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Review Article

Psychosocial Prenatal Interventions for Teenage Pregnant: A Systematic Review

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Abstract

Objective: Adolescent pregnancy is a pressing public health issue that significantly impacts the health and well-being of young mothers and their children. This systematic review evaluates the effectiveness of psychosocial prenatal interventions for pregnant adolescents, aiming to identify strategies that enhance maternal and neonatal outcomes.

Materials and methods: Systematic comprehensive literature search was conducted across PubMed, Web of Science, Scopus, Cochrane, Science Direct, Google Scholar, and Grey Literature. Studies published from 1996 to January 2023 were included if they focused on pregnant adolescents aged 10-22 years and employed randomized controlled trial (RCT) designs. The methodological quality of the included studies was assessed using the Cochrane Risk of Bias 2 tool.

Results: Out of 2,450 articles screened, 22 studies met the inclusion criteria, revealing diverse interventions categorized into six main types: antenatal/postnatal educational programs, psychological interventions, home visits, partner support, and social support interventions. Findings indicated that these psychosocial interventions significantly improved maternal mental health, increased prenatal care utilization, and enhanced perinatal outcomes. However, the review highlighted the need for more rigorously designed studies to establish definitive conclusions regarding the most effective intervention strategies.

Conclusion: Results show Educational programs focusing on antenatal and postnatal care effectively enhance knowledge, reduce substance abuse, and boost breastfeeding confidence, leading to better pregnancy outcomes. While psychosocial interventions have improved mental health and school attendance. Home visiting programs have positively impacted maternal well-being and parenting skills. Group prenatal care (GPNC) is beneficial, especially for high-risk adolescents, by combining health evaluations with group education and support. Integrating psychosocial support into prenatal care models can help reduce health disparities among adolescent populations.

Keywords: Teenage Pregnancy; Psychosocial Prenatal Interventions; Adolescent Pregnancy; Mental Health; Systematic Review; Public Health

Introduction

Adolescent pregnancy is a pressing public health issue that significantly impacts the health and well-being of young mothers and their children. Globally, approximately 21 million girls aged 15 to 19 and an estimated 1.5 million girls aged 10 to 14 give birth each year, predominantly in low- and

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middle-income countries (1). The implications of adolescent pregnancy extend beyond the individual, affecting families and communities at large. Young mothers are more likely to experience mental health issues, such as depression and anxiety, which can hinder their ability to care for themselves and their infants effectively. Studies have shown that adolescent mothers often report feelings of isolation and lack of support, which can negatively impact their parenting practices and overall maternal-infant outcomes. Furthermore, the transition into motherhood during adolescence can disrupt educational and career aspirations, perpetuating cycles of poverty and limiting opportunities for both mothers and their children (2, 3).

Recognizing these challenges, various support options are available. There is a growing emphasis on the importance of psychosocial support as a critical component of prenatal care for adolescent mothers. Psychosocial interventions encompass a range of strategies designed to enhance emotional well-being, provide social support, and improve coping skills. These interventions may include counseling, peer support groups, educational programs, and community engagement initiatives. Evidence suggests that comprehensive psychosocial support can lead to improved mental health outcomes, increased utilization of prenatal care services, and better maternal and infant health outcomes (4-6). A study by Desiree Govender et al. (2020), highlights the potential for improved maternal and child health outcomes through integrated care that encompasses medical, educational, and psychosocial components (7).

Despite the potential benefits of psychosocial interventions, the existing literature reveals a significant gap in the systematic evaluation of these strategies specifically for pregnant adolescents. Many studies focus on broader populations or fail to assess the quality and effectiveness of the interventions provided adequately. Furthermore, the heterogeneity in study designs, intervention types, and outcome measures complicates the ability to draw definitive conclusions about best practices in this area.

This systematic review aims to evaluate and synthesize existing research on prenatal psychosocial interventions for pregnant adolescents to address these gaps. We aim to identify effective strategies that enhance psychosocial support for this vulnerable population. We assess the quality of the interventions and their impact on maternal and infant health outcomes. The findings from this review are expected to contribute to the development of evidence-based guidelines for implementing psychosocial support interventions in prenatal care settings.

Materials and methods

Search method: A thorough review of the literature was performed in the PubMed, Web of Science, Scopus, Cochrane, Science Direct, Google Scholar, and Grey Literature databases following the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines, using keywords such as “Psychosocial care” , “Psychosocial intervention” , ”Education” , ”support” , “teenage” , “adolescent” , “pregnant” and “pregnancy” (Table 1).

Inclusion and exclusion criteria: The search was limited to studies published from 1996 to January 2023, and there were no language or geographic restrictions. The eligibility criteria were as follows: they needed to be peer-reviewed, full-text articles focusing on adolescent pregnant aged 10–22 years (If studies encompassed a wider age group, we considered studies where the average age or where at least 50% of the participants fell within this age range 10 and 19 years to reduce the amount of missing data), with RCT designs or comparison groups. However, research involving adolescents who have a confirmed medical condition was excluded. This review excluded duplicates, review papers, editorials, commentaries, protocols, and non-empirical studies.

Study selection: Following the initial search, all titles and abstracts were evaluated by reviewers (SY and SM) based on eligibility criteria, and full texts of the eligible studies were examined thoroughly. All researchers came together to discuss any differences in the selection of articles.

Assessing the risk of bias in included studies: To assess the methodological quality of the 13 randomized controlled trials, the Cochrane Risk of Bias (RoB) 2 tool was employed (8). This tool assesses bias across five key domains: the randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and selection of the reported results. Each domain is scrutinized against a series of signaling questions that help facilitate a detailed evaluation of the risk of bias associated with each study. In applying RoB 2, each of the above domains is rated as having a "low," "some concerns," or "high" risk of bias. In this review, seven studies received an overall high-risk score according to the RoB 2 assessment (Figures 1 and 2).

