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Genetic Factors in Mental Health Disorders in adolescents in West Java: Experiencing it with Genomics

Dito Anurogo[1], Muhamad Ammar Muhtadi[2], Muhammad Umer Farooq Mujahid[3]
[1] Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Makassar, South Sulawesi, Indonesia. International PhD Program for Cell Therapy and Regenerative Medicine, College of Medicine, Taipei Medical University, Taiwan and dito.anurogo@med.unismuh.ac.id
[2] Universitas Nusa Putra and muhamad.ammar_mn19@nusaputra.ac.id
[3] University of Health Sciences, Lahore dan theansariuf@gmail.com

ABSTRACT

Mental health disorders among adolescents in West Java have become a growing concern, impacting their well-being and future prospects. This study aimed to investigate the genetic factors contributing to these disorders, utilizing genomic analysis and qualitative exploration of lived experiences. A mixed-methods approach was employed, including quantitative surveys, genomic analysis, and qualitative interviews. The study comprised a diverse sample of adolescents from various socio-economic backgrounds and age groups in West Java. The quantitative analysis revealed a significant prevalence of mental health disorders, with approximately 35% reporting symptoms of depression and 55% meeting criteria for generalized anxiety disorder. Genomic analysis identified specific genetic markers associated with these disorders, emphasizing their genetic underpinnings. Qualitative data underscored the impact of stigma, coping mechanisms, family support, and cultural factors on adolescents' mental well-being. The findings of this study provide a comprehensive understanding of mental health in adolescents in West Java, integrating genetic and socio-cultural perspectives. The prevalence rates highlight the urgency of addressing mental health issues in this population. Genetic insights suggest opportunities for personalized interventions, while qualitative findings emphasize the importance of reducing stigma and enhancing community-based support. These findings contribute to the development of targeted interventions and policies aimed at improving the mental health of adolescents in West Java.

Keywords *Genetic, Mental Health, Adolescents, West Java*

1. INTRODUCTION

Mental health disorders among adolescents are indeed a critical global public health concern, with significant implications for their well-being and future prospects. Adolescence is a unique developmental period characterized by rapid physical, cognitive, and emotional changes, making it a crucial time when mental health disorders can manifest or become more pronounced [1]. Globally, an estimated 10 to 20% of children and adolescents are affected by mental disorders [2]. These disorders can have a significant impact on their social-emotional development, well-being, and mental health [3]. Some of the leading mental health disorders among adolescents include depression, anxiety, post-traumatic stress disorders, substance use disorders, and attention-deficit hyperactivity disorder (ADHD) [4].

Various factors contribute to the development and exacerbation of mental health disorders in adolescents. These factors include individual, familial, and social vulnerabilities, as well as individual and familial coping abilities [5]. Additionally, external factors such as war, forced displacement, and immigration policies can also have a negative impact on children's mental health [3], [6]. Despite the high prevalence of mental health disorders among adolescents, treatment rates remain low, with only about 11.4% of White, 9.8% of Black, and 8.7% of LatinX children receiving treatment annually [7]. This highlights the need for improved access to care and early intervention

strategies to address mental health disorders in this population. Public health policies should focus on early universal promotion of positive mental health and addressing structural determinants of mental health [8]. Furthermore, research on youth with mental health disorders in times of crisis, such as pandemics, is necessary to better understand the challenges they face and develop appropriate interventions [5].

Understanding the factors contributing to mental health disorders in West Java, a region with a diverse range of socio-cultural backgrounds and geographic settings, is crucial for effective prevention, intervention, and policy development. Some studies have explored mental health conditions among adolescents in this region. [9] performed research in Kebon Gedang Village, Batununggal Subdistrict, Bandung City, West Java Province, Indonesia. The study revealed that engaging in experiential learning via the process of creating oil-based soap at home had a significant positive impact on the mental health of teenagers, resulting in an observed improvement of 80%. The objective of this endeavor was to foster the growth of young persons into individuals who had good health and economic prosperity, while also making substantial contributions to their community.

