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Implementation of Peer Group Support to Improve Mental Health and Resilience in Adolescents Post-Online Learning in Public High Schools

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ABSTRACT

The transition from emergency remote learning to in-person schooling following the COVID-19 pandemic has left Indonesian high school students confronting substantial mental health vulnerabilities, including elevated stress, anxiety, and diminished resilience. This study investigated the effectiveness of a structured peer group support intervention in improving mental health outcomes and resilience among adolescents in a public senior high school (SMA Negeri) context. Employing a quasi-experimental, non-equivalent control group design, the research involved 218 students (110 in the intervention group, 108 in the control group) from a state high school in East Java, Indonesia. The intervention group participated in an eight-week peer support program comprising weekly group sessions, psychoeducation modules, and guided peer interactions, while the control group received standard school guidance services. Mental health was assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21), and resilience was measured with the Connor-Davidson Resilience Scale (CD-RISC). Data were collected at pre-test, post-test, and an eight-week follow-up, and analyzed using independent and paired sample t-tests, repeated measures ANOVA, and ANCOVA. Results indicated that the intervention group exhibited statistically significant improvements in mental health (reductions in depression, anxiety, and stress) and resilience scores compared to the control group, with medium to large effect sizes (ηp^2 ranging from .09 to .24). The findings demonstrate that peer group support represents a culturally congruent, scalable, and cost-effective strategy for addressing post-pandemic mental health challenges in Indonesian secondary education settings. The study underscores the critical role of peer relationships in adolescent psychological well-being and provides an evidence-based framework for integrating peer support programs into national school health initiatives.

Keywords: peer group support, mental health, resilience, adolescents, post-pandemic online learning.

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INTRODUCTION

The global outbreak of Coronavirus Disease 2019 (COVID-19) precipitated an unprecedented disruption to educational systems worldwide, compelling governments to enforce widespread school closures and a rapid pivot to emergency remote learning. In Indonesia, the Ministry of Education and Culture (Kemendikbud) mandated the suspension of face-to-face instruction in March 2020, affecting over 60 million students across the archipelago and initiating a prolonged period of online learning that, for many students, extended well beyond two academic years. While this policy was essential for mitigating viral transmission, the protracted reliance on digital platforms for instruction and social interaction has engendered a complex array of psychological sequelae for Indonesian adolescents, a demographic already navigating normative developmental challenges of identity formation, autonomy seeking, and peer group integration. The post-pandemic educational landscape in Indonesia is now characterized by a pressing need to address the mental health fallout of extended social isolation, academic disruption, and erosion of protective school-based social networks that traditionally buffer adolescent stress (Bertoletti et al., 2023).

Empirical evidence from Indonesia and comparable contexts paints a sobering picture of adolescent psychological well-being in the wake of emergency remote learning. A national survey conducted among Indonesian Islamic junior and senior high school students revealed that 13.29% experienced high stress levels, with 41.82% reporting moderate stress, accompanied by somatic complaints including fatigue, headaches, and irritability, as well as emotional difficulties such as anxiety and diminished motivation. Similarly, a descriptive observational study of senior high school students in Surakarta, Central Java, identified stress as the most prevalent psychopathological manifestation during online learning, surpassing both anxiety and depression in terms of frequency. These findings align with international data demonstrating that pandemic-onset remote learning is associated with lower daily positive affect, increased daily stress, and heightened psychological distress in adolescents. The cumulative impact of these stressors extends beyond transient discomfort; research has documented that prolonged exposure to academic and social disruption during critical developmental windows can precipitate enduring mental health difficulties, including an increased risk of anxiety disorders, major depressive episodes, and suicidal ideation.

Resilience conceptualized as the dynamic process of positive adaptation in the face of significant adversity has emerged as a critical protective factor in mitigating the mental health consequences of pandemic-related disruptions. For Indonesian adolescents, resilience encompasses a constellation of capacities including emotional regulation, optimistic thinking, causal analysis, empathy, self-efficacy, and goal-directed persistence. However, empirical assessments of adolescent resilience in Indonesia during and after the pandemic reveal concerning deficits. A study of 657 Indonesian senior high school students found that the ability to regulate emotions—a foundational component of resilience—requires substantial improvement, and that overall resilience levels are significantly influenced by optimism, empathy, and self-efficacy, but not by demographic factors such as gender, parental income, or geographic residence. Another study of 202 adolescents across Java Island reported that 67.3% demonstrated only moderate resilience, with only 6.9% exhibiting high resilience,

underscoring the vulnerability of this population. These data suggest that a substantial proportion of Indonesian high school students may lack the psychological resources necessary to cope effectively with the ongoing and residual challenges of the post-pandemic educational environment (Dell et al., 2025).

Social support, particularly from peer networks, has been consistently identified as a robust protective factor against psychological distress and a facilitator of resilience in adolescents. The theoretical underpinnings of peer support's efficacy are grounded in multiple frameworks, including attachment theory, which posits that secure relational bonds provide a safe haven and secure base for exploration and coping; social cognitive theory, which emphasizes the role of observational learning and social modeling in developing self-efficacy and adaptive behaviors; and the stress-buffering hypothesis, which suggests that perceived availability of social support attenuates the pathogenic effects of stress on mental health. In the context of adolescent development, peer relationships assume particular salience due to the normative shift from familial to extra familial sources of support and identity validation. During the pandemic, when traditional face-to-face peer interactions were severely curtailed, the protective functions of peer support were simultaneously most needed and least accessible, creating a perfect storm of psychological vulnerability (Bovornchutichai et al., 2026).

Research conducted in the Indonesian educational context has begun to elucidate the specific contributions of peer support to adolescent well-being during periods of educational disruption. A correlational study of 253 high school students in Makassar, South Sulawesi, demonstrated that peer social support contributed significantly to academic resilience, accounting for 20% of the variance in resilience scores during online learning. Furthermore, a cross-sectional survey involving 665 Indonesian students engaged in home-based learning found that social support from friends, family, and significant others was strongly associated with school-related subjective well-being, and that this relationship was mediated by the satisfaction of basic psychological needs for autonomy, competence, and relatedness. These findings corroborate international evidence that peer support is particularly beneficial for enhancing daily positive affect during remote learning and that peer relationships, along with parenting style and broader social support, significantly enhance students' coping strategies in online learning environments. Collectively, this body of research underscores that peer support functions as a critical resource for Indonesian adolescents navigating the psychological demands of educational transitions However, the majority of studies to date have been correlational or descriptive in nature, leaving a significant gap in experimental evidence regarding the efficacy of intentional peer support interventions in improving mental health outcomes.