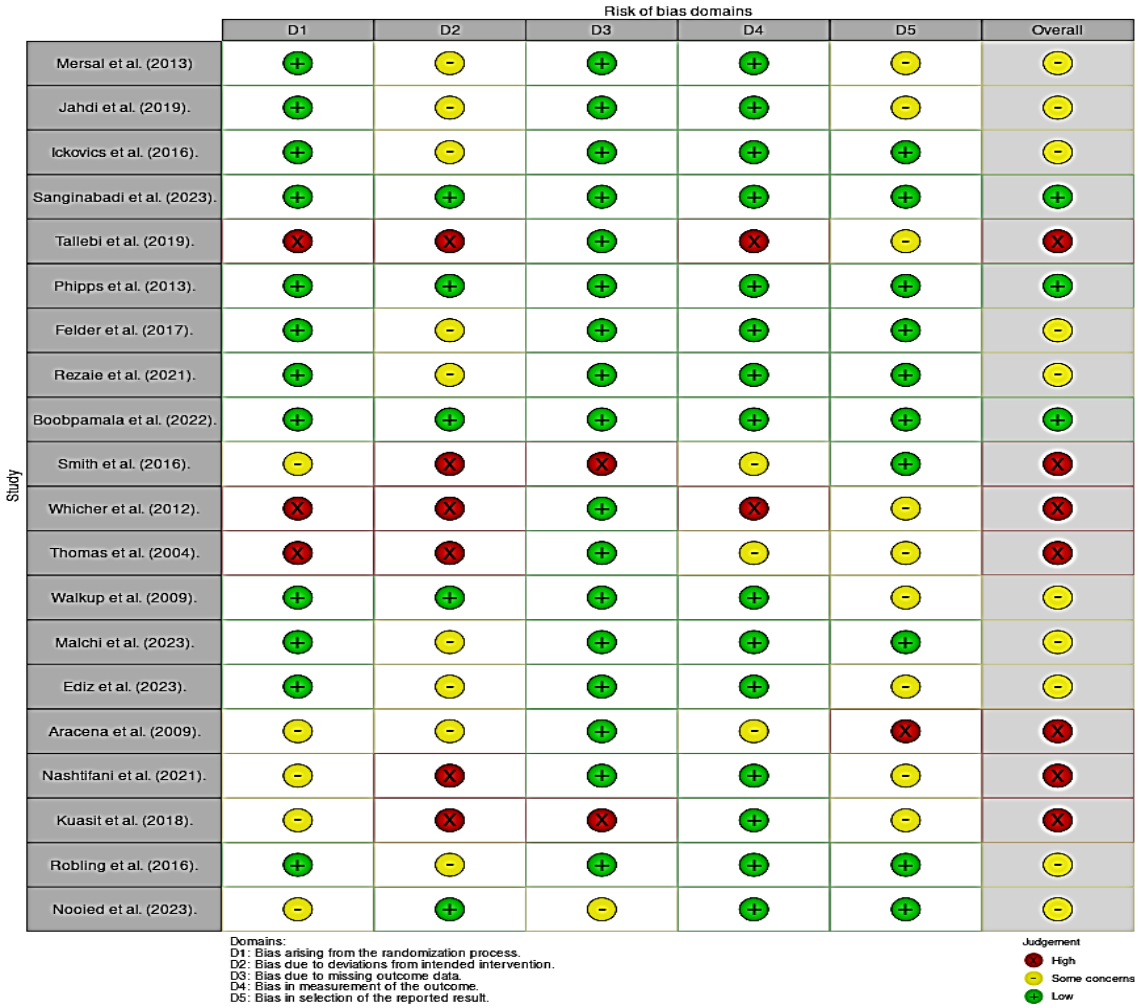

Figure 1: Traffic-light Plot of Risk of Bias in RCT (RoB-2)

In addition to assessing the quality of two program evaluation studies, the Standard Quality Assessment Criteria for Evaluating Primary Research (9), modified by Reem Al-Alawi et al. (10) to better meet the unique needs of program evaluation studies, was used (Table 2).

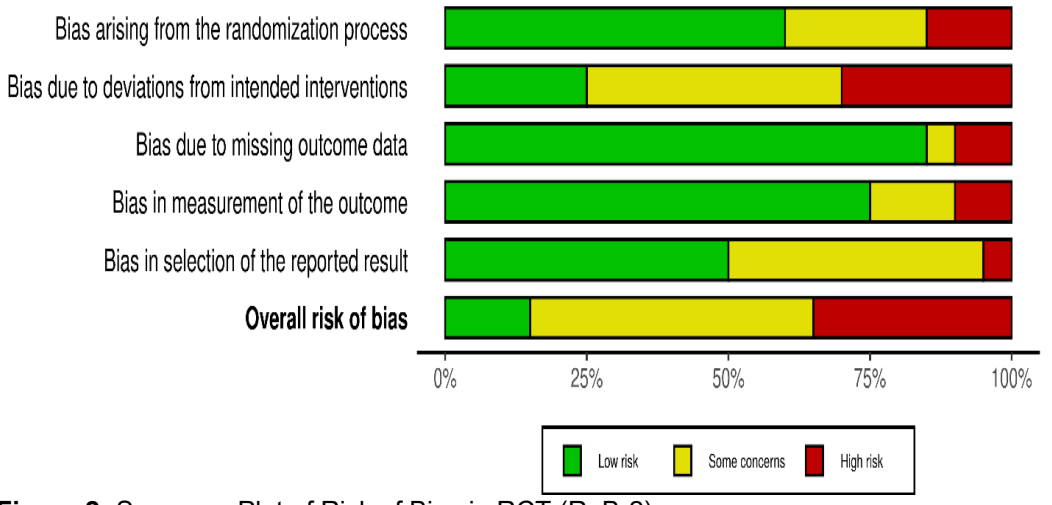

Figure 2: Summary Plot of Risk of Bias in RCT (RoB-2)

