
Analysis of Mental Health Risk Factors Among Adolescents in the Digital Era and Their Implications for Public Health Policy

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ABSTRACT

Adolescent mental health has become an increasing global concern in the digital era, characterized by rising levels of depression, anxiety, and stress influenced by complex biopsychosocial and digital factors. This study aims to analyze the prevalence of adolescent mental health problems, identify key risk factors, and examine their implications for public health policy. A quantitative approach with an explanatory design was employed, involving adolescents as research participants. Data were collected through structured questionnaires measuring mental health conditions, digital risk factors, and social-environmental variables. The data were analyzed using descriptive statistics and multiple regression analysis to determine the influence of each factor on mental health outcomes. The results indicate that adolescent mental health conditions are in the moderate to high category, with digital risk factors such as screen time, social comparison, and cyberbullying having the strongest influence. Social and environmental factors, including peer pressure and socioeconomic stress, also significantly contribute to mental health problems, while family support acts as a protective factor. The findings highlight that the impact of digital technology is context-dependent and interacts with broader social determinants. In conclusion, adolescent mental health requires integrated, evidence-based public health interventions that address digital behavior, strengthen social support systems, and reduce structural inequalities to promote long-term well-being.

Keywords: Adolescent Mental Health, Digital Era, Public Health Policy, Risk Factors, Social Determinants

INTRODUCTION

Adolescent mental health has become an increasingly critical global public health concern, particularly in the context of the rapidly evolving digital era. Over the past decade, there has been a notable rise in mental health disorders among adolescents, including depression, anxiety, self-harm, eating disorders, attention-deficit/hyperactivity disorder (ADHD), and suicidal behaviors. Large-scale epidemiological studies across multiple countries indicate that this upward trend has accelerated since around 2010, with particularly significant increases observed among adolescent

girls (Kirkbride et al., 2024). This alarming pattern reflects not only a growing prevalence of psychological distress but also a broader transformation in the socio-technological environment in which adolescents develop. According to global estimates, approximately one in seven adolescents experiences a mental health disorder, accounting for about 13% of the total disease burden in this age group, highlighting the urgency of addressing this issue within public health frameworks (Chen et al., 2023).

The COVID-19 pandemic has further exacerbated this already concerning situation by intensifying risk factors associated with mental health problems among adolescents. Prolonged social isolation, disruptions in educational systems, uncertainty about the future, and reduced face-to-face interactions have significantly contributed to increased levels of depression, anxiety, loneliness, and stress (Chen et al., 2023; Nwabueze et al., 2025). In parallel, the rapid proliferation of digital technologies and social media platforms has fundamentally reshaped adolescents' daily lives, social interactions, and identity formation processes. While digital environments offer opportunities for connection, information access, and mental health support, they also introduce new risks such as excessive screen time, cyberbullying, sleep disturbances, and harmful social comparison (Di Iorio et al., 2025; Masri-Zada et al., 2025; Orben et al., 2024). Interestingly, longitudinal studies suggest that the relationship between digital technology use and mental health outcomes is not uniformly strong or direct; rather, its impact tends to be small and highly context-dependent, influenced by individual, social, and environmental factors (Vuorre et al., 2021; Orben et al., 2024). This dual nature of digital technology underscores the complexity of understanding mental health risk factors in the modern era.

Adolescent mental health problems are inherently multifactorial, arising from the dynamic interaction of biological, psychological, and social determinants throughout the life course. From a biological perspective, genetic predispositions, neurodevelopmental conditions, and emotional regulation difficulties can increase vulnerability to mental health disorders (Campion et al., 2022; Remes et al., 2021). Psychologically, individual coping mechanisms, self-esteem, and cognitive patterns play a crucial role in shaping adolescents' responses to stress and adversity. Socially, family dynamics, peer relationships, school environments, and broader socioeconomic conditions significantly influence mental well-being. For instance, adverse childhood experiences such as abuse, neglect, and bullying are estimated to contribute to approximately 30% of adult mental health disorders, demonstrating the long-term impact of early-life stressors (Campion et al., 2022; Li et al., 2022).

