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Assessing the Level of Evidence for Interventions Used for Repeat Pregnancy in Teens for Possible Integration Into Evidence-Based Practice: A Review of Literature for Studies Carried out in the US From 1990 - 2021

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Abstract

Background: Repeat teen pregnancy among adolescents represents an important public health challenge worldwide as well as in the USA. Repeat teen pregnancy negatively impacts teen mother and the child, in enormous ways. It can cause emotional, psychological and educational challenges, as well as affect the life and opportunities of young mothers and their children. The children of teenage mothers are more likely to have lower school achievement and to drop out of high school, have more health problems, be incarcerated at some time during adolescence, give birth as a teenager, and face unemployment as a young adult.

Understanding the levels of evidence of the interventions for adolescent repeat pregnancy can provide guidance to health practitioners and decision makers in selecting an intervention.

The aim of this review is to assess the level of evidence of repeat pregnancy interventions conducted in the U.S. (United States) for possible integration into evidence-based practice.

Methods: We focused on articles conducted in the U.S. and published between 1990 and 2021. We searched for articles in: The Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, EMBASE, Social Science Citation Index, Science Citation Index, Dissertations, Abstracts Online, PsycINFO, CINAHL, POPLINE, and the reference lists of articles.

Research Question: 'What are the levels of evidence for interventions for teen repeat pregnancy?' Selection criteria: We included and evaluated any intervention that aimed to promote spacing of 2nd birth and reduced repeat teen pregnancies in adolescents ages 13 –19 years. Results: We retrieved fifty-two (52) primary repeat pregnancy intervention studies conducted in the U.S. from 1990 to 2021. Twenty-five (25) interventions met the inclusion criteria and were statistically significant. There were 12 randomized control studies that were statistically significant and met Level I evidence. Six (6) Quasi-experimental studies that were statistically significant and met Level II evidence. There were five (5) Cohort studies that were statistically significant, one prospective and four retrospective studies and met Level III evidence. Two descriptive studies of Level IV evidence.

Conclusion: Interventions, can be categorized into: home visitation, peer support, school based and comprehensive interventions including contraceptive use. There were also disparities in the intervention follow-ups, components, study location, statistical analyses and persons conducting the intervention. These disparities, made it difficult to compare and contrast the different interventions. We were able to successfully assign Levels of evidence to each intervention. We identified Twelve (12) Level I; Six(6) Level II; five (5) Level III and two (2) Level IV.

Keywords: level of evidence, repeat teenage pregnancy intervention, adolescence, USA

1. Introduction

Repeat teen pregnancy among adolescents represents an important public health challenge worldwide as well as in the USA (Govender et al., 2018). It is defined as the incidence of two or more pregnancies before the age of 20 years (Aslam et al., 2017) while rapid repeat pregnancy (RRP), is defined as a pregnancy within 2 years of a previous pregnancy (Baldwin, 2013).

Repeat teen pregnancy negatively impacts teen mother and the child, in enormous ways. It can cause emotional, psychological and educational challenges, as well as affect the life and opportunities of young mothers and their children. (Arnold et al, 2020; Harding et al, 2020; WHO 2018, Maravilla, et al., 2016; Whitaker, et al., 2016; Clark et al., 2017; Frederiksen et al., 2018). The children of teenage mothers are more likely to have lower school achievement and to drop out of high school, have more health problems, be incarcerated at some time during adolescence, give birth as a teenager, and face unemployment as a young adult (CDC, 2021).

Despite these challenges, teen parents are the ones who are most likely to have another child during adolescence. Studies have shown that, teen mothers are 500% more likely to have another child before age 20 years (Key et al., 2008). In the United States, many teen parents experience repeat births. In 2018, fifteen percent of births to mothers 19 years old or younger were repeat births (Martin et al., 2019).

Approximately 12% – 49% of adolescent repeat pregnancies in the United States of America (USA) occur within one year of the previous pregnancy (Tocce et al., 2012; Martin et al., 2019).

Short birth intervals are linked with an increased risk of death both for the new infant and for the older sibling (Hutcheon et al., 2019). Birth spacing, has a wide array of benefits including fewer unplanned pregnancies and abortions, more educational and economic opportunities, self-sufficiency improved maternal and infant health, greater family wellbeing, and reduced public spending (Kaye et al, 2014). The World Health Organization (WHO) recommends 24 months of spacing between births, as shorter pregnancy intervals are associated with adverse maternal and child health outcomes (Norton et al., 2017).

To address this public health issue, several interventions have been developed to prevent repeat teenage pregnancy, which includes school-based programs, home visitations, clinic-based programs, training, community workers, peer interventions, cash assistance programs. Some interventions have caused a 50% reduction in the odds of repeated pregnancy (RP) for at least 19 months after the first pregnancy, while some interventions, diminish in effect, after 31 months (Corcoran and Pillai, 2007; Aslam et al., 2017; Maravilla et al., 2016; Smith Battle et al., 2017).

These interventions need to be rigorously evaluated for possible integration into evidence -based practice (Urschel et al., 2001; Fineout-Overholt et al., 2010; Lachance et al., 2012, Aslam et al., 2017).

Understanding the levels of evidence of the interventions for adolescent repeat pregnancy can provide guidance to health practitioners and decision makers in selecting an intervention.

The aim of this review is to assess the level of evidence of repeat pregnancy interventions conducted in the U.S. for possible integration into evidence- based practice.

2. Method

We focused on articles published between 1990 and 2021. We searched for articles in:

The Cochrane Central Register of Controlled Trials (CENTRAL), Medline, EMBASE, Social Science Citation Index and Science Citation Index, Dissertations Abstracts Online, PsycINFO, CINAHL, POPLINE, PubMed and the reference lists of articles.

2.1 Research Question

'What are the levels of evidence for interventions for teen repeat pregnancy?'

2.2 Selection Criteria

We included and evaluated any intervention that aimed to promote spacing of 2nd birth and reduced repeat teen pregnancies in adolescents ages 13-19 years.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
Articles written in English.	Articles not written in English.
Articles involving a secondary or repeat pregnancy prevention intervention for adolescents	Articles focusing on primary pregnancy prevention for adolescents
Study participants were defined as adolescents (13 to 19 years of age)	Study participants who were not defined as adolescents
Interventions studies with baseline and follow-up intervention data	Interventions without a baseline and follow-up data
The outcome of interest, had to include reduced adolescent repeat pregnancy rate	Outcome is not significant
Articles published after 1990	Articles published before 1990

We used The Johns Hopkins Nursing Evidence-Based Practice Model (Newhouse et al., 2007) to assign levels of evidence (Table 2).

Table 2. Hierarchy of Evidence for Intervention Studies

Level of evidence	Type of Evidence
I	Randomized control studies(RCT) Systematic review or Meta-analysis of RCTs
II	Controlled studies without randomization Quasi experimental Design (QED)
III	Non-experimental study, Case control (Retrospective) or Cohort study (Prospective)
IV	Qualitative or Descriptive study Systematic review of qualitative or Descriptive studies
V	Expert opinion or

Source: The Johns Hopkins Nursing Evidence-Based Practice Model (Newhouse et al., 2007)

3. Results

We retrieved 52 primary repeat pregnancy intervention studies conducted in the U.S. from 1990 to 2021.

We identified 25 interventions which met the inclusion criteria and were statistically significant.

Table 3 depicts the results of our finding. We have summarized our data in terms of level of evidence, study design, sample size, follow-up, type of intervention/description of intervention, and outcome.

3.1 Level 1

There were 12 randomized control studies that were statistically significant (O'Sullivan et al., 1992; Kitzman et al., 1997; Stevens-Simon et al., 1997; Solomon & Liefeld, 1998; Olds et al., 2002; Sims, & Luster, 2002; Belzer et al., 2003; Black et al., 2006; Barnet et al., 2009; Katz et al., 2011; Stevens et al., 2017, Cox et al., 2019).

Three, was conducted in a hospital/ clinic setting (O'Sullivan et al., 1992; Stevens et al., 2017; Cox et al., 2019). and one in the community (Katz et al., 2011). The majority of the interventions were conducted in the home (Kitzman et al., 1997; Stevens-Simon et al., 1997; Solomon & Liefeld,1998; Olds et al., 2002; Sims, & Luster, 2002; Belzer et al., 2003; Black et al., 2006; Barnet et al., 2009).

Interventions differ in their follow-ups from baseline. Some studies were followed for less than 24 months (O'Sullivan et al., 1992; Belzer et al., 2003; Stevens et al., 2017). Eight studies were followed for 24 months (Stevens-Simon et al., 1997; Kitzman et al., 1997; Solomon & Liefeld, 1998; Olds et al., 2002; Sims, & Luster, 2002; Barnet et al., 2009; Black et al., 2006; and Katz et al., 2011). One was for over 24 months (Cox et al., 2019)

3.2 Level II

There were six (6) Quasi-experimental studies that were statistically significant (Marsh, & Wirck,1991; Rabin et al., 1991; Ruch-Ross et al., 1992; Seitz, & Apfel,1993; Key et al, 2008 and Kan et al., 2012)

Two (2) were conducted in home setting (Marsh, & Wirck, 1991; Ruch-Ross et al., 1992). Two were conducted in a school setting (Seitz, & Apfel, 1993; Key et al., 2008), one in a clinic center (Rabin et al., 1991) and one in the community (Kan et al., 2012).

Follow-ups from baseline differs. Some studies were followed for 24 months (Ruch-Ross et al., 1992; Seitz, & Apfel, 1993; Key et al., 2008 and Kan et al., 2012). Two studies were followed for over 24 months (Marsh, & Wirck, 1991; Rabin et al., 1991).

3.3 Level III

There were five (5) cohort studies that were statistically significant (Fischer 1997; Key et al., 2001; Sangalang et al., 2006; Omar et al., 2008; Cox et al., 2012)).

One prospective studies (Cox et al., 2012), Four retrospective studies (Fischer 1997; Key et al., 2001; Sangalang et al., 2006; and Omar et al., 2008).

One retrieved data from birth certificate records (Sangalang et al., 2006), two from hospital clinical data (Omar et al., 2008; Cox et al., 2012) Two were conducted in a school setting (Fischer 1997; Key et al., 2001).

Three studies were followed for 24 months and over (Key et al., 2001; Sangalang et al., 2006; Cox et al., 2012). Two were less than 24 months (Fischer 1997; Omar et al., 2008).

3.4 Level IV

Two descriptive studies (Brown et al., 1999; and Schaffer et al., 2008). One was conducted in a community setting (Brown et al., 1999). One was conducted in a school on contraceptive services. One study was followed for 5 years (Brown et al., 1999) and another for 9 years (Schaffer et al., 2008).

4. Intervention

4.1 Level 1

The type of intervention provided varies for each study. Some interventions are comprehensive involving multiple services which may include contraceptive services, contraceptive education, maternal/infant/child health services, child care, social work services, and/or home visitation (O'Sullivan et al., 1992; Kitzman et al., 1997; Stevens-Simon et al., 1997; Solomon & Liefeld,1998; Stevens et al., 2017; Cox et al., 2019); Contraceptive services and information includes counseling on correct contraceptive method use and side effects (Belzer et al., 2003; Stevens et al., 2017); Planning for contraceptive use and pregnancy planning (Olds et al., 2002); Motivational interviewing which include the use of a counseling style that emphasizes an individual's personal goals and self-efficacy in relation to complex behaviors (Sims, & Luster, 2002; Barnet et al., 2009), Mentorship which includes the use of planned mentorship curriculum by providers who have had similar life experiences (Black et al., 2006) goal setting which includes to assist teens in preparing short- and long-term plans to achieve life goals (Sims, & Luster, 2002); cell phone counseling which includes the use of cell phones to counsel and provide education without surcharge (Katz et al., 2011).

4.2 Level II

Some interventions were comprehensive (Marsh, & Wirck, 1991; and Rabin et al., 1991); Contraceptive services and information (Kan et al., 2012) which includes contraceptive information such as counseling on correct method use and side effects (Key et al, 2008); Educational classes which includes counseling, post-partum contraceptive services (Seitz, & Apfel, 1993); Goal setting and peer support (Ruch-Ross et al., 1992).

4.3 Level III

Some interventions were comprehensive (Key et al., 2001; Cox et al., 2012); Some centered on contraceptive services and information (Omar et al., 2008), goal setting and case management (Sangalang et al., 2006) and two on educational training which includes counseling, (Cox et al., 2012). Case management and skill building (Fischer 1997).

4.4 Level IV

Two descriptive studies were found. One focused on contraceptive studies which includes contraceptive information, counseling on correct use and side effects and monthly meetings (Schaffer et al., 2008). The other, included monthly meetings and incentive (Brown et al., 1999).

5. Discussion

The primary purpose of this review is to summarize repeat pregnancy interventions reported in the U.S. according to their level of evidence for possible integration to evidence-base practice.

5.1 Level of Significance

The statistical analysis used to represent level of significance for the interventions differ among the articles reviewed (Newhouse et al., 2007; Stommel & Dontje, 2014; In some, Odds ratios (ORs) and 95% confidence intervals were calculated to determine the association between intervention and control. ORs above one (1) indicate that the odds of pregnancy in the treatment group is larger than the odds of pregnancy in the control group. OR values less than 1, indicate that the interventions tend to reduce the occurrence of unwanted pregnancy among teenagers. Some Interventions outcome were reported in OR (Belzer et al., 2003). In some articles, level of significance was reported as a probability value (p-value). This is a number describing how likely it is that the data would have occurred by random chance (i.e. that the null hypothesis is true). The p-value is often expressed between 0 and 1. The smaller the p-value, the stronger the evidence that the null hypothesis should be rejected. A p-value less than 0.05 (typically ≤ 0.05) is statistically significant. It indicates a strong support that the difference observed is as a result of the intervention. A p-value, higher than 0.05 (> 0.05) is not statistically significant and supports that the difference observed, is as a result of random chance and not from the intervention implemented. The articles selected for this review, are those that are statistically significant.

Some articles reviewed, represented their level of significance as both a p-value and OR (O'Sullivan et al., 1992; Solomon & Liefeld, 1998; Key et al., 2001; Cox et al., 2019).

Level of significance of some articles were represented as a p-value only (Rabin et al., 1991; Seitz, & Apfel, 1993; Kitzman et al., 1997; Olds et al., 2002; Black et al., 2006; Barnet et al., 2009; Katz et al., 2011; Kan et al., 2012, