (Dattani et al [4]). This paper investigates the potential link between internet use and these mental health disorders using a cross-country panel data from 189 countries between 1990 and 2017.

Research on the relationship between internet use and mental health remains inconclusive. Some studies suggest that internet usage exacerbates mental health issues by fostering social comparison, fear of missing out (FoMO), and sleep disturbances (Braghieri et al. [2]; Kim and

Lee [6]; Twenge and Campbell [11]; Przybylski et al. [9]). Other studies highlight the potential of online platforms to offer social support and access to mental health resources (Richards and Richardson [10]; Andersson and Titov [1]). Given this ambiguity, understanding the relationship between internet use and mental health outcomes is a critical task, with important policy implications.

Using data from the Institute for Health Metrics and Evaluation (IHME) for mental health outcomes and from the World Bank for internet usage, this study applies a fixed effects panel regression to estimate the relationship between internet use and the incidence of anxiety and depression. The results indicate a positive correlation between internet usage and the prevalence of these mental health disorders, with diminishing marginal effects. While the relationship is statistically significant for anxiety in most model specifications, the evidence for depression is less robust, emerging in only one of five models tested.

This paper contributes to the literature in two ways. First, it provides a large-scale longitudinal analysis of the relationship between internet use and mental health, addressing gaps left by studies that rely on cross-sectional or regional data (Kim and Lee [6]; Twenge and Campbell [11]; Boers et al. [3]; Exelmans and Bulck [5]). The use of longitudinal and cross-country panel data is crucial as it captures both temporal and cross-sectional variation, allowing for the control of country-specific, time-invariant factors such as cultural or institutional characteristics, and mitigating potential biases from unobserved heterogeneity and endogeneity. This approach is essential for identifying broader patterns that are not observable in cross-sectional studies on individual countries or regions (Maurseth [8]; Mars et al. [7]). Second, by using a quadratic specification of internet use, it captures the nonlinear effects of exposure, which may explain the mixed findings in previous studies.

The remainder of the paper is structured as follows. Section 2 describes the data sources and empirical methodology. Section 3 presents the main results and robustness checks. Section 4 briefly concludes.

METHODOLOGY AND DATA

This study relies on panel data from 189 countries over the period 1990 to 2017. The primary source of data on mental health outcomes (specifically, anxiety and depression) is the Global Burden of Disease (GBD) database from the Institute for Health Metrics and Evaluation (IHME). Data on internet usage rates are obtained from the World Bank's World Development Indicators (WDI), which includes information on each country's internet penetration rate, defined as the percentage of the population with internet access, as well as country-level demographic and macroeconomic control variables.

To estimate the relationship between internet use and mental health disorders, we use the following fixed effects panel regression model:

$$D_{it} = \beta_0 + \beta_1 \text{Internet}_{it} + \beta_2 \text{Internet}_{it}^2 + \alpha_i + \gamma_t + X_{it} \cdot \delta + \varepsilon_{it}$$

Where:

- D_{it} denotes the prevalence rate of either anxiety or depression in country i at time t .

- $Internet_{it}$ is the percentage of the population with access to the internet in country i at time t .
- X_{it} is a vector of control variables: GDP per capita, female share of the population, homicides per capita, and displaced population.
- α_i denotes country-specific fixed effects to control for time-invariant heterogeneity across countries.
- γ_t captures time-fixed effects to account for global shocks that affect all countries equally.
- ε_{it} is the error term, assumed to be independently and identically distributed.

The inclusion of $Internet_{it}^2$ allows us to capture potential diminishing or nonlinear effects of internet use on mental health outcomes. Control variables address potential confounding factors that could influence mental health and internet use simultaneously. Country fixed effects account for unobserved characteristics that are constant over time, while time fixed effects control for global trends that could affect all countries in a similar manner. Lastly, we use robust standard errors in all specifications. To address endogeneity concerns, robustness checks include lagged values of the internet penetration variable as instruments and the use of alternative model specifications.

RESULTS

The main results are summarized in Tables 1 and 2. The fixed effects regression results reveal a positive and statistically significant relationship between internet use and anxiety prevalence. The coefficient of $Internet_{it}$ is positive in all model specifications: a higher level of internet usage is associated with higher rates of anxiety. The coefficient of $Internet_{it}^2$ is negative and significant in all specifications, indicating diminishing marginal effects of internet usage on anxiety rates. The inclusion of quadratic terms suggests that, at lower levels of internet penetration, the impact on anxiety is stronger, but it diminishes as internet usage increases.

Table 1: Anxiety Disorder - Corrected for Heteroskedasticity

| | Model 1 | Model 2 | Model 3 | Model 4 |
|-----------------------|------------|-------------|-------------|-------------|
| Internet | 0.001 40* | 0.001 49* | 0.001 55* | 0.000 45** |
| Internet ² | -0.000 02* | -0.000 02** | -0.000 02* | -0.000 01** |
| Female | | 0.011 21*** | 0.012 37*** | 0.007 39*** |
| GDP | | | 0.000 00 | 0.000 00 |
| Violence | | | | -0.066 91 |
| Observations | 5,292 | 5,146 | 4,878 | 406 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Depression - Corrected for Heteroskedasticity

| | Model 1 | Model 2 | Model 3 | Model 4 |
|-----------------------|-------------|-------------|------------|--------------|
| Internet | 0.000 17 | 0.000 15 | 0.000 46 | 0.002 59* |
| Internet ² | -0.000 02** | -0.000 02** | -0.000 02 | -0.000 02 |
| Female | | 0.007 04* | 0.009 08** | -0.277 23*** |
| GDP | | | 0.000 00 | 0.000 00 |
| Violence | | | | 0.110 87 |
| Observations | 5,292 | 5,146 | 4,878 | 406 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For depression, the results are less consistent. The coefficient of $Internet_{it}$ is non-significant in most specifications. The quadratic term is also not statistically significant in the last two of the four specifications, indicating that the evidence for nonlinearity is weaker in the case of depression.

Additional specifications further support the main findings.¹ When lagged internet usage is used as an instrument, the coefficient on internet use remains positive and significant for anxiety. The inclusion of additional control variables (e.g., urbanization rates) produce similar results.

In summary, the results indicate a robust positive relationship between internet use and anxiety, with diminishing marginal effects. For depression, the evidence is more mixed, with significance depending on the model specification. The results are consistent with the hypothesis that internet usage affects mental health outcomes, but the magnitude and direction of these effects differ by type of disorder.

FINAL REMARKS

This paper provides empirical evidence on the relationship between internet use and mental health outcomes, focusing on anxiety and depression across 189 countries from 1990 to 2017. The findings reveal a positive and significant association between internet usage and anxiety, with evidence of diminishing marginal effects as internet penetration increases. The evidence for depression is less consistent, suggesting that the relationship may be more complex or context-dependent.

The results have important policy implications. Policymakers should be aware that, while internet access can facilitate access to information and mental health resources, it may also contribute to higher anxiety levels. Interventions aimed at promoting healthy internet usage habits, particularly in low-income countries where health policy resources are scarce, could help mitigate potential negative mental health impacts.

Future research could explore mechanisms driving these relationships, such as the role of social media platforms, online comparison behaviors, and the impact of internet use on sleep patterns. Addressing potential endogeneity and reverse causality more robustly could also provide stronger causal evidence. Understanding these dynamics can help design policies that maximize the benefits of internet access while minimizing its mental health risks.

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¹ As results are essentially unchanged in alternative exercises, we do not report them for the sake of brevity.

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