Table 1: Strategic search in selected websites

Website	Strategy
PUBMED	Psychosocial Intervention*[mh] OR Psychosocial Intervention*[tiab] OR Psychiatric Rehabilitation [tiab] OR Mental Health Rehabilitation [tiab] OR Psychosocial Rehabilitation [tiab] OR Psychosocial Care*[tiab] OR Psychiatric Rehabilitation[tiab] OR Psychosocial Support Systems*[mh] OR Social Support System*[tiab] OR Psychosocial Support*[tiab] OR Prenatal Care [mh] OR Antenatal Care[tiab] OR health plan implementation[mh] OR Psychosocial aid[tiab] OR Psychosocial assistance[tiab] OR Multidisciplinary intervention[tiab] OR program [tiab] OR plan[tiab] OR package[tiab] OR Skilled birth attendant[tiab] OR obstetric care[tiab] AND Pregnancy in Adolescence[mh] OR Teen Pregnancy*[tiab] OR Adolescent* Pregnancy*[tiab] OR Teenage Pregnancy*[tiab] OR Preteen Pregnancy*[tiab]
Web	TS=(“Pregnancy in Adolescence " OR "Teen Pregnanc*" OR" Adolescent* Pregnanc*" OR" Teenage Pregnanc*" OR" Preteen Pregnanc* ")
	TS=(“Psychosocial Intervention*” OR “Psychosocial Intervention*” OR “Psychiatric Rehabilitation” OR “Mental Health Rehabilitation” OR” Psychosocial Rehabilitation” OR “Psychosocial Care*” OR “Psychiatric Rehabilitation” OR “Psychosocial Support System*” OR “Social Support System*” OR “Psychosocial Support*” OR “Prenatal Care” OR “Antenatal Care” OR “health plan implementation”OR “Psychosocial aid” OR “Psychosocial assistance” OR “Multidisciplinary intervention” OR “program “ OR “plan” OR “package” OR “Skilled birth attendant” OR “obstetric care”)
	TS=(“IRCT*” OR “randomised controlled study*” OR” randomised control trial*” OR “clinical trial design*” OR “clinical trial study*”)
SCOPUS	TITLE-ABS-KEY=(“Pregnancy in Adolescence “ OR “Teen Pregnanc*” OR “Adolescent* Pregnanc*” OR” Teenage Pregnanc*” OR” Preteen Pregnanc* “)
	TITLE-ABS-KEY=(“Psychosocial Intervention*” OR “Psychosocial Intervention*” OR “Psychiatric Rehabilitation” OR “Mental Health Rehabilitation” OR” Psychosocial Rehabilitation” OR “Psychosocial Care*” OR “Psychiatric Rehabilitation” OR “Psychosocial Support System*” OR “Social Support System*” OR “Psychosocial Support*” OR “Prenatal Care” OR “Antenatal Care” OR “health plan implementation”OR “Psychosocial aid” OR “Psychosocial assistance” OR “Multidisciplinary intervention” OR “program “ OR “plan” OR “package” OR “Skilled birth attendant” OR “obstetric care”)
	TITLE-ABS-KEY=(“IRCT*” OR “randomised controlled study*” OR” randomised control trial*” OR “clinical trial design*” OR “clinical trial study*”)

The studies were assessed using ten predefined criteria central to determining their overall quality. Each criterion was scored on a binary scale: a score of 1 was assigned if the criterion was met, and a score of 0 was assigned if it was not. To account for criteria deemed inapplicable, these were marked as "NA," and subsequently excluded from the final summary score. The scoring methodology involved calculating the total score by summing the points awarded for each criterion, adjusting the number of inapplicable criteria, and dividing by the maximum possible score, expressed mathematically as (X + number of N/A)/10. This rigorous framework ensured a nuanced assessment that allowed for differentiation in the quality of the articles reviewed. Thus, articles that received a full total score of one had met all ten evaluation criteria, whereas points were systematically deducted - 0.1 for each criterion not met. The two studies reviewed received scores of 0.9 and 1, indicating a high degree of compliance with the evaluation criteria. The evaluation was conducted by two reviewers separately, and any differences were settled by a third reviewer.

***Types of outcome measures*:** We included studies in which the primary focus was on perinatal outcomes for women and fetus.

Data analysis: Due to the heterogeneity in intervention approaches, providers, follow-up durations, theoretical frameworks, and outcome measures, the findings are presented in a narrative format. A descriptive summary, including text and tables, Recommended Strategy, highlights participant and intervention characteristics, follow-up lengths, and outcome measures (Table 2).

Results

The initial database search found 2,450 articles. After removing duplicates (n = 980), two reviewers (SY and SM) independently screened the titles and abstracts, identifying 1,345 potentially relevant studies. Of these, 125 articles were considered eligible. We attempted to contact the authors of 2 articles for full-text copies; however, this attempt was unsuccessful, leading to their exclusion. Ultimately, 22 studies were included in the Review (Figure 3). Quality assessment was performed using the Cochrane Risk of Bias 2 (RoB 2) tool for RCTs, as shown in Figures 1 and 3. The modified Standard Quality Assessment Criteria checklist to critically evaluate the program evaluation studies (Table 3).