Despite the mounting evidence linking peer support to enhanced psychological well-being and resilience, translating these findings into structured, school-based interventions in Indonesia remains nascent. Several scholars have advocated for the development and implementation of peer support programs in the Indonesian educational system. Maximizing the role of peer support groups would significantly increase awareness of the importance of mental health in schools, and curriculum design should intentionally integrate peer support mechanisms to promote student mental health both during and after the COVID-19 pandemic. Similarly, educators and counselors provide psychological interventions through guidance and counseling

services and approaches to enhance student resilience. However, to date, systematic evaluations of structured peer group support interventions targeting both mental health and resilience outcomes among Indonesian high school students in the post-pandemic period are conspicuously absent from empirical literature. This gap is particularly concerning given the scalability and cost-effectiveness of peer-led approaches, which have demonstrated promising results in improving youth mental health outcomes in low- and middle-income countries (LMICs). A recent scoping review of peer-led mental health interventions for youth in LMICs identified 19 studies, all of which reported improved mental health outcomes, yet noted the need for rigorous quantitative evaluations in diverse cultural contexts (Nurmala et al., 2025).

The present study seeks to address this critical gap in the literature by evaluating the effectiveness of a structured peer group support intervention in improving mental health outcomes and resilience among adolescents in an Indonesian public senior high school (SMA Negeri) after returning to in-person learning. Specifically, the research is guided by three primary objectives: (1) to examine whether participation in a peer group support intervention leads to significant reductions in symptoms of depression, anxiety, and stress compared to a control group receiving standard school guidance services; (2) to assess whether the intervention yields significant increases in resilience scores relative to the control condition; and (3) to determine whether any observed improvements are sustained over an eight-week follow-up period. The following hypotheses were formulated for empirical testing: (H1) The intervention group will demonstrate significantly lower scores on measures of depression, anxiety, and stress at post-test and follow-up compared to the control group after controlling for baseline differences. (H2) The intervention group will exhibit significantly higher resilience scores at post-test and follow-up than the control group after controlling for baseline differences. (H3) The magnitude of change in mental health outcomes (depression, anxiety, and stress) will be positively correlated with the magnitude of change in resilience scores within the intervention group, suggesting a synergistic relationship between peer support processes and the cultivation of resilience.

The significance of this study extends across theoretical, empirical, and practical domains. Theoretically, thise study contributes to the growing literature on social support and adolescent development by testing the efficacy of an intentional peer support intervention within Indonesia s specific cultural and educational context, a setting characterized by strong collectivist values that may amplify the benefits of peer-based approaches. Empirically, thise study provides much-needed experimental evidence to complement the existing body of correlational and descriptive research, thereby strengthening causal inferences regarding the relationship between peer support and adolescent mental health outcomes. The findings are intended to inform the development of evidence-based, culturally appropriate mental health promotion strategies that can be integrated into the Indonesian school curriculum and guidance counseling framework, offering a scalable and cost-effective approach to addressing the post-pandemic mental health crisis among Indonesian youth. In an era where mental health resources in Indonesian schools remain severely constrained—with an estimated ratio of one guidance counselor to over 500 students in many public schools—peer-based interventions represent a promising and sustainable pathway for expanding the reach of mental health support (Carlsson, 2026).

METHOD

Research Design

This study employed a quasi-experimental, non-equivalent control group design with pre-test, post-test, and eight-week follow-up assessments. This design was selected as it is well-suited for evaluating the effectiveness of educational and psychological interventions in naturalistic school settings where the random assignment of individual students to conditions may be impractical or ethically problematic (Creswell, 2021). The non-equivalent control group design allows for a comparison between an intervention group that receives the peer group support program and a control group that receives standard school guidance services, while controlling for potential confounding variables through statistical procedures (e.g., analysis of covariance). The inclusion of a follow-up assessment at eight weeks post-intervention permitteds the examination of the durability of any observed treatment effects over time, an important consideration for determining the practical utility of the intervention (Sugiyono, 2019). The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and received approval from the Institutional Review Board (IRB) of Universitas Negeri Surabaya (Approval No. 2024/UNESA/IRB/0456) prior to data collection.

Participants and Sampling

The target population for this study comprised students enrolled in grades 10 and 11 at public senior high schools (SMA Negeri) in East Java, Indonesia, during the 2024/2025 academic year. A single public senior high school located in Surabaya, the capital city of East Java, was purposively selected based on the following criteria: (1) the school had fully transitioned to in-person learning for a minimum of one academic year following the COVID-19 pandemic remote learning period; (2) the school administration expressed willingness to participate in the research and allocate the necessary time and resources for intervention implementation; (3) the school served a socioeconomically diverse student body, enhancing the generalizability of findings; and (4) the school had not previously implemented a structured peer support or peer mentoring program, ensuring that the intervention would represent a novel experience for participants.

Following school selection, 218 students were recruited through purposive and voluntary sampling. The inclusion criteria were as follows: (1) enrolled in grades 10 or 11 at the participating school; (2) provided written parental consent and personal assent to participate; (3) had no diagnosed severe mental health condition (e.g., psychosis, bipolar disorder) that would preclude safe participation in a peer support group, as determined by school counseling records; and (4) were willing to commit to attending all eight weekly intervention sessions (for the intervention group) or to completing all three assessment waves (for both groups). The exclusion criteria were as follows: (1) inability to read and comprehend Bahasa Indonesia at a level sufficient to complete the self-report questionnaires; and (2) anticipated school transfer or extended absence during the study period. Students were assigned to the intervention (n = 110) or control group (n = 108) based on their class section, with the school administration allocating entire class sections to either condition to minimize cross-contamination between

groups. This allocation procedure resulted in a non-randomized quasi-experimental design with naturally occurring groups.

A priori power analysis was conducted using G*Power software (version 3.1.9.7; Faul et al., 2007) to determine the minimum sample size required to detect a medium effect size (Cohen's d = 0.50) with adequate statistical power. Based on a repeated measures ANOVA design with two groups (intervention vs. control) and three measurement occasions (pre-test, post-test, follow-up), assuming an alpha level of .05, a desired power of .80, and a correlation among repeated measures of 0.50, the analysis indicated a minimum required sample size of 86 participants per group (total N = 172). The actual sample of 218 participants exceeded this minimum requirement, providing a margin of safety against potential attrition (Miles, M. B., & Huberman, 2014).

The demographic characteristics of the study sample are presented in Table 1. The sample consisted of 218 students, with 110 in the intervention group and 108 in the control group. The overall sample was 55.5% female (n = 121) and 44.5% male (n = 97), with a mean age of 16.24 years (SD = 0.78). The distribution by grade level was 51.8% in grade 10 (n = 113) and 48.2% in grade 11 (n = 105). Chi-square tests and independent samples t-tests revealed no statistically significant differences between the intervention and control groups on any demographic variable at baseline (all $p > .05$), supporting the comparability of the groups prior to intervention delivery.

Table 1. Demographic Characteristics of Study Participants.

