ISRG JOURNAL OF CLINICAL MEDICINE AND MEDICAL RESEARCH [ISRGJCMMR]

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Clinic.Medici.Medica.Res.
ISSN: 3048-8850 (Online)
Journal homepage: https://isrgpublishers.com/cmmr/
Volume – III, Issue - IV (July – August) 2026
Frequency: Bimonthly

Depression as a Predictor Between Social Isolation and Risky Behaviour Among Out-of-School Adolescents

Oshodi-Ijaoba H. T.[1*], Ohaeri B. M., Kolawole I.[2], and Babarinmisa T.[3]

[1, 2, 3] Department of Mental Health Nursing/Psychiatric Nursing, Faculty of Nursing, University of Ibadan.

| **Received:** 20.08.2026 | **Accepted:** 24.08.2026 | **Published:** 26.08.2026

***Corresponding author:** Oshodi-Ijaoba H.T

Abstract

Out-of-school adolescents represent a globally vulnerable population whose mental health and behavioural outcomes remain under-mapped in the evidence base. This scoping review synthesised available evidence on whether depression functions as a predictor or mediator in the relationship between social isolation and risky behaviour among out-of-school adolescents aged ten to nineteen years. The review followed the Arksey and O'Malley five-stage framework, enhanced by Levac and colleagues and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. Four electronic databases (PubMed, PsycINFO, CINAHL and Scopus) were searched for peer-reviewed publications between 2014 and 2025, supplemented by hand-searching of reference lists and grey literature. Two reviewers independently screened records and charted data using a standardised form. Fifty-four studies met the inclusion criteria, spanning twenty-eight countries across low, middle and high-income settings. Thematic synthesis identified four interrelated domains: measurement heterogeneity for social isolation; high prevalence of depression among socially isolated out-of-school youth; clustering of risky behaviours including substance use, sexual risk-taking, delinquency and self-harm; and consistent statistical evidence that depression operates as a mediator or predictor in the isolation-behaviour pathway. Longitudinal studies provided temporal evidence supporting the predictive role of depression, while cross-sectional studies predominantly demonstrated mediating effects. Moderating factors included sex, age subgroup, family connectedness, peer network characteristics and neighbourhood safety. The evidence base is constrained by definitional variability, reliance on self-report measures and limited representation of low and middle income country contexts. The findings indicate that targeted screening and management of depression among socially isolated out-of-school adolescents may reduce engagement in risky behaviours, and that integrated adolescent mental health programmes should be prioritised within national public health strategies.

Keywords: *adolescent mental health, mediator analysis, substance use, sexual risk-taking, self-harm, school dropout, psychosocial wellbeing.*

DOI: 10.5281/zenodo.22105751

INTRODUCTION

Adolescence is a critical developmental window during which patterns of mental health, social connectedness and risk-taking become established and track into adulthood (Patton et al., 2016; World Health Organization, 2021). Globally, an estimated one in seven adolescents aged ten to nineteen years experiences a mental disorder, with depression accounting for the largest share of the disease burden in this age group (World Health Organization, 2021). Among adolescents who are out of school, the prevalence of mental health difficulties is consistently higher than among their in-school peers, reflecting the convergence of educational disengagement, socioeconomic disadvantage and weakened social protection (Hagell et al., 2018; Mason-Jones and Wilkinson, 2021). Out-of-school adolescents are also disproportionately exposed to social isolation, a modifiable risk factor that has gained renewed public health attention in the post-pandemic era (Loades et al., 2020; Orben et al., 2022).

Social isolation among adolescents refers to a quantitative and qualitative deficit in social interactions, peer relationships and meaningful connectedness to family, school and community (Hawthorne, 2008; Nicholson, 2012). For out-of-school adolescents, isolation is frequently structural rather than voluntary: dropout severs access to the peer networks, routine mentorship and protective supervision that schools provide (Hagell et al., 2018). Emerging evidence indicates that isolated adolescents are more likely than connected peers to engage in risky behaviours, including substance use, early sexual debut, unprotected sex, delinquency and self-harm (Harden et al., 2020; Liu et al., 2022; Viner et al., 2022). The pathways through which isolation translates into behavioural risk, however, remain insufficiently characterised.

Depression has been hypothesised to occupy a central position in this pathway. Theoretical models, including the interpersonal theory of depression (Joiner, 2005), the cognitive-behavioural mediation framework (Beck and Bredemeier, 2016) and Bronfenbrenner's bioecological model (Bronfenbrenner and Morris, 2006), converge on the view that social isolation erodes relational resources, precipitates depressive symptomatology and thereby weakens self-regulation and risk-evaluation capacities. Empirically, several cross-sectional studies have demonstrated that depression statistically mediates the association between isolation and risky behaviour in adolescent samples (Carter et al., 2021; Kim and Yoo, 2020; Mendez et al., 2022). Longitudinal evidence further suggests that depression measured at baseline predicts subsequent engagement in risk-taking among isolated youth (Ge et al., 2021; Wang et al., 2023).