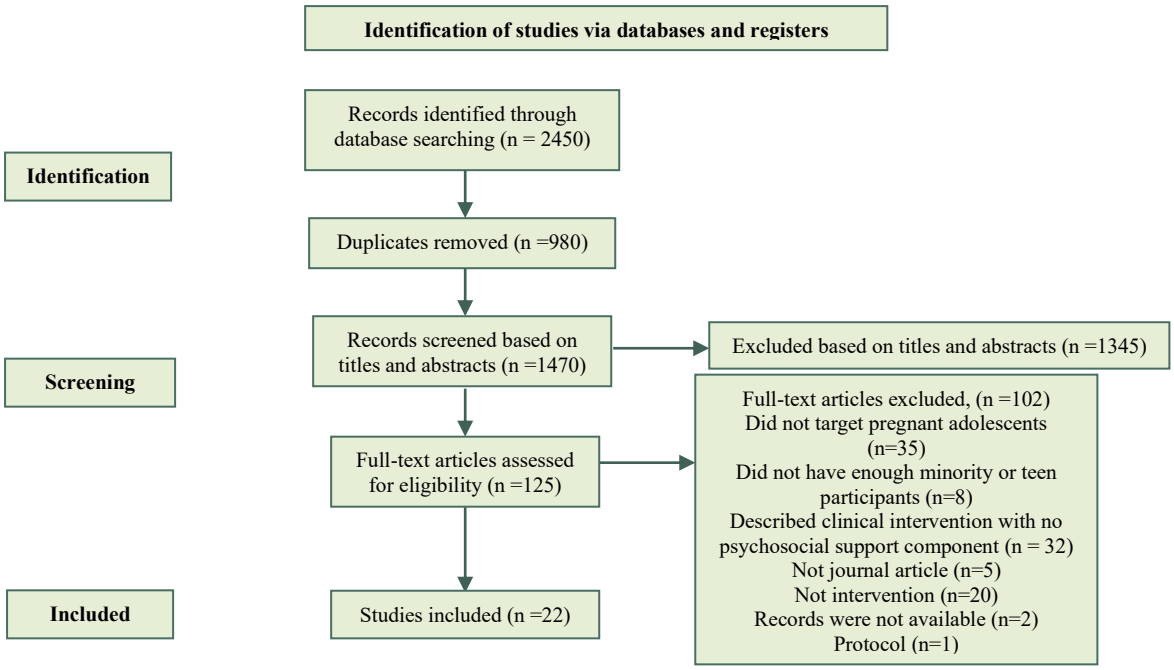

Figure 3: PRISMA flowchart for literature search and study selection

Of the RCTs evaluated, seven were considered high risk, while thirteen were considered low risk, with some concerns. Several factors contributed to classifying these trials as having a high risk of bias. First, poor randomization practices could lead to imbalances in baseline characteristics between the intervention groups, thereby biasing the results. Lack of blinding was another factor that could also increase the likelihood that expectations or preferences could influence outcomes, thereby affecting the validity of the results. However, achieving adequate blinding can be challenging in specific contexts, such as educational interventions. Another issue to consider was the management of missing data. Some studies experienced participant dropouts or incomplete outcome data, which were not adequately addressed and could lead to attrition bias. Furthermore, both program evaluation studies received high-quality scores. The included studies primarily focused on perinatal outcomes for mothers and infants, with each eligible study mandated to report at least one of these outcomes. Table 2 provides a succinct description of all studies.

The 22 randomized controlled trials (RCT) varied significantly regarding participant characteristics, sample sizes, conceptual frameworks, intervention content, providers, duration, frequency, outcome measurements, and follow-up periods. Participants included 13443 adolescent women aged 10 to 22, with the majority (ages 14 to 19) experiencing first-time, low-risk pregnancies at fetal ages ranging from 16 to 36 weeks.

Most intervention studies (n=16) used individual RCT designs, while two employed cluster RCTs and two were pilot studies. Additionally, two studies were program evaluations. Sample sizes ranged from 20 to 7,226 individuals. Nearly all studies reported the average age; twenty studies exclusively involved female participants, while two included males and females. Most studies concentrated on perinatal outcomes for women, with some also addressing outcomes for infants. The duration of intervention sessions varied widely across studies. Home visit interventions typically lasted 1 to 2 hours, whereas educational and psychoeducational sessions ranged from 45 minutes to 2 hours. However, six studies did not specify the duration of their intervention sessions. Participant outcomes were evaluated at various intervals, including pre-intervention, immediate post-intervention, and follow-up assessments conducted between 4 weeks and 24 months after childbirth.

The psychosocial, psychological, and social interventions used in the studies were categorized into five specific types, according to the Cochrane Database of Systematic Reviews by Dennis and Do Swell (2013). These types of interventions include: (1) antenatal/postnatal prenatal educational programs, (2) Psychological interventions, (3) Home visits, (4) Partner support, (5) Social support interventions, (6) Group prenatal care (GPNC), which are described below.

Table 2: Included studies

Authors, Year, Country	Type of study	General characteristics of the intervention							Main findings
		Type of intervention Recommended Strategy	Sample size	Total sample Mean ±SD	Intervention Mean ±SD	Control Mean ±SD	Data collection	Follow-up	
F Marsal et al., 2013, Egypt	RCT	Prenatal counseling	86	NR	16.33±1.26	16.92 ±1.23	-Interviews - Physical assessment	-First and three months after the pretest; -3 to 6 days after birth (home visit)	-Prenatal health education should be an integral part of prenatal care
Fereshteh Jahdi et al., 2019, Iran	RCT	Attachment behaviors training	73	18.18±1.1	60.86±9.75	44.44±12.99	-Individual social questionnaire. -Parenting Sense of Competence.	-Before the intervention -10 days after delivery	-training is effective in obtaining the Competence of adolescent mothers.
Jeannette Ickovics et al., 2016, USA	Cluster RCT	CP Plus	1148	NR	18.7 ± 1.8	18.6 ± 1.7	-Medical records and examinations	-Second and third trimesters - the 6th and 12th months after childbirth	-More favorable birth, neonatal, and reproductive outcomes.
Linda Flynn et al., 2008, USA	Program evaluation	TPP	83	NR	16.5±1.2	NR	-McBride & Gienapp (2000) -Assessment of consequences of programs related to pregnancy notices for adolescents (McBride & Jinap, 2000	Home Visits: -Each month, participants received: -1 home visit by a public health-registered nurse -1 home visit by a medical social worker	-Significant increases in resource utilization, including prenatal care appointments -No significant differences in mean infant birth weight
Roya Sanginabadi et al., 2023, Iran	Quasi-experimental	Couple-centered counseling	90	NR	17.75± 1.26	17.66± 1.16	-CWS -PRAQ	-Conducted four weeks after the last counseling session	-Reduce the anxiety and concerns of prim gravid adolescents
Behjat Tallebi et al., 2019, Iran	Quasi-experimental	-Neonatal care education	116	NR	NR	NR	-Cohen's Perceived Stress Questionnaire	-Conducted at 38 weeks -Follow-up at 30 days after delivery	-neonatal care education on Reducing stress in adolescent mothers.
Maureen Phipps et al., 2013, Rhode Island	RCT	The Project REACH intervention was an adaptation of an IPT-based	106	NR	16 ± NR	16 ± NR	KID-SCID interview	-At 6-weeks, -3months and 6months after delivery	-An intervention reduce the risk for postpartum depression
Jennifer Felder et al., 2017, California	cluster-RCT	Centering Pregnancy Plus	1135	NR	18.66 ± 1.78	18.62 ± 1.69	-Center for Epidemiologic Studies Depression Scale	-During pregnancy (second and third trimesters) -Postpartum (6 and 12 months)	-Group prenatal care may be an effective non-pharmacological option for reducing depressive symptoms.