Characteristic	Intervention Group (n = 110)	Control Group (n = 108)	Total (N = 218)	Test Statistic	p-value
Gender, n (%)				χ^2 = 0.18	.671
Male	48 (43.6%)	49 (45.4%)	97 (44.5%)		
Female	62 (56.4%)	59 (54.6%)	121 (55.5%)		
Grade Level, n (%)				χ^2 = 0.29	.590
Grade 10	58 (52.7%)	55 (50.9%)	113 (51.8%)		
Grade 11	52 (47.3%)	53 (49.1%)	105 (48.2%)		

Characteristic	Intervention Group (n = 110)	Control Group (n = 108)	Total (N = 218)	Test Statistic	p-value
Age (years), M (SD)	16.28 (0.81)	16.20 (0.75)	16.24 (0.78)	t = 0.76	.448
Parental Education, n (%)				χ^2 = 0.41	.815
≤ Senior High School	68 (61.8%)	69 (63.9%)	137 (62.8%)		
> Senior High School	42 (38.2%)	39 (36.1%)	81 (37.2%)		
Monthly Household Income (IDR), n (%)				χ^2 = 0.07	.791
< 5,000,000	71 (64.5%)	68 (63.0%)	139 (63.8%)		
≥ 5,000,000	39 (35.5%)	40 (37.0%)	79 (36.2%)		

Note. IDR = Indonesian Rupiah. χ^2 = Chi-square test statistic. t = independent samples t-test statistic. M = Mean, SD = Standard Deviation.

3.3 Intervention: Peer Group Support Program

The intervention consisted of an eight-week structured peer group support program designed specifically for the Indonesian high school context. The program was developed based on principles drawn from positive youth development (Lerner et al., 2005), social-emotional learning (Durlak et al., 2011), and peer support literature (Dennis, 2003), and was culturally adapted to reflect Indonesian collectivist values and adolescent developmental norms. The intervention was delivered in small groups of 10-12 students, each facilitated by two trained peer facilitators (students in grade 12 who had undergone a 16-hour training program conducted by the research team and school counselors). Peer facilitators were selected based on nominations from teachers and counselors and screened for emotional maturity, communication skills, and commitment to confidentiality. Facilitator training covered group facilitation skills,

active listening, psychoeducation content, confidentiality and ethical considerations, recognizing signs of distress, and appropriate referral procedures.

The intervention comprised eight weekly 90-minute sessions held during school hours in the designated classrooms. Each session followed a consistent structure: (1) check-in and grounding activity (10 minutes); (2) sychoeducation and skill-building (30 minutes); (3) guided peer discussion and support (35 minutes); and(4) closing reflection and between-session practice assignment (15 minutes). The session topics, presented in Table 2, were sequenced to build progressively from self-awareness and emotional literacy to interpersonal skills and future-oriented planning.

Table 2. Outline of Peer Group Support Intervention Sessions

Session	Topic	Objectives	Key Activities
1	Building Connection and Trust	Establish group norms; develop rapport and trust among group members	Icebreaker activities; collaborative creation of group agreements; introduction to peer support principles
2	Understanding Emotions and Stress	Increase emotional literacy; identify personal stressors related to post-pandemic school life	Emotion mapping exercise; discussion of common post-pandemic stressors; introduction to stress response psychoeducation
3	Coping Strategies and Self-Care	Introduce adaptive coping strategies; develop personalized self-care plans	Psychoeducation on problem-focused vs. emotion-focused coping; self-care menu creation; peer sharing of effective coping strategies
4	Effective Communication and Seeking Support	Enhance communication skills; normalize help-seeking behaviors	Role-play scenarios; discussion of barriers to seeking help; practice giving and receiving peer support
5	Building Resilience and Growth Mindset	Understand the components of resilience; cultivate a growth mindset	Resilience stories activity; reframing challenges as opportunities for

Session	Topic	Objectives	Key Activities
			growth; identifying personal resilience resources
6	Navigating Peer Relationships and Social Pressures	Address challenges in peer relationships; develop skills for managing social pressures	Discussion of social media influences; peer pressure role-plays; strategies for maintaining authentic friendships
7	Managing Academic Stress and Setting Goals	Apply coping strategies to academic contexts; set realistic academic and personal goals	Time management strategies; test anxiety reduction techniques; SMART goal-setting activity
8	Sustaining Growth and Looking Forward	Consolidate learning; develop plans for maintaining gains; celebrate group journey	Review of key takeaways; creation of personal wellness plans; group celebration and closure ritual

Throughout the intervention, peer facilitators were supervised weekly by the research team and school counselors to ensure fidelity to the program protocol and address any emerging concerns. Fidelity was assessed using a structured observation checklist completed by research assistants who observed 20% of all sessions (randomly selected). The checklist assessed adherence to the session content, facilitator engagement, group dynamics, and time management. The overall fidelity ratings across the observed sessions averaged 92.4% (SD = 5.8%), indicating high levels of protocol adherence.

Control Condition

Students in the control group received standard guidance and counseling services provided by the school, which included individual counseling sessions upon student request, occasional classroom guidance lessons on topics such as career planning and academic motivation, and general wellness announcements during school assemblies. The control group did not participate in the peer group support intervention nor receive any additional mental health programming beyond standard services. Following the completion of the follow-up assessment, students in the control group were offered the

opportunity to participate in a condensed version of the peer support program (four sessions) as a gesture of appreciation and to ensure equitable access to the intervention's potential benefits.

Measures and Instruments

Mental Health (Depression, Anxiety, Stress). Mental health outcomes were assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995), a 21-item self-report instrument measuring symptoms of depression, anxiety, and stress over the past week. The DASS-21 is comprised of three 7-item subscales: Depression (e.g., "I felt that life was meaningless"), Anxiety (e.g., "I felt scared without any good reason"), and Stress (e.g., "I found it hard to wind down"). Respondents rate each item on a 4-point Likert scale ranging from 0 ("Did not apply to me at all") to 3 ("Applied to me very much, or most of the time"). Subscale scores are calculated by summing the relevant items and multiplying by two to yield scores comparable to the full 42-item DASS. Higher scores indicate greater severity of symptoms. The DASS-21 has been extensively validated across diverse cultural contexts, including Indonesia, and demonstrates strong psychometric properties. In the Indonesian adolescent population, the DASS-21 has shown good internal consistency (Cronbach's α ranging from .80 to .88) and adequate convergent and discriminant validity (Kinanthi et al., 2020). In the present study, internal consistency coefficients (Cronbach's α) for the three subscales at pre-test were as follows: Depression α = .86, Anxiety α = .82, and Stress α = .85, indicating good to excellent reliability.

Resilience. Resilience was assessed using the 25-item Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003), a widely used self-reported measure of resilience. The CD-RISC assesses the ability to cope with adversity across five domains: personal competence, high standards, and tenacity; trust in one's instincts, tolerance of negative affect, and strengthening effects of stress; positive acceptance of change and secure relationships; control; and spiritual influences. Respondents rated each item on a 5-point Likert scale ranging from 0 ("Not true at all") to 4 ("True nearly all the time"), based on how they felt over the past month. The total scores ranges from 0 to 100, with higher scores indicating greater resilience. The CD-RISC has been validated for use with Indonesian adolescents and has demonstrated strong psychometric properties, including high internal consistency (Cronbach's α = .89) and good test-retest reliability (r = .87) (Wahyuni et al., 2021). In the present study, the internal consistency of the CD-RISC in thepre-test was α = .88, indicating good reliability.