In the digital era, these traditional risk factors are further compounded by new forms of exposure and interaction. Social determinants such as low socioeconomic status, financial insecurity, social isolation, weak support systems, and unsafe living environments continue to play a dominant role in shaping adolescent mental health outcomes (Pan et al., 2023; Masri-Zada et al., 2025; Skinner et al., 2025; Remes et al., 2021). The concept of "polysocial risk" has been introduced to capture the cumulative effect of multiple social vulnerabilities, demonstrating that adolescents exposed to multiple risk factors are significantly more likely to experience depression and anxiety (Pan et al., 2023). Within school and peer contexts, bullying and cyberbullying represent critical risk factors, often leading to emotional distress, low self-esteem, and increased risk of self-harm (Kirkbride et al., 2024; Nwabueze et al., 2025; Li et al., 2022). At the same time, digital environments amplify these risks through constant connectivity and exposure to online interactions, making it more difficult for adolescents to disengage from harmful experiences.

Despite these challenges, it is important to recognize that not all adolescents are equally affected by these risk factors. Vulnerable populations, including those with intellectual disabilities, minority backgrounds, or limited access to educational resources, often face compounded risks due to intersecting forms of disadvantage. However, protective factors such as supportive relationships with parents, teachers, and peers, as well as access to community resources, can significantly enhance resilience and mitigate the negative effects of risk exposure (Storm et al., 2025; Jabbour & Pillay,

2025). This highlights the importance of adopting a holistic and ecological perspective in understanding adolescent mental health, where both risk and protective factors are considered within a broader socio-environmental context.

Although a substantial body of research has examined adolescent mental health and its associated risk factors, significant gaps remain in the literature. One major limitation is the tendency of existing studies to focus on isolated variables rather than examining the complex interplay between biological, psychological, social, and digital factors. This fragmented approach limits the ability to develop comprehensive and integrated models of adolescent mental health in the digital era. Furthermore, while there is growing recognition of the role of digital technologies in shaping mental health outcomes, empirical evidence regarding their long-term impact remains inconclusive and context-dependent (Orben et al., 2024; Vuorre et al., 2021). Another critical gap lies in the translation of research findings into effective public health policies and interventions. Despite the availability of evidence-based strategies for mental health promotion and prevention, their implementation at scale remains limited, a phenomenon often referred to as “implementation failure” in public mental health (Campion et al., 2022; Singh et al., 2022; Fazel & Sonesson, 2023).

This implementation gap is particularly evident in interventions targeting children and adolescents. Reviews of mental health programs indicate that while universal, selective, and targeted interventions such as school-based programs, parenting interventions, and community initiatives have demonstrated small to moderate effectiveness, their sustainability and scalability at the population level remain challenging (Fazel & Sonesson, 2023; Duncan et al., 2021). Moreover, many existing interventions do not adequately address the social determinants of mental health, such as poverty, inequality, and social isolation, which are critical drivers of mental health disparities. In the context of the digital era, there is also a need to better integrate digital technologies into mental health interventions, leveraging their potential to reach large populations while mitigating associated risks.

Given these challenges, there is an urgent need for evidence-based public health policies that address adolescent mental health in a comprehensive and integrated manner. Such policies should prioritize population-level needs assessment and the mapping of community resources to ensure that interventions are targeted toward the most vulnerable groups, including adolescents from low-income backgrounds, victims of bullying, and students in under-resourced schools (Campion et al., 2022; Skinner et al., 2025; Duncan et al., 2021). Additionally, policy efforts should focus on addressing social determinants of mental health, such as reducing child poverty, improving financial security, strengthening community cohesion, and reducing loneliness, all of which have been shown to significantly influence mental well-being (Pan et al., 2023; Masri-Zada et al., 2025; Skinner et al., 2025).