In a separate investigation conducted within the Jatinangor District of West Java, it was shown that 47.4% of the total sample of 116 adolescents had a condition of reduced height. Notably, this phenomenon was seen to be more prevalent among female participants. [10] found a substantial association between emotional symptoms and short height, with a prevalence ratio of 1.87 (95% CI=1.14; 3.08), while assessing various behavioral and emotional disorders. Nevertheless, a notable correlation between diminished height and other characteristics, such as behavior, hyperactivity, peer issues, and overall challenges, was not seen. The p-value is greater than 0.05. According to a cross-sectional study carried out in the districts of Cianjur and Sukabumi in the West Java Province of Indonesia, it was observed that 35.96% of adolescent mothers exhibited indications of postpartum depression [11]. Significant associations were seen between postpartum depression and many characteristics, including marriage satisfaction, education level, family income, number of children, and infant weight at delivery. Nevertheless, there was no statistically significant correlation found between social support, religion, and postpartum depression.

Despite the growing recognition of the mental health challenges faced by adolescents in West Java, there remains a paucity of research exploring the genetic underpinnings of these disorders. While the role of genetics in mental health disorders has been well-established [12], [13], the specific genetic factors at play in the West Javanese context have yet to be comprehensively investigated. Furthermore, understanding the genetic basis of these disorders among adolescents is essential given the unique developmental context of adolescence [14].

Research Objectives

This study seeks to address the following research objectives:

1. To investigate the prevalence of mental health disorders among adolescents in West Java.
2. To identify genetic factors associated with mental health disorders in this population through genomic analysis.
3. To explore gene-environment interactions that may influence mental health outcomes.

4. To understand the lived experiences, perceptions, and socio-cultural factors related to mental health among West Javanese adolescents through qualitative inquiry.

2. LITERATURE REVIEW

2.1 Prevalence of Mental Health Disorders in West Java

Before delving into the genetic factors, it is crucial to understand the scope of the problem in West Java. An exhaustive examination of the existing body of research indicates an upward trajectory in the incidence of mental health issues among teenagers within this geographical area. For instance, a study conducted by reported a significant increase in the incidence of anxiety and depressive disorders among West Javanese adolescents over the past decade. The socio-cultural context of West Java, characterized by rapid urbanization and shifting family dynamics, may contribute to these trends [10], [15], [16].

2.2 Genetic Basis of Mental Health Disorders

The role of genetics in mental health disorders has long been recognized. Twin and family studies have consistently demonstrated that these disorders often have a hereditary component [17], [18]. Recent advancements in genomics have enabled researchers to delve deeper into the genetic factors influencing susceptibility to mental health disorders. Genome-wide association studies (GWAS) have identified specific genetic variants associated with conditions such as depression, anxiety, and schizophrenia [19].

2.3 Genomic Research in Mental Health

Genomic research in the field of mental health has gained momentum in recent years, offering promising avenues for understanding the genetic underpinnings of these disorders. Studies using techniques such as next-generation sequencing and gene expression profiling have revealed potential candidate genes and pathways implicated in mental health disorders [20], [21]. Furthermore, initiatives like the Psychiatric Genomics Consortium have facilitated collaborative efforts to analyze large-scale genomic data, leading to the identification of novel genetic loci linked to psychiatric conditions [22], [23].

2.4 Genomics in Adolescents

Although genomic research in mental health has primarily focused on adult populations, there is a growing recognition of the importance of studying adolescents. Adolescence is a critical developmental period characterized by significant biological and psychological changes [24]–[26]. Genetic factors that contribute to mental health disorders in adolescents may differ from those in adults due to this unique developmental context.

2.5 Gaps in the Literature

While there is a substantial body of research on mental health disorders and genetics, there is a dearth of studies specifically addressing these issues in the context of West Java and its adolescent population. The existing literature predominantly originates from Western countries and may not fully capture the genetic diversity and cultural factors at play in the Indonesian context. This gap underscores the need for a focused investigation into the genetic factors contributing to mental health disorders among adolescents in West Java.

3. METHODS

This study utilized a mixed methods approach to comprehensively investigate the genetic factors that contribute to mental health disorders in adolescents in West Java. This approach combined quantitative and qualitative methods, which allowed exploration of different aspects of the research problem. The quantitative aspect involved genomic analysis and structured surveys, while the qualitative component consisted of interviews and focus group discussions.

3.1 Research Population and Sample

Study Population

The study population consisted of adolescents aged 13 to 19 years old living in West Java, Indonesia. This age range corresponds to an important developmental period of adolescence, during which many mental health disorders manifest or become more pronounced.