Demographic Questionnaire. A brief demographic questionnaire was administered at the pre-test to collect information on participants' age, gender, grade level, parental education (coded as ≤ senior high school vs. > senior high school), and monthly household income (coded as < 5,000,000 IDR vs. ≥ 5,000,000 IDR, based on the East Java provincial minimum wage). This information was used to characterize the sample and examine potential demographic moderators of the intervention effects.

Procedure

Data collection occurred in three waves: pre-test (Week 0, prior to intervention commencement), post-test (Week 9, immediately following the final intervention session), and follow-up (Week 17, eight weeks after the post-test). At each assessment

wave, participants completed the DASS-21, CD-RISC, and (at pre-test only) demographic questionnaire. Questionnaires were administered in a paper-and-pencil format in group settings within the school, supervised by trained research assistants who were blind to the participants' group assignment. Participants were assured of the confidentiality of their responses and were provided with a unique identification code to link their data across assessment waves while maintaining their anonymity. The pre-, post, and follow-up assessment sessions each lasted approximately 30-40 minutes.

All participants provided written informed consent (parental/guardian consent for students aged 18 years) and personal assent prior to enrollment in the study. The study protocol was reviewed and approved by the Institutional Review Board (IRB) of Universitas Negeri Surabaya (Approval No. 2024/UNESA/IRB/0456). Participants were informed of their right to withdraw from the study at any time without penalty. A referral protocol was established for students who exhibited elevated levels of distress on the DASS-21 or disclosed suicidal ideation; such students were referred to the school counselor for further assessment and support.

Data Analysis Plan

Data were entered into Microsoft Excel and imported into IBM SPSS Statistics version 27.0 for analysis. Prior to conducting the primary analyses, the data were screened for missing values, outliers, and violations of statistical assumptions (normality, homogeneity of variance, and sphericity). Missing data were minimal (< 5% across all variables) and were handled using multiple imputation with 10 imputed datasets based on the assumption that data were missing at random (MAR). The normality of continuous variables was assessed using the Shapiro-Wilk tests and visual inspection of the Q-Q plots. The homogeneity of variance was assessed using Levene's test. For repeated measures analyses, Mauchly's test of sphericity was employed; where sphericity was violated, Greenhouse-Geisser corrections were applied.

Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to characterize the sample and summarize scores on all outcome measures at each assessment wave. Independent samples t-tests and chi-square tests were used to compare the intervention and control groups on demographic variables and baseline outcome measures to assess the success of group allocation.

To evaluate the effects of the intervention on mental health outcomes (depression, anxiety, stress) and resilience, a series of 2 (Group: intervention vs. control) × 3 (Time: pre-test, post-test, follow-up) mixed-model repeated measures analyses of variance (ANOVAs) were conducted for each dependent variable. Significant Group × Time interactions were followed by simple main effects analyses with Bonferroni corrections to examine within-group changes over time and between-group differences at each time point. Additionally, analysis of covariance (ANCOVA) was employed to compare post-test and follow-up scores between groups while controlling for pre-test scores, providing a more precise estimate of intervention effects and reducing the error variance. Effect sizes were calculated using partial eta-squared (ηp^2) for ANOVA analyses, with values of .01, .06, and .14 interpreted as small, medium, and large effects, respectively (Cohen, 1988). For ANCOVA and pairwise comparisons, Cohen's d was calculated, with values of 0.20, 0.50, and 0.80 interpreted as small, medium, and large effects, respectively, respectively.

To examine the relationship between changes in mental health and resilience, Pearson product-moment correlation coefficients were calculated between change scores (post-test minus pre-test) for the DASS-21 subscales and CD-RISC total scores within the intervention group. An alpha level of .05 was used to determine the statistical significance of all analyses. Given the multiple comparisons conducted across the primary outcome measures, a Holm-Bonferroni correction was applied to control the family wise error rate.

RESULTS AND DISCUSSION

Preliminary Analyses and Baseline Equivalence

Prior to conducting the primary analyses, the data were screened for completeness, outliers, and violations of statistical assumptions. Of the 218 participants enrolled at baseline, 210 (96.3%) completed the post-test assessment (intervention group: n = 107, 97.3%; control group: n = 103, 95.4%), and 203 (93.1%) completed the follow-up assessment (intervention group: n = 104, 94.5%; control group: n = 99, 91.7%). The attrition rates did not differ significantly between the intervention and control groups at either the post-test ($\chi^2 = 0.58$, $p = .446$) or follow-up ($\chi^2 = 0.67$, $p = .413$). Little's MCAR test indicated that the data were missing completely at random ($\chi^2 = 184.27$, $df = 171$, $p = .231$). Missing data were imputed using multiple imputation with 10 iterations, and sensitivity analyses comparing the results from the complete-case analysis and imputed datasets revealed no substantive differences in the pattern or significance of the findings. Subsequent analyses weare performed based on the imputed datasets.

Shapiro-Wilk tests indicated that scores on the DASS-21 subscales (Depression, Anxiety, Stress) and the CD-RISC were approximately normally distributed at each assessment wave (all $p > .05$). Levene's tests confirmed homogeneity of variance between groups for all outcome measures at pre-test, post-test, and follow-up (all $p > .05$). For repeated measures analyses, Mauchly's test indicated violations of sphericity for depression ($W = 0.82$, $p = .016$), anxiety ($W = 0.79$, $p = .008$), and stress ($W = 0.84$, $p = .027$); consequently, Greenhouse-Geisser corrections were applied to these analyses. The CD-RISC satisfied the assumption of sphericity ($W = 0.91$, $p = .089$).

Baseline equivalence between the intervention and control groups was assessed for both demographic characteristics (as reported in Table 1) and pre-test scores foro all outcome measures. Independent samples t-tests revealed no statistically significant differences between groups at pre-test for depression ($t(216) = 0.82$, $p = .413$), anxiety ($t(216) = 1.15$, $p = .252$), stress ($t(216) = 0.67$, $p = .504$), or resilience ($t(216) = -1.23$, $p = .220$). These findings indicate that the groups were comparable on all outcome measures prior to the intervention delivery, lending credibility to the quasi-experimental design.

Descriptive Statistics

The means and standard deviations for all outcome measures at pre-test, post-test, and follow-up are presented in Table 3. The table displays the scores separately for the intervention and control groups, along with the results of between-group comparisons

at each time point. Visual representations of the mean scores across time for each outcome measure are shown in Figures 14.

Table 3. Means and Standard Deviations for Mental Health and Resilience Outcomes by Group and Time.

Outcome Measure	Group	Pre-test M (SD)	Post-test M (SD)	Follow-up M (SD)
Depression	Intervention (n=110)	14.82 (5.64)	9.47 (4.21)	10.12 (4.58)
	Control (n=108)	14.21 (5.38)	13.89 (5.12)	14.03 (5.24)
	t-test (p-value)	*t=0.82 (.413)*	*t=-6.98 (<.001)*	*t=-5.79 (<.001)*
Anxiety	Intervention (n=110)	13.95 (5.23)	8.86 (4.02)	9.44 (4.31)
	Control (n=108)	13.18 (4.89)	12.76 (4.78)	12.94 (4.92)
	t-test (p-value)	*t=1.15 (.252)*	*t=-6.53 (<.001)*	*t=-5.48 (<.001)*
Stress	Intervention (n=110)	16.78 (5.92)	11.24 (4.68)	11.93 (4.85)
	Control (n=108)	16.28 (5.47)	15.94 (5.33)	16.12 (5.48)
	t-test (p-value)	*t=0.67 (.504)*	*t=-6.93 (<.001)*	*t=-5.91 (<.001)*

Outcome Measure	Group	Pre-test M (SD)	Post-test M (SD)	Follow-up M (SD)
Resilience	Intervention (n=110)	54.21 (10.87)	68.74 (9.53)	65.92 (10.14)
	Control (n=108)	56.03 (11.12)	57.18 (10.89)	56.89 (11.02)
	t-test (p-value)	*t=-1.23 (.220)*	*t=8.32 (<.001)*	*t=6.28 (<.001)*

Note. M = Mean; SD = Standard Deviation. t-tests were used for independent samples comparisons between the intervention and control groups at each time point. P-values in bold indicate statistical significance at $\alpha = .05$.

Intervention Effects on Mental Health Outcomes

Depression.

A 2 (Group) × 3 (Time) mixed-model repeated measures ANOVA was conducted to examine the effects of the intervention on depression scores. The analysis revealed a statistically significant main effect of Time, $F(1.78, 384.21) = 34.67$, $p < .001$, $\eta p^2 = .14$, a significant main effect of Group, $F(1, 216) = 18.92$, $p < .001$, $\eta p^2 = .08$, and, critically, a significant Group × Time interaction, $F(1.78, 384.21) = 41.23$, $p < .001$, $\eta p^2 = .16$. The significant interaction indicates that the pattern of change in depression scores over time differed between the intervention and control groups. Simple main effects analyses with Bonferroni correction revealed that the intervention group exhibited a significant decrease in depression scores from pre-test to post-test (mean difference = -5.35, 95% CI [-6.18, -4.52], $p < .001$, $d = 1.07$) and from pre-test to follow-up (mean difference = -4.70, 95% CI [-5.54, -3.86], $p < .001$, $d = 0.91$), with a small but significant increase from post-test to follow-up (mean difference = 0.65, 95% CI [0.18, 1.12], $p = .003$, $d = 0.15$). In contrast, the control group showed no significant changes in depression scores across any time points (all $p > .05$). Between-group comparisons at post-test indicated significantly lower depression scores in the intervention group compared to the control group (mean difference = -4.42, 95% CI [-5.67, -3.17], $p < .001$, $d = 0.94$), a difference that was largely maintained at follow-up (mean difference = -3.91, 95% CI [-5.22, -2.60], $p < .001$, $d = 0.79$).

Analysis of covariance (ANCOVA) controlling for pre-test depression scores further substantiated the intervention effect at post-test, $F(1, 215) = 78.45$, $p < .001$, $\eta p^2 = .27$, and follow-up, $F(1, 215) = 54.32$, $p < .001$, $\eta p^2 = .20$. The adjusted post-test means (controlling for baseline) were 9.34 (SE = 0.42) for the intervention group and 14.02 (SE = 0.43) for the control group, respectively. The adjusted follow-up means were 9.98 (SE = 0.45) for the intervention group and 14.16 (SE = 0.46) for the control group.

Anxiety.

The 2 × 3 repeated measures ANOVA for anxiety scores revealed a significant main effect of Time, $F(1.76, 380.15) = 28.91$, $p < .001$, $\eta p^2 = .12$, a significant main effect of Group, $F(1, 216) = 16.45$, $p < .001$, $\eta p^2 = .07$, and a significant group × time interaction, $F(1.76, 380.15) = 35.87$, $p < .001$, $\eta p^2 = .14$. Simple main effects analyses indicated that the intervention group demonstrated a significant decrease in anxiety scores from pre-test to post-test (mean difference = -5.09, 95% CI [-5.92, -4.26], $p < .001$, $d = 1.09$) and from pre-test to follow-up (mean difference = -4.51, 95% CI [-5.36, -3.66], $p < .001$, $d = 0.94$), with a small but significant increase from post-test to follow-up (mean difference = 0.58, 95% CI [0.11, 1.05], $p = .011$, $d = 0.14$). The control group showed no significant changes in anxiety scores over time (all $p > .05$). Between-group comparisons at post-test indicated significantly lower anxiety scores in the intervention group (mean difference = -3.90, 95% CI [-5.11, -2.69], $p < .001$, $d = 0.88$), with this difference partially sustained at follow-up (mean difference = -3.50, 95% CI [-4.79, -2.21], $p < .001$, $d = 0.76$).

ANCOVA controlling for pre-test anxiety scores confirmed the intervention effect at post-test, $F(1, 215) = 67.82$, $p < .001$, $\eta p^2 = .24$, and follow-up, $F(1, 215) = 46.91$, $p < .001$, $\eta p^2 = .18$. The adjusted post-test means were 8.72 (SE = 0.39) for the intervention group and 12.89 (SE = 0.40) for the control group. The adjusted follow-up means were 9.29 (SE = 0.42) for the intervention group and 13.07 (SE = 0.43) for the control group.

4.3.3 Stress.

The 2 × 3 repeated measures ANOVA for stress scores yielded a significant main effect of Time, $F(1.79, 386.42) = 31.56$, $p < .001$, $\eta p^2 = .13$, a significant main effect of Group, $F(1, 216) = 19.78$, $p < .001$, $\eta p^2 = .08$, and a significant group × time interaction, $F(1.79, 386.42) = 38.92$, $p < .001$, $\eta p^2 = .15$. Simple main effects analyses showed that the intervention group experienced a significant decrease in stress scores from pre-test to post-test (mean difference = -5.54, 95% CI [-6.41, -4.67], $p < .001$, $d = 1.04$) and from pre-test to follow-up (mean difference = -4.85, 95% CI [-5.73, -3.97], $p < .001$, $d = 0.89$), with a small but significant increase from post-test to follow-up (mean difference = 0.69, 95% CI [0.19, 1.19], $p = .003$, $d = 0.14$). The control group showed no significant changes in stress scores over time (all $p > .05$). Between-group comparisons at post-test indicated significantly lower stress scores in the intervention group (mean difference = -4.70, 95% CI [-6.00, -3.40], $p < .001$, $d = 0.94$), with this difference largely maintained at follow-up (mean difference = -4.19, 95% CI [-5.54, -2.84], $p < .001$, $d = 0.81$).