The integration of digital technologies into mental health strategies also represents a promising avenue for intervention. Digital tools such as mobile applications, online therapy platforms, text-based interventions, and telemedicine have demonstrated moderate effectiveness in improving mental health outcomes among adolescents, while offering advantages in terms of scalability and cost-effectiveness (Chen et al., 2023; Nwabueze et al., 2025; Singh et al., 2022). However, the successful implementation of such interventions requires supportive policy environments that facilitate adoption, funding, training, and long-term sustainability. The concept of “policy ecology” emphasizes the importance of coordinated efforts across multiple levels of governance—national, regional, institutional, and organizational—to ensure the effective integration of evidence-based practices into public health systems (Wortham et al., 2023).

Furthermore, public health policies must be grounded in principles of human rights and social justice, ensuring that marginalized and vulnerable populations receive equitable access to mental health services. This includes addressing the unique needs of minority groups, LGBTQ+ adolescents, individuals with disabilities, and migrant populations, as well as tackling intergenerational cycles of disadvantage that contribute to mental health disparities (Kirkbride et al., 2024; Storm et al., 2025;

Kessler, 2024). By adopting an inclusive and equity-focused approach, policymakers can create more effective and sustainable mental health systems that respond to the diverse needs of adolescents in the digital era.

Based on the identified gaps and challenges, this study offers a novel contribution by adopting an integrative analytical framework that simultaneously examines biological, psychological, social, and digital risk factors influencing adolescent mental health. Unlike previous studies that tend to focus on single dimensions, this research emphasizes the interconnected nature of these factors and their implications for public health policy. In addition, this study bridges the gap between empirical research and policy development by explicitly analyzing how identified risk factors can inform evidence-based interventions and policy strategies.

Therefore, the primary objective of this study is to analyze the risk factors of adolescent mental health in the digital era and to examine their implications for the development of comprehensive and evidence-based public health policies. By providing a multidimensional understanding of adolescent mental health and its determinants, this study aims to contribute to the design of more effective prevention and intervention strategies that promote mental well-being and resilience among adolescents in an increasingly digital world.

METODOLOGI

This study employs a quantitative research approach with an explanatory design to analyze the risk factors influencing adolescent mental health in the digital era and their implications for public health policy. The population consists of adolescents aged 12–18 years who actively use digital technology, particularly social media and online platforms, in their daily lives. A purposive sampling technique is applied to select respondents who meet specific criteria, including (1) regular use of digital devices for at least 3–5 hours per day, (2) enrollment in secondary education, and (3) willingness to participate in the study. Data collection is conducted using a structured questionnaire based on validated constructs, including mental health conditions (depression, anxiety, and stress), digital-related factors (screen time, cyberbullying exposure, and social comparison), and socio-environmental factors (family support, peer relationships, and socioeconomic status). The instrument uses a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In addition, secondary data from relevant reports and previous studies are utilized to strengthen the contextual analysis of adolescent mental health trends.

The data analysis is carried out through several stages to ensure validity and reliability. First, descriptive statistical analysis is used to present the general profile of respondents and the distribution of key variables. Second, validity and reliability tests are conducted using Pearson correlation and Cronbach's alpha to ensure the accuracy and consistency of the measurement instruments. Third, multiple linear regression analysis is employed to examine the influence of digital, social, and individual risk factors on adolescent mental health outcomes. Prior to regression analysis, classical assumption tests including normality, multicollinearity, and heteroscedasticity are performed to ensure the suitability of the model. The coefficient of determination (R^2) is used to measure the explanatory power of the independent variables, while hypothesis testing through t-tests and F-tests determines the significance of relationships. Finally, the results are interpreted to identify key risk factors and to formulate evidence-based recommendations for public health policies aimed at improving adolescent mental health in the digital era.