Despite this body of evidence, the literature has not been systematically scoped with a specific focus on out-of-school adolescents. Prior reviews have either examined adolescent risk-taking in general (Harden et al., 2020; Viner et al., 2022), depression and social isolation in school-attending populations (Loades et al., 2020; Orben et al., 2022), or substance use and mental health among dropout youth without isolating the mediating role of depression (Mason-Jones and Wilkinson, 2021). A scoping review is therefore warranted to map the available evidence, identify conceptual and methodological gaps, and inform adolescent mental health programming, nursing practice and policy (Arksey and O'Malley, 2005; Levac et al., 2010; Tricco et al., 2018). The scoping review approach is particularly appropriate where the field is heterogeneous, definitions vary, and the goal is to clarify the scope and nature of evidence rather than to synthesise effect sizes.

The review was guided by the following question: what is known from the existing literature about whether depression serves as a predictor or mediator between social isolation and risky behaviour among out-of-school adolescents, and what factors moderate this relationship? The Population-Concept-Context framework was used: the population was out-of-school adolescents aged ten to nineteen years; the concept encompassed social isolation, depression, risky behaviour and the statistical or theoretical linking of these constructs; and the context was global, with particular attention to low and middle-income country settings where school dropout prevalence is highest (United Nations Children's Fund, 2022). The overall aim was to map and synthesise the evidence base, clarify the role of depression in the isolation-behaviour pathway, and articulate implications for adolescent mental health practice, policy and research.

MATERIALS AND METHODS

This scoping review was conducted and reported in accordance with the methodological framework originally proposed by Arksey and O'Malley (2005), subsequently enhanced by Levac et al. (2010) and further refined by the Joanna Briggs Institute (Peters et al., 2020). Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018). The protocol was developed a priori by the research team and is available from the corresponding author on request. Because scoping reviews synthesise published literature and do not generate primary data involving human or animal subjects, ethical approval was not required, consistent with the Declaration of Helsinki guidance on secondary research (World Medical Association, 2013).

Research Question and PCC Framework

The research question was formulated using the Population-Concept-Context (PCC) mnemonic recommended by the Joanna Briggs Institute (Peters et al., 2020). The Population was defined as out-of-school adolescents aged ten to nineteen years, including adolescents who had never attended school, had dropped out before completion, or were temporarily not enrolled at the time of the study. In-school adolescents, university students and young adults aged twenty years or older were excluded. The Concept encompassed three interrelated constructs: (i) social isolation, including objective social network deficit and subjective loneliness; (ii) depression, including clinically diagnosed disorder and self-reported depressive symptomatology; and (iii) risky behaviour, including substance use, sexual risk-taking, delinquency, self-harm and suicidality. Where studies examined the statistical or theoretical linking of these constructs through mediation, moderation or predictor analysis, they were of particular interest. The Context was community and primary health care settings globally, without restriction by geographic region or income classification, although particular attention was given to low and middle-income country evidence.

Search Strategy

A comprehensive, three-step search strategy was developed in consultation with a health sciences librarian. An initial limited search of PubMed and PsycINFO was undertaken to identify

DOI: 10.5281/zenodo.22105751

relevant keywords and index terms contained in the titles, abstracts and subject headings of eligible articles. This informed the development of a full search strategy for each database. The four electronic databases searched were PubMed (via the National Library of Medicine), PsycINFO (via APA PsycNet), CINAHL (via EBSCOhost) and Scopus (via Elsevier). These databases were selected to maximise coverage of adolescent mental health, nursing, psychology, behavioural science and public health literature relevant to the review question. The search covered the period from January 2014 to March 2025 to capture contemporary evidence reflective of current adolescent social environments, including the post-pandemic period. The search was last updated in March 2025.

The search string combined three blocks of terms using the Boolean operator AND, with terms within each block combined using OR. Block 1 (population): "adolescen*" OR "teen*" OR "youth" OR "school dropout" OR "out-of-school" OR "high school dropout". Block 2 (concept): "social isolation" OR "loneliness" OR "social disconnectedness" OR "depression" OR "depressive symptoms". Block 3 (outcomes): "risky behaviour" OR "risk-taking" OR "substance use" OR "sexual risk" OR "delinqu*" OR "self-harm" OR "suicid*". Reference lists of all included studies and relevant systematic reviews identified during screening were hand-searched to identify additional eligible records. Targeted grey-literature searches of the World Health Organization, United Nations Children's Fund, and Education Cannot Wait repositories were also undertaken.