ANCOVA controlling for pre-test stress scores confirmed the intervention effect at post-test, $F(1, 215) = 72.34$, $p < .001$, $\eta p^2 = .25$, and follow-up, $F(1, 215) = 51.67$, $p < .001$, $\eta p^2 = .19$. The adjusted post-test means were 11.09 (SE = 0.45) for the intervention group and 16.08 (SE = 0.46) for the control group The adjusted follow-up means were 11.77 (SE = 0.48) for the intervention group and 16.27 (SE = 0.49) for the control group.

Table 4. Summary of Repeated Measures ANOVA Results for Mental Health Outcomes

Outcome	Effect	F	df	p	ηp^2
Depression	Time	34.67	1.78, 384.21	< .001	.14
	Group	18.92	1, 216	< .001	.08
	Time × Group	41.23	1.78, 384.21	< .001	.16
Anxiety	Time	28.91	1.76, 380.15	< .001	.12
	Group	16.45	1, 216	< .001	.07
	Time × Group	35.87	1.76, 380.15	< .001	.14
Stress	Time	31.56	1.79, 386.42	< .001	.13
	Group	19.78	1, 216	< .001	.08
	Time × Group	38.92	1.79, 386.42	< .001	.15

Note. df = degrees of freedom (Greenhouse-Geisser corrected where sphericity was violated). ηp^2 = partial eta-squared.

4.4 Intervention Effects on Resilience

A 2 (Group) × 3 (Time) repeated measures ANOVA was conducted to evaluate the effects of the intervention on resilience scores. The analysis revealed a significant main effect of Time, $F(2, 432) = 42.18$, $p < .001$, $\eta p^2 = .16$, a significant main effect of Group, $F(1, 216) = 21.34$, $p < .001$, $\eta p^2 = .09$, and a significant Group × Time interaction, $F(2, 432) = 47.65$, $p < .001$, $\eta p^2 = .18$. Simple main effects analyses with Bonferroni correction revealed that the intervention group exhibited a significant increase in resilience scores from pre-test to post-test (mean difference = 14.53, 95% CI [12.81, 16.25], $p < .001$, $d = 1.42$) and from pre-test to follow-up (mean difference = 11.71, 95% CI [9.94, 13.48], $p < .001$, $d = 1.11$), with a small but significant decrease from post-test to follow-up (mean difference = -2.82, 95% CI [-3.79, -1.85], $p < .001$, $d = 0.29$). The control group showed no significant changes in resilience scores across time (all $p > .05$). Between-group comparisons at post-test indicated significantly higher resilience scores in the

intervention group (mean difference = 11.56, 95% CI [9.82, 13.30], $p < .001$, $d = 1.13$), with this difference partially sustained at follow-up (mean difference = 9.03, 95% CI [7.17, 10.89], $p < .001$, $d = 0.85$).

ANCOVA controlling for pre-test resilience scores confirmed the intervention effect at post-test, $F(1, 215) = 84.27$, $p < .001$, $\eta p^2 = .28$, and follow-up, $F(1, 215) = 58.93$, $p < .001$, $\eta p^2 = .22$. The adjusted post-test means were 68.96 (SE = 0.84) for the intervention group and 56.96 (SE = 0.85) for the control group. The adjusted follow-up means were 66.15 (SE = 0.89) for the intervention group and 56.67 (SE = 0.91) for the control group.

Table 5. Summary of Repeated Measures ANOVA Results for Resilience Outcome

Outcome	Effect	F	df	p	ηp^2
Resilience	Time	42.18	2, 432	< .001	.16
	Group	21.34	1, 216	< .001	.09
	Time × Group	47.65	2, 432	< .001	.18

Note. df = degrees of freedom. ηp^2 = partial eta-squared.

4.5 Relationship Between Changes in Mental Health and Resilience

To examine the hypothesis that improvements in mental health were associated with increases in resilience, Pearson product-moment correlation coefficients were calculated between change scores (post-test minus pre-test) for the three DASS-21 subscales and the CD-RISC total score within the intervention group. The results are shown in Table 6. Consistent with Hypothesis 3, significant negative correlations were observed between changes in resilience and changes in depression ($r = -.52$, $p < .001$), anxiety ($r = -.48$, $p < .001$), and stress ($r = -.45$, $p < .001$). These negative correlations indicate that greater increases in resilience are associated with greater decreases in depression, anxiety, and stress symptoms. Scatter plots depicting these relationships are presented in Figure 5.

Table 6. Correlations Between Change Scores for Mental Health and Resilience in the Intervention Group (n = 110)

Variable	1	2	3	4
1. Δ Depression	—			
2. Δ Anxiety	.58**	—		
3. Δ Stress	.61**	.54**	—	
4. Δ Resilience	-.52**	-.48**	-.45**	—

Note. Δ = Change score (post-test minus pre-test). ** $p < .001$.

4.6 Additional Analyses: Subgroup and Moderation Effects

Exploratory analyses were conducted to examine whether the intervention effects varied as a function of demographic characteristics, including gender, grade level, parental education, and household income. Separate 2 (Group) × 2 (Demographic subgroup) × 3 (Time) repeated measures ANOVAs were conducted for each outcome measure, with the inclusion of each demographic variable as a between-subjects factor. No significant three-way interactions (Group × Demographic subgroup × Time) were observed for any outcome measure (all $p > .05$), indicating that the intervention was equally effective across gender, grade level, parental education, and household income subgroups. Additionally, within the intervention group, no significant differences in the magnitude of change scores were observed as a function of group attendance rates ($r = .12$, $p = .208$) or facilitator ratings of group cohesion ($r = .15$, $p = .118$), suggesting that the intervention effects were robust and not contingent upon perfect attendance or exceptionally high group cohesion.

5. Discussion

This study evaluated the effectiveness of a structured, eight-week peer group support intervention in improving mental health outcomes and resilience among Indonesian high school students in the post-pandemic period. The findings provide robust evidence supporting the efficacy of peer support as a culturally congruent and scalable intervention strategy for addressing the psychological sequelae of remote learning. Students who participated in the peer group support program exhibited significant reductions in depression, anxiety, and stress symptoms, and significant increases in resilience comparet to the control group which received standard school guidance services. These improvements were evident immediately following the intervention and were largely sustained at an eight-week follow-up, with effect sizes ranging from medium to large ($\eta p^2 = .14.28$). The results affirm the study's hypotheses and contribute to the growing international literature on the utility of peer-based approaches for promoting adolescent mental health in low- and middle-income country (LMIC) contexts (Fortier et al., 2026).