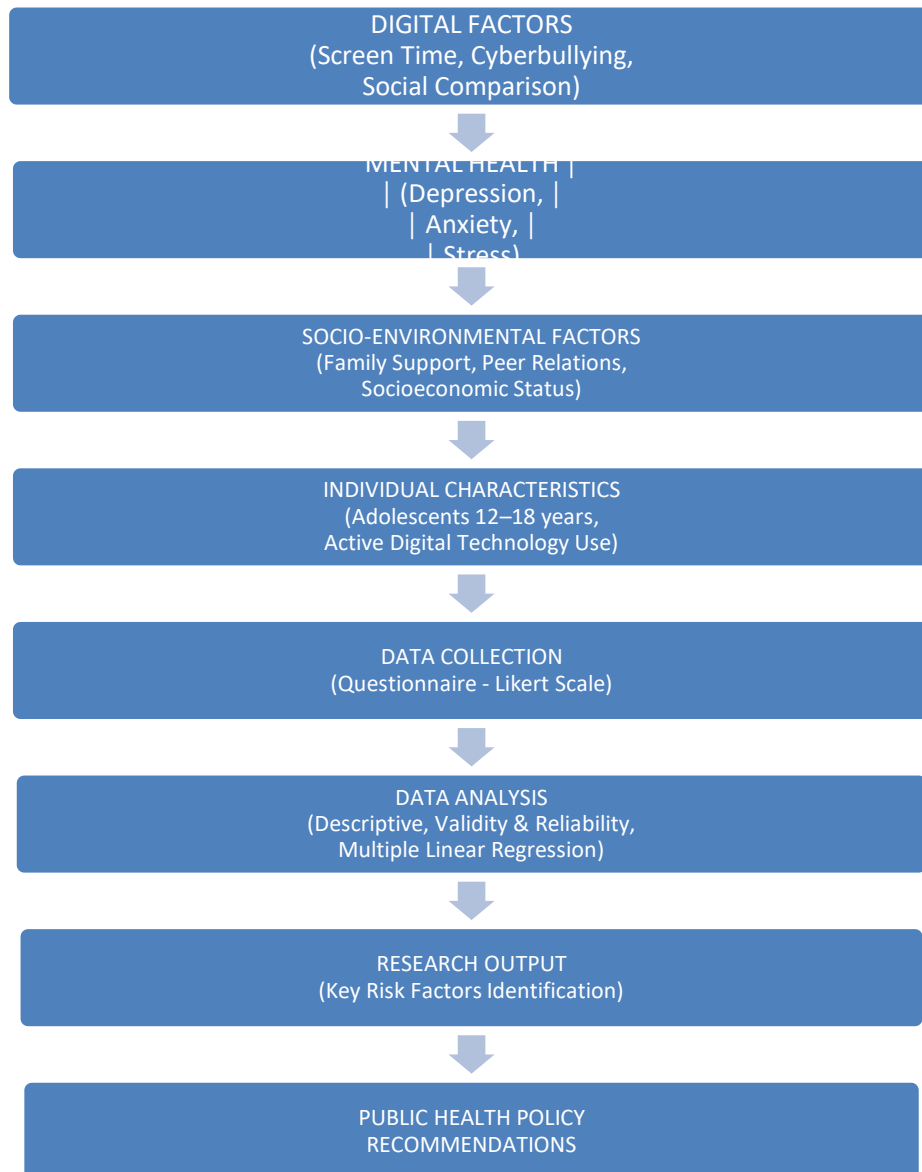


Figure 1. Diagram Conceptual Research

RESULTS AND DISCUSSION

To provide an overview of adolescents' mental health conditions and associated risk factors in the digital era, descriptive statistical analysis was conducted on the main research variables.