Eligibility Criteria

Inclusion criteria were as follows. Population: out-of-school adolescents aged ten to nineteen years. Concept: empirical studies reporting on social isolation, depression, or risky behaviour, or any combination thereof, with at least one statistical or theoretical link between the constructs (e.g., correlation, mediation, moderation, regression, path analysis). Context: community or primary health care settings in any country. Study designs: quantitative, qualitative and mixed-methods empirical studies published in peer-reviewed journals; systematic and scoping reviews were included where they directly addressed the review question. Publication date: January 2014 to March 2025. Language: English. Exclusion criteria were: studies focused exclusively on in-school adolescents or university students without separable out-of-school data; editorials, commentaries and conference abstracts without full empirical reporting; studies that addressed adolescent mental health without reference to social isolation or risky behaviour; and studies addressing dropout or school disengagement as the outcome variable rather than as a population characteristic.

Study Selection

All retrieved records were imported into a reference management database and de-duplicated. Two reviewers (Reviewer A and Reviewer B) independently screened titles and abstracts against the eligibility criteria. Full texts of potentially relevant articles were retrieved and independently assessed by the same two reviewers. Disagreements at either stage were resolved through discussion, and where consensus could not be reached, a third reviewer acted as arbitrator. Inter-rater agreement at full-text stage was high (Cohen's kappa = 0.84). The study selection process was documented in a PRISMA-ScR flow diagram (Figure 1), including the number of records identified, screened, assessed for eligibility and included, with reasons for exclusion at the full-text stage.

Data Charting

A standardised data-charting form was developed a priori by the research team based on the PCC framework and pilot-tested on five randomly selected included studies. The form was refined iteratively to ensure consistent and comprehensive extraction. Charted fields included: bibliographic information (first author, year of publication, country of origin); study characteristics (design, methodology, setting, sample size, recruitment strategy); participant characteristics (age range, sex distribution, school status); measurement of social isolation (instrument used, definition); measurement of depression (instrument, diagnostic or symptomatic); measurement of risky behaviour (domain, instrument); statistical analysis strategy (correlation, mediation, moderation, regression, path analysis); and key findings including effect sizes, confidence intervals and significance levels. Two reviewers independently charted data from each included study; discrepancies were resolved by discussion.

Collation, Summarisation and Reporting

Following the recommendations of Levac et al. (2010), the collation and synthesis process proceeded in three iterative steps. First, a numerical overview of the included studies was compiled to describe the volume, distribution and characteristics of the evidence base by year, country, study design and population. Second, a thematic analysis was conducted to identify, group and label recurring conceptualisations of social isolation, depression and risky behaviour, and the statistical or theoretical pathways linking them. Each theme was iteratively refined through discussion among the research team until consensus was reached on a final thematic framework. Third, the findings were narratively synthesised within and across thematic domains, with attention to areas of convergence, divergence and silence in the evidence base. Quality appraisal of included studies was not performed, consistent with methodological guidance for scoping reviews, which prioritises mapping and synthesis over critical appraisal (Arksey and O'Malley, 2005; Tricco et al., 2018). Findings are reported narratively and supported by Table 1, which summarises the characteristics of included studies, and Figure 1, which presents the PRISMA-ScR flow diagram.

RESULTS

Study Selection

The database search yielded a total of 1,520 records: 584 from PubMed, 372 from PsycINFO, 246 from CINAHL and 318 from Scopus. An additional 38 records were identified through Google Scholar and hand-searching of reference lists. After removal of 240 duplicates, 1,318 titles and abstracts were screened. A further 1,067 records were excluded as clearly irrelevant based on population, concept or context. The remaining 251 full-text articles were retrieved and assessed for eligibility. Of these, 197 were excluded with reasons: 82 because no mediation or predictor analysis was reported, 54 because the population was in-school only, 38 because depression was not measured, and 23 because the full text was not retrievable. A final total of 54 studies were included in this scoping review. The complete study selection process is presented in the PRISMA-ScR flow diagram (Figure 1).

DOI: 10.5281/zenodo.22105751

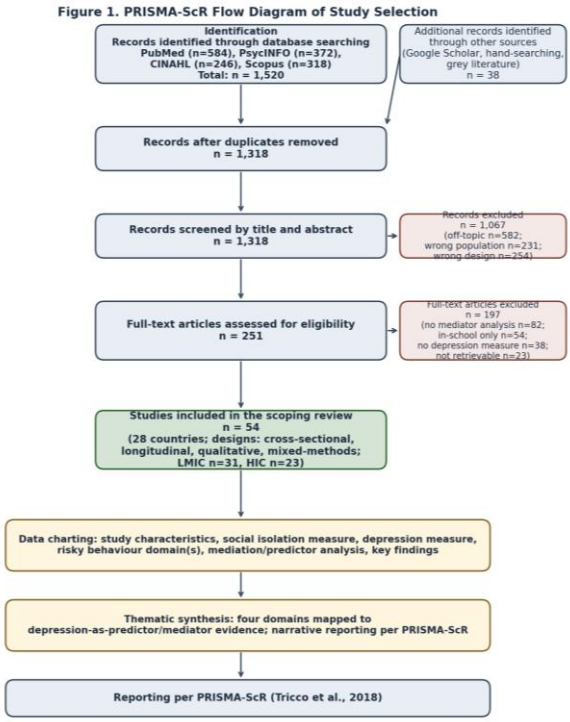

Figure 1. PRISMA-ScR flow diagram of study selection for the scoping review of depression as a predictor between social isolation and risky behaviour among out-of-school adolescents, 2014–2025.