Interpretation of Intervention Effects on Mental Health Outcomes

The significant reductions in depression, anxiety, and stress observed among the intervention group participants weare both clinically and statistically meaningful. At baseline, both groups reported mean scores on the DASS-21 subscales that fell within the "moderate" symptom severity range, consistent with prior research documenting elevated psychological distress among Indonesian adolescents during and after the pandemic. Following the eight-week peer support intervention, the intervention group's mean scores decreased to the "mild" range for depression and anxiety and to the "normal" range for stress, whereas the control group's scores remained within the moderate range across all three areas. The magnitude of these reductions—with Cohen's d effect sizes ranging from 0.88 to 1.09—is comparable to, and in some cases exceeds, the effects observed for established evidence-based interventions such as cognitive-behavioral therapy (CBT) delivered in school settings. This is particularly noteworthy given that the peer support intervention was delivered by trained student facilitators

rather than licensed mental health professionals, suggesting that peer-led approaches may offer a highly cost-effective alternative or adjunct to traditional mental health services in resource-constrained educational setting.

Several mechanisms may account for the observed reductions in mental health symptoms. First, the structured group sessions provided participants with a consistent and supportive social environment in which they could openly discuss their emotional experiences, normalize their struggles, and receive validation and empathy from peers who shared similar challenges. This process of "shared experience" and "mutual identification" is a hallmark of peer support and is theorized to reduce feelings of isolation and self-stigma, which are potent risk factors for the development and maintenance of depression and anxiety. For Indonesian adolescents, who may face cultural barriers to seeking formal mental health care due to stigma or limited mental health literacy, peer support groups likely serve as a more accessible and acceptable avenue for emotional expression and support seeking. Second, the psychoeducational components of the intervention which covered topics such as emotion regulation, stress management, and adaptive coping strategies likely equipped participants with tangible skills and knowledge that enhanced their capacity to manage the daily stressors of academic and social life. The provision of psychoeducation within a peer context may have amplified its effectiveness, as adolescents are often more receptive to information delivered by peers than by authority figures (Verma & Pandey, 2025). Third, guided peer discussions and skill-building activities provided opportunities for social modeling and vicarious learning, wherein participants observed their peers engaging in adaptive coping behaviors and were thereby encouraged to adopt similar strategies.

The finding that the intervention effects were largely sustained at the eight-week follow-up, despite a small but statistically significant rebound in symptoms (mean differences ranging from 0.58 to 0.69 points on the DASS-21 subscales), is encouraging and suggests that the benefits of peer support extend beyond the immediate intervention period. The slight erosion of treatment gains over time is a common phenomenon in mental health intervention research and underscores the potential value of booster sessions or ongoing peer support mechanisms for maintaining improvements. Future iterations of the program might incorporate monthly "maintenance" sessions or establish peer support networks that continue to meet informally following the conclusion of the structured program. Nevertheless, the fact that follow-up scores remained significantly lower than baseline scores and significantly lower than control group scores indicates that the intervention conferred durable benefits (Cavanah et al., 2026).

Interpretation of Intervention Effects on Resilience

The intervention group's significant increase in resilience—with an effect size ($d = 1.42$) that qualifies as large by conventional standards—represents a particularly noteworthy finding. Prior research with Indonesian adolescents has documented that resilience levels during the pandemic were predominantly moderate, with only a small minority exhibiting high resilience, and that emotion regulation—a core component of resilience—was identified as an area in need of improvement. The present study demonstrates that a relatively brief, peer-delivered intervention can produce substantial gains in resilience, moving participants from a baseline mean score of 54.21

(corresponding to approximately the 35th percentile based on Indonesian adolescent norms) to a post-test mean score of 68.74 (approximately the 75th percentile). This shift is clinically meaningful, as higher resilience is consistently associated with alower risk of mental health difficulties and better academic and social outcomes.

The mechanisms through which peer group support enhances resilience are likely to be multifaceted. Consistent with the integrated theoretical framework guiding this study, the intervention may have strengthened resilience by: (1) fostering secure peer attachments that serve as a protective buffer against stress and a foundation for emotional regulation; (2) providing opportunities for social modeling and vicarious learning that enhanced participants' self-efficacy and adaptive coping repertoires; and (3) increasing perceived social support, which in turn altered cognitive appraisals of stress and reduced the perceived threat associated with academic and social challenges. The psychoeducational content related to growth mindset and resilience-building (Session 5) likely contributed directly to participants' understanding of resilience as a malleable capacity that can be cultivated through effort and social support, rather than a fixed trait. This reframing may have empowered the participants to approach challenges with greater optimism and persistence.

The significant negative correlations observed between changes in resilience and changes in mental health symptoms (r = -.45 to -.52) provide empirical support for the hypothesized synergistic relationship between peer support processes and resilience cultivation. Participants who experienced the greatest gains in resilience also exhibited the greatest reductions in depression, anxiety, and stress levels. This pattern of findings is consistent with a transactional model in which peer support enhances resilience, which in turn buffers against the pathogenic effects of stress, leading to improved mental health outcomes. Alternatively, it is plausible that improvements in mental health freed up cognitive and emotional resources that allowed participants to more fully engage in resilience-building activities, or that the relationship is bidirectional and mutually reinforcing. Longitudinal research with more frequent measurement intervals is required to disentangle the temporal dynamics of these relationships.

Comparison with Prior Research

The findings of the present study align with and extend a growing body of international research on the efficacy of peer support interventions for adolescents mental health. A scoping review of peer-led interventions in LMICs identified 19 studies, all of which reported improved mental health outcomes, and concluded that peer-led models represent a valuable strategy for addressing youth mental health in resource-constrained settings. The present study adds to this evidence base by providing rigorous quasi-experimental data from the Indonesian context, which has been underrepresented in peer support intervention literature. The effect sizes observed in the present study (ηp^2 = .14 to .28) are comparable to or larger than those reported in a systematic review of school-based peer support interventions for adolescent mental health, which found pooled effect sizes of g = 0.15 to 0.30 across various mental health outcomes (Kamalah et al., 2025). The relatively large effects observed in the present study may reflect the cultural congruence of the peer support approach in the collectivist Indonesian context, where group-based, relationshipa-oriented interventions may be particularly resonant and impactful (Hofstede, 2001).

The present findings also resonate with prior correlational research conducted in Indonesia which has documented associations between peer support and positive psychological outcomes. Peer social support accounted for 20% of the variance in academic resilience among Indonesian high school students engaged in online learning, a finding that is conceptually consistent with the present study's demonstration that a structured peer support intervention can produce significant gains in resilience. Similarly, social support from friends and family was strongly associated with school-related subjective well-being among Indonesian students during home-based learning, and this relationship was mediated by the satisfaction of basic psychological needs for autonomy, competence, and relatedness. The present study extends these correlational findings by providing experimental evidence that intentional, structured peer support can produce meaningful improvements in mental health and resilience.

Implications for Theory, Practice, and Policy

The findings of this study have several important implications. Theoretically, the results provide empirical support for an integrated framework that synthesizes attachment theory, social cognitive theory, and the stress-buffering hypothesis. The observed improvements in mental health and resilience are consistent with the proposition that peer support operates through multiple mutually reinforcing pathways, including the provision of secure relational bonds, facilitation of social learning and self-efficacy enhancement, and attenuation of stress appraisals. Future theoretical work might further elaborate on the specific mechanisms that are most operative in the Indonesian cultural context and explore how individual differences (e.g., attachment style, baseline resilience) moderate the effects of peer support interventions.

Practically, the findings provide a compelling rationale for integrating structured peer group support programs into the Indonesian school curriculum and guidance counseling framework. The peer support intervention evaluated in this study is scalable, cost-effective, and culturally appropriate, making it a promising strategy for expanding the reach of mental health promotion efforts in a country where mental health resources in schools are severely limited. The intervention can be implemented with relatively minimal training for peer facilitators and does not require the involvement of expensive mental health professionals, making it feasible for adoption in public schools across Indonesia's diverse geographic and socioeconomic landscape. The fact that the intervention was equally effective across gender, grade level, parental education, and household income subgroups suggests that it may be broadly applicable to the general adolescent population rather than being beneficial only for a specific subset of students. This universality enhances the potential public health impact of widespread implementation (Datu & Fung, 2024).

From a policy perspective, the findings support the inclusion of peer support programs as a core component of the Indonesian government's national mental health strategy for schools. The Ministry of Education and Culture (Kemendikbud) and the Ministry of Health (Kementerian Kesehatan) have both acknowledged the importance of addressing adolescent mental health in the post-pandemic period however, concrete, evidence-based interventions have been lacking. This study provides an empirical foundation for developing national guidelines for school-based peer support programs.

Such guidelines may include recommendations for facilitator selection and training, session content and structure, supervision and support for peer facilitators, and strategies for program evaluation and continuous quality improvement. Additionally, the findings underscore the importance of investing in teacher and counselor training to support the implementation and sustainability of peer support initiatives. Teachers and counselors are well-positioned to identify students who may benefit from peer support, provide ongoing supervision and support to peer facilitators, and ensure appropriate referrals for students who require more intensive mental health services.

Limitations and Directions for Future Research

Despite the strengths of the present study, several limitations warrant acknowledgment and provide directions for future studies. First, the quasi-experimental design, while robust, does not permit definitive causal inferences because of the lack of random assignment to conditions. Although the intervention and control groups were comparable in terms of demographic characteristics and baseline outcome measures, it is possible that unmeasured confounding variables (e.g., pre-existing differences in social skills, family support, or prior mental health history) influenced the observed effects. Future research employing cluster randomized controlled trial (RCT) designs, with schools randomly assigned to intervention or control conditions, would provide stronger evidence of causality and would enhance the internal validity of the findings.

Second, the study was conducted in a single public senior high school in Surabaya, a major urban center in East Java. While the school served a socioeconomically diverse student body, the findings may not be generalizable to other contexts, such as rural schools, private schools, or schools in other regions of Indonesia with different cultural and linguistic characteristics. For example, the collectivist orientation of Javanese culture may have amplified the benefits of a group-based peer support intervention in ways that my not be replicated in more individualistic cultural contexts within Indonesia (e.g., among certain ethnic groups in Sumatra or Sulawesi). Future multisite studies involving schools from diverse geographic regions and school types would be valuable for assessing the generalizability of the findings and identifying contextual factors that moderate intervention effectiveness.

Third, the outcome measures relied exclusively on self-report questionnaires, which are subject to biases such as social desirability, recall bias and shared method variance. While the DASS-21 and CD-RISC are well-validated instruments with established psychometric properties, future research could strengthen the evidence base by incorporating multi-method, multi-informant assessments, including teacher and parent ratings of adolescent mental health and behavioral observations of peer interactions. Additionally, the inclusion of objective indicators, such as school attendance records, academic performance data, and disciplinary referrals, would provide a more comprehensive picture of the intervention's real-world impact.

Fourth, the follow-up period of eight weeks, while longer than That of many studies in this literature, is still relatively brief and does not permit conclusions regarding the long-term durability of intervention effects. It is unknown whether the improvements observed at follow-up would be sustained over six months, one year, or more. Longitudinal studies with extended follow-up periods (e.g., 6, 12, and 24 months) are needed to determine whether the benefits of peer support interventions persist over

the longer term and whether booster sessions or ongoing peer support mechanisms are necessary to maintain these gains.

Fifth, thise study did not include a formal assessment of intervention fidelity beyond session observations and did not evaluate the specific mechanisms through which the intervention produced its effects. Although the theoretical framework posits that secure peer attachments, social modeling, and stress buffering are operative mechanisms, these were not directly measured in the present study. Future research could incorporate measures of proposed mediators (e.g., perceived peer support, self-efficacy, emotion regulation, and stress appraisals) to formally test the hypothesized pathways of change. Additionally, qualitative research, including interviews and focus groups with participants and facilitators, would provide rich, nuanced insights into the lived experiences of adolescents in peer support groups and help illuminate the active ingredients of the intervention.

Sixth, thise study did not assess the potential iatrogenic effects of peer support groups. While the overall pattern of findings was positive, it is possible that for some participants, the group context may have exacerbated their distress or facilitated negative social comparisons or "co-rumination." Future research should monitor potential adverse effects and explore individual difference variables that may predict differential responsiveness to peer support interventions.

Finally, thise study did not include an active comparison condition, such as an attention control group or an alternative intervention (e.g., teacher-led psychoeducation). The control group received standard school guidance services, which were minimal and non-systematic. Future research could compare peer support interventions with other evidence-based approaches (e.g., cognitive-behavioral skills groups, mindfulness-based interventions) to determine their relative efficacy and cost-effectiveness

CONCLUSION

The present study provides compelling evidence that a structured peer group support intervention can yield significant and clinically meaningful improvements in mental health and resilience among Indonesian high school students in the post-pandemic period in Indonesia. Participants in the eight-week intervention exhibited substantial reductions in symptoms of depression, anxiety, and stress, and significant gains in resilience relative to a control group receiving standard school guidance services. These improvements were largely sustained at the eight-week follow-up, and effect sizes ranged from medium to large. The findings underscore the critical role of peer relationships in adolescent psychological well-being and demonstrate that intentional, school-based peer support programs represent a promising, scalable, and culturally congruent strategy for addressing the mental health challenges faced bay Indonesian youth. As Indonesia continues to navigate the long-term psychological impacts of the COVID-19 pandemic and the associated educational disruptions, the integration of evidence-based peer support interventions into the fabric of Indonesian secondary education holds considerable promise for fostering a generation of resilient, mentally healthy young people. Future research should prioritize rigorous

experimental designs, multisite evaluations, extended follow-up assessments, and mechanistic investigations to further refine and optimize peer support interventions for the Indonesian context and beyond.

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Ethical Compliance

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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