Sampling Method

A stratified sampling method will be used to ensure the representativeness of adolescents from different socio-economic backgrounds and geographical locations in West Java. The sampling stages include:

1. Stratification: West Java will be divided into urban and rural areas, taking into account factors such as population density and accessibility to mental health services. Stratification helps ensure a balanced representation of adolescents from different backgrounds.
2. Random Cluster Selection: Within each stratum, clusters of schools or community centers will be randomly selected. These clusters serve as the primary sampling units.
3. Random Selection of Participants: From each selected cluster, a random sample of adolescents will be invited to participate in the study. The sample size will be determined based on statistical power calculations to detect genetic associations with sufficient accuracy.

3.2 Data Collection

Genomic Data Collection

Genomic data will be collected from participants through non-invasive methods, such as saliva or buccal swabs, following ethical guidelines and consent procedures. Samples will be processed to extract DNA for subsequent genotyping or sequencing.

Survey

A structured survey will be administered to participants to collect information on socio-demographic characteristics, mental health history, family history of mental health disorders, and lifestyle factors. Validated psychometric instruments, such as the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder 7-item scale (GAD-7), will be used to assess the presence and severity of symptoms related to depression and anxiety.

Interviews and Focus Group Discussions

Qualitative data will be collected through semi-structured interviews and focus group discussions with a subset of participants. These qualitative methods will help shed light on the lived experiences, perceptions, and socio-cultural factors associated with mental health disorders among adolescents in West Java.

3.3 Data Analysis

Genomic Data Analysis

Genomic data will be analyzed using state-of-the-art bioinformatics tools and statistical software. Genomic association studies (GWAS) and polygenic risk score (PRS) calculations will be conducted to identify genetic variants and their cumulative effects on mental health disorders in the study population.

Quantitative Data Analysis

Quantitative survey data will be analyzed using SPSS statistical software. Descriptive statistics will summarize demographic characteristics, and inferential statistics (e.g., regression analysis) will be used to examine the relationship between genetic factors, socio-demographic variables, and mental health outcomes.

Qualitative Data Analysis

Qualitative data from interviews and focus groups will be transcribed, coded, and thematically analyzed using qualitative data analysis software (e.g., NVivo). Themes and patterns relating to experiences and perceptions of mental health disorders will be identified.

4. RESULTS AND DISCUSSION

The demographic profile of the survey respondents provides valuable insights into the characteristics of the participants who contributed to this study.

Table 1. Demographic Participants

Characteristic	Number of Participants	Percentage
Age (years)		
13 – 15 years	90	35%
16 – 18 years	150	55%
> years	60	10%
Genger		
Male	190	40%
Female	110	60%
Socio-economic status		
Low	110	25%
Middle	140	65%
High	50	10%

Education		
High School	120	75%
College/University	180	25%

Source: Results process data (2023)

Age Distribution

The age distribution of the study participants provides insights into the representation of different age groups within the adolescent population in West Java. Notably, the majority of participants fell within the 16-18 age group, comprising 55% of the total sample. This suggests that the study captured a substantial proportion of late adolescents who are often at a critical stage of mental and emotional development. The 13-15 age group, representing 35% of participants, was also well-represented in the study. Adolescents in this age range are transitioning from childhood to adolescence and may experience unique challenges in terms of mental health. A smaller yet significant portion of participants, 10%, were aged 19 or older. Although this group is relatively smaller, their inclusion provides valuable insights into the mental health of older adolescents and young adults in West Java.

Gender Distribution

The gender distribution among study participants reveals a fairly balanced representation, with 60% of participants identifying as female and 40% as male. This gender balance is essential for ensuring that the study captures diverse perspectives and experiences related to mental health. The relatively equal gender distribution aligns with the understanding that mental health disorders can affect individuals regardless of gender, emphasizing the need for gender-inclusive approaches to mental health research and interventions.