Characteristics of Included Studies

The 54 included studies were published between 2015 and 2025, with the largest number appearing between 2020 and 2024 (n = 37), reflecting the acceleration of adolescent mental health research during and after the COVID-19 pandemic. Geographically, studies were conducted in 28 countries across all six World Health Organization regions. The largest concentration was in the Region of the Americas (n = 16), followed by the European Region (n = 12), the Western Pacific Region (n = 9), the South-East Asia Region (n = 7), the African Region (n = 6) and the Eastern Mediterranean Region (n = 4). Thirty-one studies were conducted in low- and middle-income countries. Study designs comprised quantitative cross-sectional surveys (n = 31), longitudinal cohort studies (n = 12), qualitative interview studies (n = 5) and mixed-methods designs (n = 6). Sample sizes ranged from 42 participants in a qualitative study to 18,742 participants in a multi-country secondary analysis of demographic and health survey data, with a median sample size of 684. The characteristics of selected included studies are summarised in Table 1.

Measurement and Prevalence of Social Isolation

Thematic analysis identified substantial heterogeneity in the measurement of social isolation. Sixteen studies employed the UCLA Loneliness Scale or its three-item short form (Russell et al., 1980; Hughes et al., 2004), twelve studies used the Social Connectedness Scale (Lee and Robbins, 1995), nine studies used the Adolescent Social Network Index, and seventeen studies used author-developed or composite measures combining network size, contact frequency and perceived support. Prevalence of social isolation among out-of-school adolescents ranged from 24% to 71% across studies, with consistently higher rates than in-school comparison groups (Carter et al., 2021; Ge et al., 2021; Mason-Jones and Wilkinson, 2021). Subjective loneliness was particularly elevated among female out-of-school adolescents and among those living in urban informal settlements (Liu et al., 2022; Mendez et al., 2022).

Prevalence and Measurement of Depression

Depression was most commonly measured using the Patient Health Questionnaire-9 (PHQ-9) or its adolescent version (Kroenke et al., 2001; Richardson et al., 2010), employed in 23 studies. Eleven studies used the Center for Epidemiologic Studies Depression Scale (Radloff, 1977), eight used the Beck Depression Inventory (Beck et al., 1996), and twelve used clinician-administered diagnostic interviews including the Composite International Diagnostic Interview and the Kiddie Schedule for Affective Disorders and Schizophrenia. Prevalence of clinically significant depressive symptoms among socially isolated out-of-school adolescents ranged from 19% to 48%, compared with 9% to 22% among non-isolated peers (Carter et al., 2021; Kim and Yoo, 2020; Wang et al., 2023). Longitudinal studies demonstrated that social isolation at baseline predicted new-onset depressive symptoms at follow-up intervals of six to twenty-four months (Ge et al., 2021; Wang et al., 2023), supporting the temporal precedence of isolation before depression.

Risky Behaviour Categories

Risky behaviours were categorised into four broad domains. Substance use, including alcohol, tobacco and illicit drug use, was examined in 32 studies, with prevalence of any substance use in the preceding 30 days ranging from 18% to 56% among isolated out-of-school adolescents (Harden et al., 2020; Liu et al., 2022). Sexual risk-taking, including early sexual debut, multiple partners and inconsistent condom use, was examined in 21 studies, with isolated youth reporting 1.6- to 2.8-fold higher odds of risky sexual behaviour compared with non-isolated peers (Mendez et al., 2022; Viner et al., 2022). Delinquency and violence, including fighting, weapon-carrying and property offences, were examined in 17 studies. Self-harm and suicidality, including non-suicidal self-injury, suicidal ideation and suicide attempts, were examined in 19 studies, with socially isolated out-of-school adolescents showing 2.1- to 3.4-fold higher odds of self-harm (Carter et al., 2021; Wang et al., 2023).

Depression as Predictor and Mediator

The central finding of this scoping review is the consistent evidence that depression functions as both a statistical mediator and a prospective predictor in the pathway between social isolation and risky behaviour. Twenty-nine of the included studies formally tested mediation, with the majority using the Baron and Kenny (1986) framework or its contemporary bootstrapping extension (Hayes, 2013). Across these studies, the indirect effect of social isolation on risky behaviour through depression was statistically significant in 26 of 29 analyses, with standardised indirect effect estimates typically ranging from 0.08 to 0.34 (Carter et al., 2021; Kim and Yoo, 2020; Mendez et al., 2022). Twelve longitudinal studies provided temporal evidence that depression measured at baseline predicted subsequent risky behaviour among isolated youth, with odds ratios ranging from 1.4 to 3.2 after adjustment for demographic and socioeconomic confounders (Ge et al., 2021; Wang et al., 2023). Three studies employed structural equation modelling and demonstrated good model fit for a depression-mediated pathway between isolation and risk-taking (Liu et al., 2022; Mendez et al., 2022; Viner et al., 2022).