Table 2: Included studies (continue)

Authors, Year, Country	Type of study	General characteristics of the intervention							Main findings
		Type of intervention Recommended Strategy	Sample size	Total sample Mean ±SD	Intervention Mean ±SD	Control Mean ±SD	Data collection	Follow-up	
Ronya Rezaie et al., 2021, Iran	RCT	Self-care counseling	54	NR	17.96 ±1.5	18.07± 0.96	-HPQ-II -PRE-MAMA -PSI	-Before the Intervention -4 Weeks After the Intervention	-Improve the health practices of adolescent pregnant women -Enhance their attitudes towards maternal roles and pregnancy
Sunetr Boobpamala et al., 2022, Thailand	RCT	EDPP	72	NR	17.44 ± 1.46	17.81±1.24	-Sociodemographic Information -Antenatal Depression Scale -Coping Skills Scale	-Before the program -7, 9, and 11 weeks after the program	-Depression scores in the experimental group were statistically lower than in the control group over time. -Mean coping skill scores were statistically higher in the experimental group than in the control group at Week 11.
Peggy Smith et al., 2016, USA	Quasi-experimental	partner support in a prenatal care program	173	17.4 ± 1.1	17.2 ±1.0	17.4 ± 1.1	-ACASI -Family Formation conceptualization of social support was based on Weiss's (1974)	-During pregnancy until one month after delivery	-Significant shift in family formation and increased monetary support from partners from baseline to postpartum (at least one CP session was perceived).
Emma Whicher et al., 2012, England	Pilot Project	Motivational interviewing	20	NR	17.42 ±1.17	NR	-PESQ -ASMA -PESQ -TLFBC	-Before the intervention -Three months later	-Statistically To reduce substance use/misuse in pregnant teenagers.
Deborah Thomas, 2004, Rose Island	A Pilot Study	Comprehensive Psychoeducational	41	NR	16.1 ± 1.2	17.2±1.3	-CES-D -Radloff 1977 - AAPI-2	NR	-Can be effective in changing parenting attitudes and beliefs, suggesting an ultimate improvement in health promotion and disease prevention in adolescent women and their children.
Mary Rogers, 1996, Columbia, South Carolina	Program evaluation	RMP	7226	NR	NR	NR	-RMP data -Maternity Data System data -Birth certificate data	-Pregnancy -After childbirth	-No significant effect on low birth weight (LBW) -Unmarried teenagers in the RMP group were less likely to have a preterm birth (PTB) compared to unmarried teenagers in other counties.

Table 2: Included studies (continue)

Authors, Year, Country	Type of study	General characteristics of the intervention							Main findings
		Type of intervention Recommended Strategy	Sample size	Total sample Mean ±SD	Intervention Mean ±SD	Control Mean ±SD	Data collection	Follow-up	
John T. walkup, 2009, India	RCT	Home-visiting	167	NR	NR	NR	-Parenting Knowledge -Parent Involvement. -HOME -ITSEA -Center for Epidemiological Studies–Depression -Substance Use (not applicable proportions reported) -Social Support -Parenting Stress Index	-Interventions began during pregnancy and continued to: -6 months postpartum -Follow-up assessments at 2, 6, and 12 months postpartum.	-Effective for young American Indian mothers in improving maternal knowledge and infant behavior outcomes. -A longer, larger study is needed to replicate results and evaluate the durability of child behavior outcomes.
Fateme Malchi, 2023, Iran	RCT	Group prenatal care	294	NR	17.42±1.31	17.40±1.28	-Empowerment Scale for Pregnant Women (developed by Kameda et al., 2008)	-Before Intervention: 6-10 weeks -After Intervention: 38-40 weeks	-The total empowerment score was significantly improved in the GPNC group compared to the Individual Prenatal Care (IPNC) group
Ediz Ç, Kavak Budak F, 2023, Turkey	RCT	PSSB	105	NR	18.36±0.77	18.18±0.94	BAI EPDS MSPSS	pre-test–post-test	-Reduced anxiety and depression and increased the perceived social support levels of pregnant adolescents.
Marcela Aracena et al., 2009, Santiago de Chil.	RCT	Psychoeducational and Home Visits During the Third Trimester of Pregnancy	104	17.21±1.38	17.3 ±.23	17, 15 ± .22	-Physical Health Evaluation: -Chilean adaptation of Goldberg's -General Health Questionnaire -Questionnaire developed by the Pan-American Health Organization -Child Evaluation: -Assessment of physical health -Psychomotor skills -Indicators for child abuse	-Duration: Home visits continued until the child reached one year of age. -Average Visits: Each mother received an average of 12 one-hour home visits.	-The home visit program was more effective than standard care provided by health centers in: 1-Encouraging a higher level of mental health. 2-Improving nutritional status among young women. 3-Promoting a higher level of language development in children.
Maryam Nashtifani, 2021, Iran	RCT	Cognitive-behavioral counseling	64	NR	17.31 ±1.28	16.56±1.85	ESPW	-Before the intervention -Two weeks after the intervention	-Empowerment score in the intervention group was significantly higher compared to the control group.

Table 2: Included studies (continue)

Authors, Year, Country	Type of study	General characteristics of the intervention							Main findings
		Type of intervention Recommended Strategy	Sample size	Total sample Mean ±SD	Intervention Mean ±SD	Control Mean ±SD	Data collection	Follow-up	
Umaporn Kuasit, 2018, Thailand	RCT	RENP	130	NR	17.39±1.83	17.35± 1.70	-Resilience Scale -Life Goals Scale	-Before the intervention -4th week after the intervention -8th week after the intervention	-The experimental group had a significantly greater improvement in the mean score of life goals compared to the control group at both the 4th and 8th weeks
Michael Robling, 2016, England	RCT	FNP	18 sites/ 1618 women.	NR	17·9 ± NR	17·9 ± NR	-Maternal outcomes -Child outcomes	Time points at 6, 12, 18, and 24 months (nested within participants, family nurses, and sites)	-Adding the FNP to usual health and social care did not provide extra short-term benefits. - Program continuation is not justified based on current evidence, but may be reconsidered if longer-term evidence emerges. .
Bussayamas Nooied, 2023, Southern Thailand	RCT	NCSEEPMA	128	NR	17.05±1.53	17.08± 1.58	-FCTTQ -TCBSEI	-1st Session: Gestational Age (GA) 32-35 weeks (60 minutes) -2nd Session: GA 33-36 weeks -Additional Assessment: GA 34-37 weeks	-The experimental group showed a significantly higher mean score for childbirth self-efficacy ($p < 0.001$) and a lower mean score for fear of childbirth ($p < 0.001$).