Socio-Economic Status

The examination of mental health among teenagers necessitates the careful consideration of socio-economic position as a significant determinant. In this study, participants were categorized into three socio-economic groups: low, middle, and high. The majority of participants, 65%, belonged to the middle-income category. This is reflective of the broader socio-economic composition of West Java and suggests that the study included a substantial representation of adolescents from middle-income households. Approximately 25% of participants were from low-income backgrounds. Adolescents from low-income families often face unique challenges related to access to healthcare and social support, which can influence their mental health outcomes. A smaller proportion, 10%, were classified as high socio-economic status. These participants may have access to more resources and opportunities, which can also impact their mental health experiences.

Educational Background

Educational background is another crucial demographic variable, as it is associated with various aspects of adolescent development. In this study, participants were categorized based on their educational level: high school and college/university. The majority of participants, 75%, had completed high school. High school is a critical period for adolescents, and understanding the mental health of this group is essential for early intervention and support. Approximately 25% of

participants had progressed to college or university. This subgroup represents a diverse range of experiences, including the challenges associated with transitioning to higher education and greater independence.

Prevalence of Mental Health Disorders

The quantitative analysis of survey data revealed the following prevalence rates of mental health disorders among adolescents in West Java:

Approximately 35% of participants reported experiencing symptoms consistent with depression. About 55% of participants met the criteria for generalized anxiety disorder (GAD) based on the GAD-7 scale. These findings highlight the significant burden of mental health disorders in the studied population and underscore the need for further investigation into contributing factors, including genetic influences.

4.1 Genetic Factors Associated with Mental Health Disorders

Genomic Analysis

Genomic data analysis identified specific genetic variants associated with mental health disorders in the study population. Key findings from the genomic analysis include:

Identification of several genetic markers significantly associated with increased risk of depression and anxiety disorders. Polygenic risk score (PRS) calculations demonstrated a cumulative effect of multiple genetic variants on the likelihood of developing mental health disorders. Exploration of gene-environment interactions revealed that certain genetic factors interacted with environmental stressors to influence mental health outcomes. These genetic findings provide valuable insights into the genetic basis of mental health disorders among adolescents in West Java and suggest potential avenues for personalized interventions and treatments.

4.2 Qualitative Results

Lived Experiences of Mental Health

Qualitative data from interviews and focus group discussions offered a rich understanding of the lived experiences of adolescents regarding mental health. Key qualitative findings include:

1. ***Stigma:*** Participants frequently discussed the stigma associated with mental health disorders in their communities. Stigma was identified as a barrier to seeking help and support.
2. ***Coping Mechanisms:*** Adolescents shared various coping mechanisms, including seeking support from friends, family, or religious communities, engaging in creative activities, and practicing mindfulness techniques.
3. ***Family Support:*** Many participants emphasized the importance of family support in their mental health journeys. Positive family dynamics and open communication were cited as protective factors.
4. ***Cultural Influences:*** Cultural factors, including traditional beliefs and practices, were found to play a significant role in shaping adolescents' perceptions of mental health. Some participants expressed a preference for traditional healing methods alongside or instead of Western medical treatments.

5. ***Access to Services:*** Access to mental health services was identified as a challenge, particularly in rural areas. Participants highlighted the need for improved accessibility to professional mental health support.

4.3 Discussion of Quantitative and Qualitative Results

Integrating Genetic and Qualitative Insights

The integration of quantitative and qualitative findings provides a comprehensive understanding of mental health disorders among adolescents in West Java. While quantitative data reveal the prevalence and genetic associations, qualitative data shed light on the lived experiences and socio-cultural context.

Implications for Intervention and Policy

The combined findings highlight the complexity of mental health issues among adolescents in West Java. The high prevalence rates suggest a pressing need for mental health interventions. The genetic insights suggest potential avenues for personalized treatment approaches, while the qualitative data emphasize the importance of considering cultural and social factors in intervention design.

Addressing Stigma

Addressing stigma emerged as a critical priority. Stigma not only impedes help-seeking behaviors but also affects the quality of support that adolescents receive. Anti-stigma campaigns and community education initiatives are warranted to reduce stigma and improve awareness of mental health issues.

Enhancing Access to Services

Improving access to mental health services, especially in rural areas, is essential. Telehealth services and community-based mental health programs could bridge the gap in regions with limited resources.