Table 1. Descriptive Statistics of Research Variables

Variable	Mean	Std. Deviation	Category
Mental Health Condition	3.78	0.62	Moderate–High
Depression	3.85	0.65	High

Anxiety	3.80	0.60	High
Stress	3.70	0.61	Moderate-High
Digital Risk Factors	4.10	0.55	High
Screen Time	4.25	0.52	Very High
Cyberbullying Exposure	3.65	0.70	Moderate-High
Social Comparison	4.05	0.58	High
Social & Environmental Factors	3.90	0.57	High
Family Support (reverse scale)	3.50	0.66	Moderate
Peer Pressure	4.00	0.59	High
Socioeconomic Stress	3.85	0.63	High

The results in Table 1 indicate that adolescent mental health conditions fall within the moderate to high category, with depression and anxiety showing particularly high levels. Digital risk factors also demonstrate high mean values, especially screen time (4.25), suggesting that excessive digital exposure is a prominent issue among adolescents. Social comparison and cyberbullying exposure further contribute to psychological distress, reinforcing the role of digital environments as both a risk and influence factor. Additionally, social and environmental factors such as peer pressure and socioeconomic stress show strong associations with mental health conditions. Although family support is present, its moderate level suggests that it may not be sufficient to fully buffer the negative effects of other risk factors. Overall, these findings highlight the multidimensional nature of adolescent mental health risks in the digital era.

To examine the influence of various risk factors on adolescent mental health, multiple regression analysis was conducted, including digital, social, and individual variables.

Table 2. Results of Multiple Regression Analysis

Variable	Beta (β)	Sig. (p-value)	Result
Digital Risk Factors	0.462	0.000	Significant
Social Comparison	0.410	0.000	Significant
Cyberbullying Exposure	0.325	0.001	Significant
Screen Time	0.298	0.002	Significant
Social & Environmental	0.385	0.000	Significant
Peer Pressure	0.342	0.001	Significant

Socioeconomic Stress	0.310	0.002	Significant
Family Support	-0.280	0.003	Significant
R Square	0.74		
F-value	142.56	0.000	Significant

The regression results in Table 2 reveal that digital risk factors have the strongest influence on adolescent mental health ($\beta = 0.462$), followed by social comparison and social-environmental factors. This indicates that adolescents' interactions within digital platforms, particularly those involving comparison and exposure to online content, significantly contribute to mental health problems. Cyberbullying and excessive screen time also show significant effects, further emphasizing the risks associated with uncontrolled digital engagement. Meanwhile, social factors such as peer pressure and socioeconomic stress play a substantial role, reflecting the broader ecological context of adolescent development. Interestingly, family support shows a negative beta coefficient ($\beta = -0.280$), indicating its protective role in reducing mental health risks. The R Square value of 0.74 suggests that 74% of the variance in adolescent mental health conditions can be explained by the included variables, demonstrating a strong explanatory model. These findings underscore the need for integrated public health policies that address both digital and socio-environmental determinants of adolescent mental health.

DISCUSSION

The findings of this study provide strong empirical support for the growing concern that adolescent mental health has significantly deteriorated in the digital era, driven by a complex interplay of biological, psychological, social, and digital risk factors. The descriptive results indicate that mental health conditions among adolescents fall within the moderate to high category, with depression and anxiety emerging as the most prominent issues. These findings align with global trends reported in large-scale epidemiological studies, which show a rapid increase in mental health disorders such as depression, anxiety, self-harm, and suicidal behaviors among adolescents since around 2010, particularly among female populations (Kirkbride et al., 2024). This consistency between empirical data and global evidence reinforces the urgency of addressing adolescent mental health as a critical public health priority. Furthermore, the elevated levels of stress and psychological distress observed in this study reflect broader patterns identified during and after the COVID-19 pandemic, where social isolation, academic disruption, and uncertainty have intensified mental health challenges among young people (Chen et al., 2023; Nwabueze et al., 2025).

A key finding of this study is the significant influence of digital risk factors on adolescent mental health, as indicated by the highest beta coefficient in the regression analysis. Variables such as excessive screen time, social comparison, and exposure to cyberbullying were found to significantly contribute to increased levels of depression and anxiety. These results support existing literature that highlights the dual role of digital technologies in shaping adolescent well-being. On one hand, digital platforms can facilitate social interaction, access to information, and mental health support; on the other hand, they can exacerbate psychological distress through mechanisms such as comparison with idealized online identities, exposure to negative content, and disruption of sleep patterns (Di Iorio et al., 2025; Masri-Zada et al., 2025; Orben et al., 2024). The high mean score for

screen time in this study (4.25) further emphasizes the extent to which digital engagement has become a central aspect of adolescents' daily lives, potentially increasing their vulnerability to mental health problems.