CP Plus: Centering Pregnancy Plus group prenatal care; TPP: Teen Parenting Partnership Program; CWS: Cambridge Worry Scale; PRAQ: Pregnancy related; HPQ-II: Health Practices in Pregnancy Questionnaire-II; Pre-MAMA: PSI: Pregnancy Symptoms Inventory; ACASI: Through Computer Aided Self-Reporting Interview; EDPP: Enhancing Developmentally Oriented Primary Prevention program; PESQ: Personal Experience Screening Questionnaire; ASMA: Assessment of Substance Misuse in Adolescents; PESQ: The Personal Experience Screening Questionnaire; AAPI: Adult-Adolescent Parenting Inventory; CES-D: Center Studies Epidemiological - scale Depression; HOME: Home Observation for Measurement of the Environment; ITSEA: Infant Toddler Social Emotional Assessment; BAI: Beck Anxiety Inventory; EPDS: Edinburgh Postpartum Depression Scale; MSPSS: Multidimensional Scale of Perceived Social Support; ESPW: Empowerment Scale for Pregnant Women; RENP: Resilience Enhancing Nursing Program; FNP: Family Nurse Partnership; NCSEEPMA: Nurse-led childbirth self-efficacy enhancement program with mobile application; FCTTQ: The Fear of Childbirth in the Third Trimester Questionnaire; TCBSEI: Thai Childbirth Self-Efficacy Inventory

Table 3: Quality assessment criteria for evaluating program evaluating studies

Criteria of evaluation	Rogers et al. 1996	Flynn et al. 2008
1. Research question/objective is clearly described and relevant to educational program evaluation in teenage pregnancy.	Yes	Yes
2. The type of approach is empirical.	Yes	Yes
3. The context/country of the study is described.	Yes	Yes
4. The theoretical framework is stated.	Yes	Yes
5. Variables/domains are evaluated/outlined.	Yes	Yes
6. Data collection method is described.	Yes	Yes
7. Reliability and validity of data collection tools are reported.	Yes	No
8. Study sample is defined.	Yes	Yes
9. Data analysis is clearly described.	Yes	Yes
10. Results and conclusion are reported in sufficient detail.	Yes	Yes
Total score	1	0.9

Adapted from Kmet, L. M., Lee, R. C., & Cook, L. S. (2004). Standard quality assessment criteria for evaluating primary research papers from a variety of fields (copyright 2004 by the Alberta Heritage Foundation for Medical Research), pp. 4 & 5; and from Kraft, M., Kastel, A., Eriksson, H., & Hedman, A. R. (2016). "Global nursing—A literature review in the field of education and practice." Nursing Open, 4, 125 and modified by Al Alawi, R. and G. L. Alexander (2020). "Systematic review of program evaluation in baccalaureate nursing programs." Journal of Professional Nursing 36(4): 236-244.

Antenatal/postnatal prenatal educational programs encompass six subsets of studies, which include :(I) Prenatal counseling, (II) Neonatal care education, (III) Self-care counseling, (IV) Centering Pregnancy Plus, (V) Teen Parenting Partnership (TPP) Program, (V) Prenatal counseling, (VI) Resilience Enhancing Nursing Program (RENP), (VII) Family Nurse Partnership (FNP) program, (VIII) Nurse-led Childbirth Self-Efficacy Enhancement Program with Mobile Application (NCSEEPMA).

Psychological interventions are represented by seven studies, which include: (I) Comprehensive Psychoeducational, (II) Cognitive-behavioral counseling, (III) EDPP (Enhancing Developmentally Oriented Primary Prevention) program, (IV) The Project REACH intervention was an adaptation of an IPT-based prevention intervention, (V) Motivational interviewing, (VI) PSSB psychoeducation program:

Two studies included partner support. (I) Couple-centered counseling, (II) Partner support in a prenatal care program: Social support interventions: (I) Resource Mothers Program (RMP) and Group Prenatal Care (GPNC)**:** (I) Group Prenatal Care

Discussion

This study examines the implementation of a recommended strategy for addressing adolescent pregnancy through an evaluation system designed to assess the quality of RCT interventions. Due to the heterogeneity in intervention approaches, providers, follow-up durations, theoretical frameworks, and outcome measures, a narrative synthesis was employed.

The interventions were categorized into psychosocial, psychological, and social approaches, as identified in the Cochrane Database of Systematic Reviews by Dennis and Do Swell (2013). Psychosocial support entails providing emotional, psychological, and social assistance to individuals, particularly during times of stress or upheaval. For teenage mothers, it is essential that they receive psychosocial support during pregnancy to foster their emotional well-being, self-esteem, and resilience (11). Psychosocial support can take various forms, including counseling, peer support groups, and educational programs focused on parenting and life skills (12). The results of this review showed that psychosocial support interventions may have positive effects on several outcomes for teen mothers. For example, studies have shown that adolescents with access to psychosocial support are more likely to engage in healthier behaviors, seek prenatal care, and develop positive coping strategies, thereby improving their overall mental health and parenting practices (13-18). In addition, effective psychosocial support can promote stronger family bonds and facilitate connections to community resources, creating a supportive network for adolescent mothers and their children (14, 19-21).

The interventions fell into five primary categories: Prenatal/Postnatal educational programs, Psychological interventions, Home visits, Partner support, Social support interventions, and Group prenatal care (GPNC).

Educational programs focused on antenatal and

postnatal care for pregnant adolescents have proven effective in enhancing prenatal and postpartum adjustment. These programs increase pregnancy-related knowledge, decrease substance abuse, and boost confidence in breastfeeding. Additionally, they lead to improved overall pregnancy outcomes and can be successfully implemented through organized classes and peer education approaches (22, 23). However, the effects of general antenatal education for childbirth or parenthood remain largely unknown. Furthermore, individualized prenatal education does not appear to increase the rate of vaginal birth after cesarean section, highlighting a significant gap in current understanding (24).