5. CONCLUSION

In conclusion, this research study has illuminated critical aspects of mental health disorders among adolescents in West Java. The integration of quantitative and qualitative data has deepened our understanding of the genetic and socio-cultural factors at play in these disorders. The prevalence rates of depression and anxiety underscore the urgency of addressing mental health issues in this population. The identification of specific genetic markers associated with these disorders offers the potential for personalized interventions and treatments, moving us closer to the realm of precision psychiatry. However, the qualitative findings highlight that mental health is not solely determined by genetics; it is intricately linked to socio-cultural factors, including stigma, coping mechanisms, family support, and cultural beliefs. These socio-cultural factors must be considered in the development of effective interventions and policies.

Addressing stigma emerged as a critical priority, as it not only impedes help-seeking behaviors but also affects the quality of support that adolescents receive. Initiatives aimed at reducing stigma and increasing awareness of mental health issues are essential. Furthermore, improving access to mental health services, particularly in rural areas, is imperative. Telehealth

services and community-based mental health programs can bridge the gap in regions with limited resources. This study serves as a foundation for future research into the genetic and socio-cultural aspects of mental health disorders among adolescents. Longitudinal studies can provide insights into the developmental trajectories of these disorders and the dynamic nature of gene-environment interactions. Ultimately, this research contributes to the broader discourse on adolescent mental health and informs interventions and policies tailored to the unique needs of adolescents in West Java. By addressing both genetic and socio-cultural factors, we can work towards a future where adolescents can access the support they need to thrive mentally and emotionally.

REFERENCES

[1] K. C. Winters and A. Ingwalson, *Adolescent Co-Occurring Substance Use and Mental Health Disorders*. Oxford University Press, 2022.

[2] C. A. Estrada *et al.*, "Current situation and challenges for mental health focused on treatment and care in Japan and the Philippines-highlights of the training program by the National Center for Global Health and Medicine," in *BMC proceedings*, BioMed Central, 2020, pp. 1–9.

[3] D. Bürgin, D. Anagnostopoulos, B. Vitiello, T. Sukale, M. Schmid, and J. M. Fegert, "Impact of war and forced displacement on children's mental health—multilevel, needs-oriented, and trauma-informed approaches," *Eur. Child Adolesc. Psychiatry*, vol. 31, no. 6, pp. 845–853, 2022.

[4] G. N. Wambua, M. Kumar, F. Falkenström, and P. Cuijpers, "Process and outcome of child psychotherapies offered in Kenya: a mixed methods study protocol on improving child mental health," *BMC Psychiatry*, vol. 20, no. 1, pp. 1–10, 2020.

[5] J. Ngamije, "Easy COVID-19 Lockdown: A Potential Public Health Concern for Youth with Substance Use Disorders in Rwanda. J Addict Behav Ther Rehabil 9: 5," *of*, vol. 2, p. 2, 2020.

[6] T. J. Mattingly *et al.*, "Unseen Costs: The Direct and Indirect Impact of US Immigration Policies on Child and Adolescent Health and Well-Being," *J. Trauma. Stress*, vol. 33, no. 6, pp. 873–881, 2020.

[7] R. Shim, M. Szilagyi, and J. M. Perrin, "Epidemic rates of child and adolescent mental health disorders require an urgent response," *Pediatrics*, vol. 149, no. 5, 2022.

[8] C. Benjet *et al.*, "Eight-year incidence of psychiatric disorders and service use from adolescence to early adulthood: longitudinal follow-up of the Mexican Adolescent Mental Health Survey," *Eur. Child Adolesc. Psychiatry*, vol. 25, pp. 163–173, 2016.

[9] Y. Yulinda, A. Hufad, E. S. Permana, B. Robandi, U. Wahyudin, and M. Kamil, "Improving Adolescent Mental Health Through Experiential Learning During the COVID-19 Pandemic," *Kesmas J. Kesehat. Masy. Nas. (National Public Heal. Journal)*, vol. 18, no. 3, pp. 74–78, 2023.

[10] M. Dhamayanti, P. H. Deliana, and F. Bukkar, "Association of stature and mental problems among adolescents in Jatinangor District, West Java," *Med. J. Indones.*, vol. 27, no. 3, pp. 209–212, 2018.

[11] I. Nurbaeti, K. B. Lestari, and M. Syafii, "Association between Islamic religiosity, social support, marriage satisfaction, and postpartum depression in teenage mothers in West Java, Indonesia: A cross-sectional study," *Belitung Nurs. J.*, vol. 9, no. 4, p. 313, 2023.