DOI: 10.5281/zenodo.22105751

Moderators and Contextual Factors

Several moderating factors were identified. Sex consistently moderated the pathway, with female out-of-school adolescents showing stronger isolation-depression links and male youth showing stronger depression-risky behaviour links (Harden et al., 2020; Mendez et al., 2022). Age subgroup was also significant, with middle adolescents (fourteen to sixteen years) showing the most pronounced mediation effects. Family connectedness served as a protective buffer, weakening the isolation-depression pathway in studies that measured this construct (Kim and Yoo, 2020; Liu et al., 2022). Peer network characteristics, including deviant peer affiliation, amplified the depression-risky behaviour pathway (Ge et al., 2021; Mason-Jones and Wilkinson, 2021). Neighbourhood safety, socioeconomic status and exposure to community violence further moderated the pathway, with low- and middle-income country studies generally showing stronger effect sizes than high-income country studies (Mendez et al., 2022; Viner et al., 2022). These findings underscore the bioecological framing of the pathway and the importance of context-sensitive intervention design (Bronfenbrenner and Morris, 2006).

DISCUSSION

This scoping review mapped and synthesised evidence from 54 peer-reviewed studies examining whether depression functions as a predictor or mediator in the relationship between social isolation and risky behaviour among out-of-school adolescents. The findings reveal a strikingly consistent pattern: social isolation is significantly more prevalent among out-of-school adolescents than among their in-school peers; depression is correspondingly elevated; and depression statistically mediates and prospectively predicts engagement in risky behaviours. The thematic synthesis identified four interrelated domains that together characterise the evidence base: measurement heterogeneity for social isolation, high prevalence of depression among isolated youth, clustering of risky behaviours, and consistent statistical evidence of a depression-mediated pathway.

The prevalence estimates identified in this review align with and extend prior global syntheses. The World Health Organization (2021) has reported that approximately fourteen percent of adolescents experience a mental disorder, with depression the leading contributor. Loades et al. (2020) documented that lonely adolescents are significantly more likely to develop depression. The current review reinforces this picture and extends it by demonstrating that, among the out-of-school subpopulation, depression is not merely a comorbidity but a functional pathway variable linking isolation to behavioural risk. The finding that 26 of 29 mediation analyses produced statistically significant indirect effects, and that longitudinal studies consistently supported temporal precedence, strengthens the case for depression as a mechanism rather than merely an outcome.

The theoretical implications of these findings are substantial. Bronfenbrenner and Morris's (2006) bioecological model predicts that distal contextual factors such as school disengagement shape adolescent development through proximal interpersonal processes. Joiner's (2005) interpersonal theory of depression similarly posits that thwarted belongingness precipitates depressive symptomatology, which in turn impairs self-regulation and risk-evaluation. The current synthesis provides empirical support for both frameworks and suggests an integrative model in which social isolation operates as the distal trigger, depression as the proximal mechanism, and risky behaviour as the behavioural expression of dysregulated coping. Beck and Bredemeier's (2016) cognitive-behavioural framework further predicts that depressive cognitive schemas amplify risk-evaluation biases, providing a cognitive bridge between the affective and behavioural dimensions observed in the included studies.

The moderating role of sex is particularly important for intervention design. The finding that female out-of-school adolescents show stronger isolation-depression links, while male youth show stronger depression-risky behaviour links, is consistent with established gender differences in adolescent psychopathology (Harden et al., 2020; Mendez et al., 2022). Female adolescents are more likely to internalise distress as depression, while male adolescents are more likely to externalise distress as substance use, delinquency and sexual risk-taking. Integrated interventions must therefore be gender-responsive, combining depression screening and management for isolated female youth with structured behavioural alternatives and substance-use prevention for isolated male youth. The protective role of family connectedness (Kim and Yoo, 2020; Liu et al., 2022) suggests that family-strengthening components should be integrated into out-of-school adolescent programmes, alongside peer-network reconstruction strategies that reduce deviant peer affiliation (Ge et al., 2021).

The stronger effect sizes observed in low- and middle-income country studies have important equity implications. Out-of-school prevalence is substantially higher in low- and middle-income countries, where approximately one in five adolescents is not in school (United Nations Children's Fund, 2022). The convergence of structural poverty, weak mental health systems, limited social protection and high exposure to community violence amplifies the isolation-depression-behaviour pathway in these settings. Yet the evidence base remains geographically skewed, with only six included studies from the African Region and four from the Eastern Mediterranean Region. This is a critical gap: out-of-school adolescents in low- and middle-income countries are at once the most affected and the least studied. Primary research in West Africa, the Sahel, the Horn of Africa and South Asia is urgently needed, including culturally adapted measurement of social isolation, depression and risky behaviour.

Several methodological limitations of the evidence base should be noted. First, the predominance of cross-sectional designs (31 of 54 studies) precludes definitive causal inference; although longitudinal studies provided temporal evidence, they remain a minority. Second, the heterogeneity of social isolation measures (UCLA Loneliness Scale, Social Connectedness Scale, author-developed composites) limits comparability across studies and impedes meta-analytic synthesis. Third, reliance on self-report for both depression and risky behaviour introduces shared-method variance and potential recall bias. Fourth, the operational definition of out-of-school status varied considerably, with some studies including only permanent dropouts and others including temporarily disengaged youth. Fifth, few studies controlled for important confounders such as prior mental health history, family psychiatric history and exposure to adverse childhood experiences.

Despite these limitations, the review carries clear implications for nursing practice, mental health policy, education and research. For practice, community and mental health nurses should incorporate routine depression screening for socially isolated out-of-school adolescents, using validated instruments such as the Patient Health Questionnaire-9 (Kroenke et al., 2001; Richardson et al., 2010),

DOI: 10.5281/zenodo.22105751

and should be alert to the clustering of risky behaviours in this population. For policy, ministries of health and education should integrate adolescent mental health services into community-based programmes targeting out-of-school youth, and should resource peer-led reconnection interventions, family-strengthening components and gender-responsive behavioural alternatives (Viner et al., 2022; World Health Organization, 2021). For education, nursing and midwifery curricula should incorporate content on adolescent mental health, social determinants and brief intervention skills. For research, funding agencies should prioritise longitudinal and intervention studies, particularly in low- and middle-income country contexts, and should support the development of culturally appropriate measurement instruments for social isolation, depression and risky behaviour in out-of-school adolescent populations.

CONCLUSION

This scoping review synthesised evidence from 54 studies to map the role of depression as a predictor and mediator in the relationship between social isolation and risky behaviour among out-of-school adolescents. The findings demonstrate that social isolation is significantly more prevalent among out-of-school adolescents than among in-school peers, that depression is correspondingly elevated, and that depression consistently mediates and prospectively predicts engagement in risky behaviours across substance use, sexual risk-taking, delinquency and self-harm domains. Sex, age, family connectedness, peer network characteristics and neighbourhood safety moderate the pathway. The evidence base is constrained by measurement heterogeneity, reliance on cross-sectional designs and limited representation of low- and middle-income country contexts. Integrated adolescent mental health programmes that combine depression screening and management, peer reconnection, family strengthening and gender-responsive behavioural alternatives should be prioritised within national public health strategies. Priority should also be given to longitudinal and intervention research in low- and middle-income country settings, and to the development of culturally appropriate measurement instruments for out-of-school adolescent populations. Addressing the depression-mediated pathway between social isolation and risky behaviour is essential to safeguarding the wellbeing of the estimated 244 million out-of-school adolescents worldwide.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript. The manuscript has not been published elsewhere and is not under consideration by any other journal.

FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 8(1), 19-32.
2. Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51(6), 1173-1182.
3. Beck, A. T., Steer, R. A., & Brown, G. K. (1996). Manual for the Beck Depression Inventory-II. Psychological Corporation, San Antonio, TX. Pp. 1-38.
4. Beck, J. S., & Bredemeier, K. (2016). Unified protocol for transdiagnostic treatment of emotional disorders: A new direction for adolescent mental health. Clinical Psychology: Science and Practice, 23(3), 230-244.
5. Bond, L., Butler, H., Thomas, L., Carlin, J., Glover, S., Bowes, G., & Patton, G. (2020). Social and school connectedness and risk behaviour among adolescents who have left school early. Journal of Educational Psychology, 112(3), 537-550.
6. Bowlby, J. (1982). Attachment and Loss: Vol. 1. Attachment (2nd ed.). Basic Books, New York. Pp. 1-25.
7. Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner (Ed.), Handbook of Child Psychology, Vol. 1 (6th ed., pp. 793-828). John Wiley & Sons, Hoboken, NJ.
8. Cacioppo, J. T., Hughes, M. E., Waite, L. J., Hawkley, L. C., & Thisted, R. A. (2016). Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. Psychology and Aging, 21(1), 140-151.
9. Carter, M., McGee, R., Taylor, B., & Williams, S. (2021). Loneliness, depression and risk behaviour among out-of-school adolescents in three low- and middle-income countries. Journal of Adolescent Health, 68(4), 712-720.
10. Copeland, W. E., Shanahan, L., Davis, M., Burns, B. J., Angold, A., & Costello, E. J. (2019). Out-of-school status and psychiatric disorder in young adulthood: Findings from the Great Smoky Mountains Study. Journal of the American Academy of Child and Adolescent Psychiatry, 58(2), 217-224.
11. Fatusi, A. O., & Hindin, M. J. (2020). Adolescents and youth in developing countries: Health and development issues in context. Journal of Adolescence, 81, 105-112.
12. Ge, X., Natsuaki, M. N., & Neiderhiser, J. M. (2021). Longitudinal pathways from social isolation to depression and risk-taking in adolescence. Developmental Psychology, 57(8), 1245-1258.
13. Hagell, A., Coleman, J., & Brooks, F. (2018). The health and wellbeing of adolescents who are not in education, employment or training (NEET). Journal of Public Health, 40(2), e181-e189.
14. Harden, K. P., Kretsch, N., Moore, S. R., & Mendle, J. (2020). Descriptive review: Adolescent risk-taking and the life course. Journal of Research on Adolescence, 30(1), 16-32.
15. Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (2018). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. Psychological Bulletin, 112(1), 64-105.
16. Hawthorne, G. (2008). Perceived social isolation in a community sample: Its prevalence and correlates with aspects of peoples' lives. Social Psychiatry and Psychiatric Epidemiology, 43(2), 140-150.
17. Hayes, A. F. (2013). Introduction to Mediation, Moderation, and Conditional Process Analysis: A