Addressing these limitations is essential for future research and program development. Tailored educational interventions targeting the unique needs of pregnant adolescents can yield significant benefits.

Laurenzi et al. suggest that psychosocial interventions yield small to moderate improvements in positive mental health and school attendance among pregnant and parenting adolescents, although evidence for preventing mental health disorders remains limited (25). In addition, Evelyn Verbeke et al. show that Interventions targeting mental health issues during and after pregnancy demonstrate good cost-effectiveness, but further research is necessary to assess their long-term impact (26). Furthermore, the study by Uriko et al. emphasizes the need for future psychosocial interventions to define conditions, explore prevention methods, encourage self-help, evaluate cost-effectiveness, understand healthcare professional needs, and raise public awareness (27). Additionally, fostering public awareness and enhancing accessibility to cost-effective interventions can significantly contribute to improved outcomes for this vulnerable population. Future studies should prioritize long-term evaluations and the integration of culturally sensitive approaches to ensure interventions are both effective and sustainable.

Various studies have shown that Home visiting programs for adolescent mothers can enhance parenting skills, maternal well-being, and certain child health outcomes (28, 29). However the Family Nurse Partnership program in England did not provide extra benefits regarding socioeconomic stability compared to standard care, nor did it significantly reduce emergency visits or hospitalizations for children (30). These programs have shown some positive effects on maternal mental health but have not had a notable impact on repeat pregnancy rates. Taherh Hadian et al., show that a systematic review and meta-analysis found on that while home visiting improved mental health outcomes for adolescent mothers, it did not significantly decrease the rates of repeat pregnancies or births (31). Similarly, B. Barnet et al., show that a community-based program in the United States did not influence depression levels or repeat pregnancy rates. Although home visiting programs show potential in various areas, several challenges persist. Effective coordination between community programs and primary care services is crucial but often inadequate (28). Additionally, Jody Duong Nguyen et al. state that the success of these programs can differ based on the frequency and duration of visits, and the specific needs of the population served. Although home visiting programs show potential in various areas, several challenges persist (32). Future research should focus on improving home-visiting programs to address challenges, align them with cultural, social, and economic contexts, and enhance their effectiveness. Standardized training and evidence-based guidelines can ensure consistent, high-quality service delivery. Long-term evaluations, such as children's academic and social development, can offer deeper insights into program impacts. Collaboration among policymakers, healthcare providers, and community organizations is vital to overcoming funding barriers and increasing accessibility. These efforts will better support adolescent mothers and their children, fostering healthier families and communities.

According to numerous studies, Partner support is crucial for enhancing the psychological well-being, parenting skills, and birth outcomes on pregnant adolescents (33- 36). However, there is a need for additional strategies to involve young fathers, who may not readily offer support during pregnancy. Comprehensive support programs that engage both parents and include targeted interventions can significantly improve these outcomes (21). Future research and initiatives should prioritize the engagement of young fathers and address issues related to relationship instability to fully leverage the benefits of partner support during adolescent pregnancy (21, 37). Healthcare providers and community organizations should collaborate to create culturally sensitive programs addressing the unique challenges of pregnant adolescents and their partners. These initiatives should emphasize communication, conflict resolution, and shared parenting. Policies ensuring access to education, jobs, and healthcare for

young parents can foster a supportive environment, reducing adverse outcomes of adolescent pregnancies and promoting healthier futures for families.

Several studies show that Social support interventions have proven effective in improving outcomes for pregnant adolescents and young parents. These programs can help reduce the rates of repeat pregnancies and school dropouts, enhance mental health, and decrease fears related to childbirth (5, 38, 39). However, K. Mohammad et al., fines that the effectiveness of social support heavily depends on its quality and type; excessive support may lead to increased stress, lower maternal self-efficacy, and marital conflicts among adolescent mothers (40). Additionally, M. Logsdon et al., indicate that social support interventions did not result in significant differences in alleviating symptoms of depression in pregnant adolescents six weeks after giving birth (41). Ultimately, it is crucial to develop tailored and balanced social support programs to improve the well-being of adolescent mothers and their children.

According to several studies, Group prenatal care (GPNC) has emerged as a novel approach designed to enhance pregnancy outcomes, especially among high-risk groups like adolescents. This model integrates personal health evaluations with group-based education and social support, potentially providing several advantages over traditional individual prenatal care (IPNC). Benefits may include better pregnancy outcomes, increased empowerment and knowledge, improved mental health, and greater attendance and adherence rates. These results indicate that GPNC could be an effective strategy for promoting the health and well-being of young mothers, particularly those in high-risk categories. Additional research is necessary to validate these advantages and assess the cost-effectiveness of GPNC (42- 44).. Implementing GPNC can reduce disparities in maternal healthcare by fostering a supportive environment for shared experiences and collective learning, particularly in underserved communities with limited prenatal care access. By integrating medical care, peer support, and education, GPNC may alleviate isolation, enhance self-efficacy, and promote healthier pregnancy behaviors. However, challenges like logistical barriers, cultural differences, and the need for trained facilitators must be addressed. Customizing GPNC for diverse populations is essential to maximize its impact. Policymakers and healthcare providers should invest in pilot programs and studies to assess its scalability and sustainability, ensuring accessibility and effectiveness for all pregnant individuals.

Different theories can explain the effectiveness of these interventions. The Social Support Theory suggests that emotional and informational support can help pregnant adolescents deal with stress and improve their coping strategies (45). Additionally, the Health Belief Model indicates that having more knowledge about prenatal care can lead to healthier behaviors and better health outcomes (46). Surprisingly, our review found that while many studies showed improvements in psychological outcomes, only a few demonstrated significant changes in objective health measures like birth weight or gestational age. This difference emphasizes the importance of focusing on both subjective and objective measures in future research.

Evaluating intervention effectiveness is challenging due to variations in cultural contexts, demographics, intervention types, and outcomes. Socioeconomic factors like poverty and cultural beliefs about extramarital sex significantly impact efficacy (47). The complex link between poverty and adolescent pregnancy complicates causal analysis, particularly in high-risk groups from low-income areas. Additionally, the cost-efficiency of interventions, such as home visits that require skilled professionals and multiple sessions, needs to be assessed. These interventions can lead to significant research costs and demand a long-term commitment from the participants involved. So, investigations should be done based on the health economy of each country, GDP, the amount of income, and human resources and contexts.