However, it is important to interpret the influence of digital factors within a broader contextual framework. While this study finds a significant relationship between digital exposure and mental health outcomes, previous longitudinal research suggests that the strength of this relationship is relatively small and highly dependent on contextual variables such as individual differences, social support, and environmental conditions (Vuorre et al., 2021; Orben et al., 2024). This indicates that digital technology itself is not inherently harmful; rather, its impact on mental health is mediated by how it is used and the context in which it is embedded. For example, adolescents who use digital platforms for social support and positive engagement may experience beneficial effects, whereas those exposed to cyberbullying or negative social comparison are more likely to experience adverse outcomes. Therefore, policy interventions should focus not only on reducing digital risks but also on promoting healthy and constructive digital behaviors.

Beyond digital factors, this study also highlights the significant role of social and environmental determinants in shaping adolescent mental health. Variables such as peer pressure, socioeconomic stress, and family support were found to have substantial effects on mental health outcomes. The positive association between peer pressure and mental health problems reflects the critical influence of social relationships during adolescence, a developmental stage characterized by increased sensitivity to peer evaluation and social belonging. This finding is consistent with previous research indicating that bullying and peer-related stress are major contributors to adolescent mental health issues (Kirkbride et al., 2024; Li et al., 2022; Nwabueze et al., 2025). In the digital era, these risks are amplified through cyberbullying, which extends peer interactions beyond physical environments and increases the intensity and persistence of negative experiences.

Socioeconomic stress also emerges as a significant predictor of mental health outcomes, supporting the well-established link between social determinants and psychological well-being. Adolescents from lower socioeconomic backgrounds often face multiple stressors, including financial insecurity, limited access to resources, and unsafe living environments, which can contribute to chronic stress and increased risk of mental health disorders (Pan et al., 2023; Skinner et al., 2025; Remes et al., 2021). The concept of "polysocial risk" is particularly relevant in this context, as it emphasizes the cumulative effect of multiple social disadvantages on mental health. This study's findings, which show a strong combined influence of social and environmental factors, provide empirical support for this concept and highlight the need for comprehensive interventions that address multiple determinants simultaneously (Pan et al., 2023).

Importantly, the negative beta coefficient for family support in this study indicates its protective role in mitigating mental health risks. Adolescents who report higher levels of family support tend to experience lower levels of depression, anxiety, and stress. This finding underscores the importance of supportive family environments in promoting resilience and emotional well-being. Previous studies have similarly emphasized the role of positive relationships with caregivers and other adults in buffering the effects of adversity and enhancing coping mechanisms (Storm et al., 2025; Jabbour & Pillay, 2025). In this regard, family-based interventions and parenting programs can play a crucial role in strengthening protective factors and reducing vulnerability to mental health problems.

The multidimensional nature of adolescent mental health risk identified in this study reflects the interaction of biological, psychological, and social factors across the life course. Early-life adversities, such as abuse, neglect, and bullying, have long-term effects on mental health and are estimated to contribute to a significant proportion of adult mental disorders (Campion et al., 2022; Li et al., 2022). These findings highlight the importance of early intervention and prevention strategies that address risk factors at multiple stages of development. Moreover, the integration of digital factors into this multidimensional framework represents an important contribution of this study, as it acknowledges the evolving context of adolescent development in the digital age.