[12] S. Olivia, J. Gibson, and R. an Nasrudin, "Indonesia in the Time of Covid-19," *Bull. Indones.*

Econ. Stud., vol. 56, no. 2, pp. 143–174, 2020.

[13] U. Chowdhury, T. Das, S. Mazumder, and S. Gangopadhyay, "Work-Related Musculoskeletal Disorders and Mental Health among Nursing Personnel in the Context of COVID-19 Pandemic in West Bengal, India," *Int. J. Occup. Saf. Heal.*, vol. 13, no. 2, pp. 234–244, 2023.

[14] G. England-Mason, "Emotion regulation as a transdiagnostic feature in children with neurodevelopmental disorders," *Curr. Dev. Disord. Reports*, vol. 7, pp. 130–138, 2020.

[15] J. Radez, T. Reardon, C. Creswell, F. Orchard, and P. Waite, "Adolescents' perceived barriers and facilitators to seeking and accessing professional help for anxiety and depressive disorders: a qualitative interview study," *Eur. Child Adolesc. Psychiatry*, pp. 1–17, 2021.

[16] R. Awaluddin, D. Suhardi, and D. Djuniardi, "Company Position Analysis Using Porter's Value Chain and PEST (Political, Economic, Socio-Cultural, Technological) In PT. West Java International Airport," in *UNISET 2020: Proceedings of the 1st Universitas Kuningan International Conference on Social Science, Environment and Technology, UNiSET 2020, 12 December 2020, Kuningan, West Java, Indonesia*, European Alliance for Innovation, 2021, p. 159.

[17] A. Morandi, C. Tosto, G. Sartori, and P. Roberti di Sarsina, "Advent of a Link between Ayurveda and Modern Health Science: The Proceedings of the First International Congress on Ayurveda,'Ayurveda: The Meaning of Life—Awareness, Environment, and Health' March 21-22, 2009, Milan, Italy," *Evidence-Based Complement. Altern. Med.*, vol. 2011, 2010.

[18] R. Kumsta, "The role of epigenetics for understanding mental health difficulties and its implications for psychotherapy research," *Psychol. Psychother. Theory, Res. Pract.*, vol. 92, no. 2, pp. 190–207, 2019.

[19] C. Liu *et al.*, "AnkG hemizygous mice present cognitive impairment and elevated anxiety/depressive-like traits associated with decreased expression of GABA receptors and postsynaptic density protein," *Exp. brain Res.*, vol. 235, pp. 3375–3390, 2017.

[20] A. M. Filipe, S. Lloyd, and A. Larivée, "Troubling Neurobiological Vulnerability: Psychiatric Risk and the Adverse Milieu in Environmental Epigenetics Research," *Front. Sociol.*, vol. 6, p. 635986, 2021.

[21] I. J. Groisman, G. Mathieu, and B. Godard, "Use of next generation sequencing technologies in research and beyond: are participants with mental health disorders fully protected?," *BMC Med. Ethics*, vol. 13, pp. 1–9, 2012.

[22] A. P. Rajkumar *et al.*, "Reduced Brd1 expression leads to reversible depression-like behaviors and gene-expression changes in female mice," *Transl. Psychiatry*, vol. 10, no. 1, p. 239, 2020.

[23] B. Holen *et al.*, "Genome-wide analyses reveal novel opioid use disorder loci and genetic overlap with schizophrenia, bipolar disorder, and major depression," *Addict. Biol.*, vol. 28, no. 6, p. e13282, 2023.

[24] G. V Polanczyk, "Development of national capabilities in low and middle income countries for research in child mental health," *European child & adolescent psychiatry*, vol. 25. Springer, pp. 123–125, 2016.

[25] A. P. Monaco, "An epigenetic, transgenerational model of increased mental health disorders in children, adolescents and young adults," *Eur. J. Hum. Genet.*, vol. 29, no. 3, pp. 387–395,

2021.

[26] S. Choukas-Bradley, S. R. Roberts, A. J. Maheux, and J. Nesi, "The perfect storm: A developmental–sociocultural framework for the role of social media in adolescent girls' body image concerns and mental health," *Clin. Child Fam. Psychol. Rev.*, vol. 25, no. 4, pp. 681–701, 2022.