Adolescence can be divided into early, middle, and late stages, each characterized by unique physical, emotional, and social changes (48, 49). It is crucial to consider the developmental stages of adolescence when evaluating interventions.

The long-term outcomes of interventions, such as poverty, re-pregnancy rates, dropping out of school, higher risk of behavioral problems, and lower education levels for children, are often overlooked. Evidence suggests that children of teenage mothers are at increased risk of becoming teenage parents themselves, highlighting the intergenerational cycle of adolescent pregnancy (49, 50).

Customizing interventions to align with cultural norms and employing qualitative research methods will enhance the effectiveness of programs. Furthermore, utilizing technology to reach

adolescents in various settings could improve accessibility and engagement (15, 51). Education is closely linked to health, and teenage pregnancy is one of the primary reasons why girls drop out of high school (52). In addition, further research is required to better understand strategies to encourage school graduation among adolescent females who become parents. In conclusion, while the interventions examined were effective, ongoing research is essential to identify programs' most impactful characteristics and ensure their sustainability and relevance in diverse contexts.

In the health care system, existing interventions often lack a specific focus on psychosocial support, which is critical to addressing the complex emotional and social challenges adolescent mothers face (53). For example, while educational programs may provide valuable information about prenatal care, they may not adequately address the emotional needs of young mothers or the stigma associated with teen pregnancy (54, 55). Conversely, mental health support programs may focus solely on psychological well-being without incorporating practical parenting education (12). This disconnect highlights the need for a more integrated framework that combines educational, emotional, and social support.

Due to heterogeneity in intervention approaches, providers, follow-up duration, theoretical frameworks, and outcome measures, it was not possible to conduct a meta-analysis study and determine causality.

Current global strategies often prioritize preventing early pregnancies and STDs but often neglect teenage pregnancies within marriage, reducing effectiveness in certain contexts. Addressing this requires educating parents and communities on promoting timely marriage and pregnancy. Key strategies to prevent early marriage and unintended pregnancies include:

1. Education Programs: Focus on women's rights, healthy relationships, and early marriage consequences.
2. Comprehensive Sexual Education: Promote knowledge of contraception and reproductive health.
3. Stricter Laws: Enforce laws against early marriage.
4. Financial Incentives: Reward families delaying marriage.
5. Access to Healthcare: Provide healthcare and counseling services.
6. Counseling Programs: Establish school and community counseling initiatives.
7. Community Involvement: Engage local communities and NGOs in awareness campaigns.
8. Role Models: Highlight successful examples of later marriages.
9. Media Campaigns: Use social media and TV to promote delaying marriage and pregnancy.

To improve psychosocial support for adolescent mothers, several recommendations are essential: Holistic Prenatal Programs, adoption models that include psychosocial support and medical education, and training healthcare providers to address the unique needs of pregnant adolescents.

Peer Support Networks, Establish networks that connect young mothers, fostering a sense of belonging and reducing isolation. Group sessions can enhance social skills and coping mechanisms. Community Partnerships, Collaborate with local organizations, educational institutions, and mental health agencies to create a supportive ecosystem. Offer resources such as parenting classes, mental health services, and career counseling.

This research highlights the practical implications for healthcare providers and policymakers. Comprehensive support systems for pregnant adolescents can lead to better perinatal outcomes and empower young mothers as they transition into parenthood. Integrating psychosocial support into prenatal care can help reduce health disparities among adolescents.

Enhancing psychosocial support for teenage mothers is not just a health issue; it is a societal imperative. Collaborative efforts among healthcare providers, policymakers, and community organizations are necessary to foster a supportive environment that empowers young mothers and their families.

Conclusion

This comprehensive review highlights the positive impact of psychological, psychosocial, and psychoeducational interventions: such as antenatal/postnatal prenatal educational programs, psychological interventions, home visits, partner support, social support interventions, and group prenatal care (GPNC); on perinatal outcomes for teenage mothers and their infants compared to control groups. Interventions for pregnant adolescents have shown mixed results in maternal and fetal outcomes. Educational programs focusing on antenatal and postnatal care effectively enhance knowledge, reduce substance abuse, and boost breastfeeding confidence, leading to better pregnancy outcomes. While

psychosocial interventions have improved mental health and school attendance, their effectiveness in preventing mental health disorders is still under investigation. Home visiting programs have positively impacted maternal well-being and parenting skills but haven't significantly reduced repeat pregnancies or emergency visits. Partner support is crucial for enhancing psychological well-being, yet strategies to engage young fathers are limited. Social support interventions show promise in reducing repeat pregnancies and improving mental health, but their effectiveness varies based on quality and type. Group prenatal care (GPNC) is beneficial, especially for high-risk adolescents, by combining health evaluations with group education and support. While these interventions have potential, further research is necessary to optimize their effectiveness and address challenges.

However, the review does not provide sufficient evidence to identify which intervention is the most effective. Our healthcare system often lacks a specific focus on psychosocial support, which is critical to addressing the complex emotional and social challenges adolescent mothers face. To develop a comprehensive approach, prenatal intervention programs should adopt a holistic model that includes psychosocial support and medical education, establish peer support networks, and create community partnerships to address the psychosocial needs of adolescent mothers. Moreover, integrating psychosocial support into prenatal care models can help reduce health disparities among adolescent populations.

Future research on adolescent pregnancy should consider the health economics of individual countries, including GDP, income levels, and available human resources. Additionally, implementation data across diverse cultures and contexts can reveal areas for improvement and inform tailored programming. Key areas of focus include standardized intervention strategies, longitudinal studies on the effects of psychosocial support, and leveraging digital health technologies to enhance resources for young mothers in underserved communities.

Policy recommendations: Addressing these gaps is essential for establishing evidence-based guidelines that effectively inform policymakers and healthcare providers about best practices in supporting adolescent mothers. The findings of the present study can also be used as a basis for planning effective interventions to reduce the consequences of pregnancy in adolescents and be made available to stakeholders and healthcare providers involved with adolescents.

Conflict of Interests

Authors declare no conflict of interests.

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