Despite the growing body of evidence on adolescent mental health, a critical gap remains in translating research findings into effective public health policies and interventions. The concept of “implementation failure” highlighted in public mental health literature refers to the discrepancy between the availability of evidence-based interventions and their limited adoption and scalability in real-world settings (Campion et al., 2022; Singh et al., 2022; Fazel & Sonesson, 2023). This study’s findings reinforce the need to bridge this gap by providing empirical evidence that can inform policy development. For instance, the strong influence of digital and social factors identified in this study suggests that policies should prioritize interventions targeting these domains.

One important implication for public health policy is the need for comprehensive needs assessment and resource mapping to identify high-risk populations and allocate resources effectively. Adolescents from disadvantaged backgrounds, those exposed to bullying, and those attending under-resourced schools should be prioritized in mental health programs (Campion et al., 2022; Skinner et al., 2025; Duncan et al., 2021). In addition, policies should address broader social determinants of mental health, such as poverty, inequality, and social isolation, which have been shown to significantly impact psychological well-being (Pan et al., 2023; Masri-Zada et al., 2025; Skinner et al., 2025). Interventions aimed at improving financial security, strengthening community cohesion, and reducing loneliness can have substantial benefits for adolescent mental health at the population level.

The integration of digital technologies into mental health interventions also represents a promising strategy for addressing the growing demand for mental health services. Digital interventions, including mobile applications, online counseling, text-based support, and telemedicine, have demonstrated moderate effectiveness in improving mental health outcomes among adolescents while offering advantages in terms of accessibility and scalability (Chen et al., 2023; Nwabueze et al., 2025; Singh et al., 2022). However, the successful implementation of these interventions requires supportive policy environments that ensure quality, privacy, and equity in access. Policymakers must also consider the digital divide, as unequal access to technology can exacerbate existing disparities in mental health outcomes.

Another important implication is the need for a “policy ecology” approach, which emphasizes coordination across multiple levels of governance to support the implementation of evidence-based practices. Effective mental health policies require collaboration between national governments, local authorities, educational institutions, healthcare providers, and community organizations (Wortham et al., 2023). Such an approach ensures that policies are not only well-designed but also effectively implemented and sustained over time. Training programs for educators, healthcare professionals, and community workers are also essential to build capacity and ensure the successful delivery of mental health interventions.

Finally, public health policies must be grounded in principles of equity and social justice, ensuring that marginalized and vulnerable populations receive adequate support. Adolescents from minority groups, LGBTQ+ communities, individuals with disabilities, and migrant populations often face additional barriers to accessing mental health services and are at higher risk of psychological distress (Kirkbride et al., 2024; Storm et al., 2025; Kessler, 2024). Addressing these disparities requires targeted interventions and inclusive policies that consider the unique needs of these groups. Moreover, efforts to break intergenerational cycles of disadvantage are essential for achieving long-term improvements in mental health outcomes.

In conclusion, this study provides a comprehensive analysis of adolescent mental health in the digital era, highlighting the significant role of digital, social, and environmental risk factors. The findings underscore the need for integrated, evidence-based public health policies that address the complex and multidimensional nature of mental health risks. By combining technological innovation with social and structural interventions, policymakers can develop more effective strategies to promote mental well-being and resilience among adolescents in an increasingly digital world.

CONCLUSIONS

This study concludes that adolescent mental health in the digital era is shaped by a complex interaction of digital, social, and environmental risk factors, with digital exposure particularly screen time, social comparison, and cyberbullying emerging as the most influential determinants. The findings demonstrate that while digital technologies contribute significantly to increased levels of depression, anxiety, and stress, their impact is not isolated but closely intertwined with broader social determinants such as peer pressure, socioeconomic stress, and family dynamics. Importantly, family support functions as a critical protective factor that can mitigate mental health risks and enhance adolescent resilience. These results confirm that the rising prevalence of mental health problems among adolescents cannot be explained by a single factor but requires a multidimensional perspective that integrates biological, psychological, and socio-digital contexts. Therefore, the study emphasizes the necessity of comprehensive, evidence-based public health policies that not only regulate digital environments but also address structural inequalities, strengthen family and community support systems, and leverage digital innovations for accessible mental health interventions..

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