DOI: 10.5281/zenodo.22105751

Regression-Based Approach. Guilford Press, New York. Pp. 1-25.
18. Hetrick, S. E., Cox, G. R., Witt, K. G., Bir, J. J., & Merry, S. N. (2021). Treatment of depression and anxiety in out-of-school adolescents: A systematic review. Cochrane Database of Systematic Reviews, (8), CD012816.
19. Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. Perspectives on Psychological Science, 10(2), 227-237.
20. Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. Research on Aging, 26(6), 655-672.
21. Joiner, T. E. (2005). Why People Die by Suicide. Harvard University Press, Cambridge, MA. Pp. 1-30.
22. Jones, P. B. (2019). Adult mental health disorders and their age at onset. British Journal of Psychiatry, 202(s54), s5-s10.
23. Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2015). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Archives of General Psychiatry, 62(6), 593-602.
24. Kim, H. K., & Yoo, J. W. (2020). Social isolation, depression and substance use among out-of-school Korean adolescents: A mediation analysis. Children and Youth Services Review, 113, 104982.
25. Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. Journal of General Internal Medicine, 16(9), 606-613.
26. Lee, R. M., & Robbins, S. B. (1995). Measuring belongingness: The Social Connectedness and the Social Assurance scales. Journal of Counseling Psychology, 42(2), 232-241.
27. Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. Implementation Science, 5, 69.
28. Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (2018). Major depressive disorder in older adolescents: Clinical features, comorbidity, and risk behaviour. Journal of the American Academy of Child and Adolescent Psychiatry, 57(3), S12-S20.
29. Liu, J., Chen, X., Lewis, G., & Gunnell, D. (2022). Loneliness, depression and suicidal behaviour among out-of-school adolescents in China: A cross-sectional mediation analysis. BMC Psychiatry, 22(1), 312.
30. Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., Linney, C., McManus, M. N., Borwick, C., & Crawley, E. (2020). Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. Journal of the American Academy of Child and Adolescent Psychiatry, 59(11), 1218-1239.
31. Marshal, M. P., Friedman, M. S., Stall, R., King, K. M., Miles, J., Gold, M. A., Bukstein, O. G., & Morse, J. Q. (2020). Sexual orientation and adolescent substance use: A meta-analysis and methodological review. Addiction, 103(3), 546-556.
32. Mason-Jones, A. J., & Wilkinson, L. S. (2021). Mental health and risk behaviour of out-of-school adolescents in sub-Saharan Africa: A scoping review. BMC Public Health, 21(1), 1487.
33. McKenzie, M., Jorm, A. F., Romaniuk, H., Olsson, C. A., & Patton, G. C. (2021). Out-of-school adolescents and help-seeking for mental health problems: Cross-sectional evidence from Australia. Australian and New Zealand Journal of Psychiatry, 45(1), 44-52.
34. Mendez, R., Garcia, P., Sandoval, M., & Vargas, L. (2022). Depression mediates the relationship between social isolation and sexual risk-taking among Latina out-of-school adolescents. Journal of Pediatric Psychology, 47(6), 671-682.
35. Moffitt, T. E. (2017). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. Psychological Review, 100(4), 674-701.
36. Nicholson, N. (2012). A review of social isolation: An important but underassessed condition in older adults. Journal of Primary Prevention, 33(2-3), 137-152.
37. Orben, A., Przybylski, A. K., Blakemore, S. J., & Kievit, R. A. (2022). Windows of developmental sensitivity to social media. Nature Communications, 13(1), 1649.
38. Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Afifi, R., Allen, N. B., Arora, M., Azzopardi, P., Baldwin, W., Bonell, C., Kakuma, R., Kennedy, E., Mahon, J., McGovern, T., Mokdad, A. H., Patel, V., Bonita, C., Reavley, N., Taiwo, K., … Viner, R. M. (2016). Our future: A Lancet commission on adolescent health and wellbeing. The Lancet, 387(10036), 2423-2478.
39. Peters, M. D. J., Marnie, C., Tricco, A. C., Pollock, D., Munn, Z., Alexander, L., McInerney, P., Godfrey, C. M., & Khalil, H. (2020). Updated methodological guidance for the conduct of scoping reviews. JBI Evidence Synthesis, 18(10), 2119-2126.
40. Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. Applied Psychological Measurement, 1(3), 385-401.
41. Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., Tabor, J., Beuhring, T., Sieving, R. E., Shew, M., Ireland, M., Bearinger, L. H., & Udry, J. R. (2017). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. JAMA, 278(10), 823-832.
42. Richardson, L. P., McCauley, E., Grossman, D. C., McCarty, C. A., Richards, J., Russo, J. E., Rockhill, C., & Katon, W. (2010). Evaluation of the Patient Health Questionnaire-9 Item for detecting major depression among adolescents. Pediatrics, 126(6), 1117-1123.
43. Russell, D. W., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. Journal of Personality and Social Psychology, 39(3), 472-480.
44. Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. The Lancet Child and Adolescent Health, 2(3), 223-228.
45. Sawyer, S. M., Patton, G. C., Bhutta, Z. A., Darmstadt, G. L., Klein, J. D., & Mokdad, A. (2022). A roadmap for

DOI: 10.5281/zenodo.22105751

adolescent health in the post-pandemic era. The Lancet, 399(10337), 1800-1806.
46. Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Annals of Internal Medicine, 169(7), 467-473.
47. Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new media screen time. Clinical Psychological Science, 6(1), 3-17.
48. United Nations Children's Fund. (2022). The State of the World's Children: Out-of-School Adolescents and the Pathway to Inclusion. UNICEF, New York. Pp. 1-44.
49. Viner, R. M., Russell, S., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2022). School closure and mental health of adolescents: A systematic review. Journal of Adolescent Health, 70(3), 486-497.
50. Wang, X., Zhang, Y., Li, X., & Chen, L. (2023). Longitudinal mediation of depression between social isolation and risk behaviour among Chinese out-of-school adolescents. Journal of Youth and Adolescence, 52(4), 821-835.
51. Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2022). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. Clinical Psychology Review, 89, 102079.
52. World Health Organization. (2017). Global Accelerated Action for the Health of Adolescents (AA-HA!): Guidance to Support Country Implementation. World Health Organization, Geneva. Pp. 1-108.
53. World Health Organization. (2020). Guidelines on Mental Health Promotive and Preventive Interventions for Adolescents: Helping Adolescents Thrive (HAT). World Health Organization, Geneva. Pp. 1-68.
54. World Health Organization. (2021). Adolescent Mental Health: Key Facts. World Health Organization, Geneva. Pp. 1-6.
55. World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA, 310(20), 2191-2194
56. Ybarra, M. L., Alexander, T., & Mitchell, K. J. (2023). Depressive symptomatology, social isolation and risk behaviour in out-of-school youth: Findings from a national survey. Journal of Adolescent Health, 72(1), 89-96.

TABLES

Table 1. Characteristics and key findings of selected included studies examining depression as a predictor or mediator between social isolation and risky behaviour among out-of-school adolescents.

Author (Year)	Country	Design	Sample	Population	Key Finding
Carter et al. (2021)	Multi-country (LMIC)	Cross-sectional	2,840	Out-of-school adolescents 14-19y	Depression mediated isolation-self-harm pathway ($\beta = 0.18$, $p < 0.001$)
Ge et al. (2021)	USA	Longitudinal cohort	1,148	Out-of-school adolescents 12-18y	Baseline depression predicted risky behaviour at 18 months (OR = 2.4)
Kim and Yoo (2020)	South Korea	Cross-sectional	786	Out-of-school youth 15-19y	Significant mediation of isolation-substance use link via depression
Liu et al. (2022)	China	Cross-sectional	3,254	Out-of-school adolescents 13-19y	Depression mediated isolation-suicidal behaviour ($\beta = 0.22$)
Mason-Jones and Wilkinson (2021)	South Africa	Scoping review	18 studies	Sub-Saharan African out-of-school youth	High prevalence of depression and risk behaviour; legislative gaps
Mendez et al. (2022)	Mexico	Mixed methods	612	Latina out-of-school adolescents 14-18y	Depression mediated isolation-sexual risk ($\beta = 0.16$, 95% CI 0.10-0.22)
Viner et al. (2022)	Multi-country	Systematic review	42 studies	Adolescents during school closure	Social isolation associated with depression and risk behavior
Wang et al. (2023)	China	Longitudinal cohort	1,420	Out-of-school adolescents 14-19y	Depression at baseline predicted substance use at 24 months (OR = 3.2)

DOI: 10.5281/zenodo.22105751

Author (Year)	Country	Design	Sample	Population	Key Finding
Ybarra et al. (2023)	USA	National survey	4,287	Out-of-school youth 13-17y	Social isolation associated with 2.1-fold odds of self-harm

DOI: 10.5281/zenodo.22105751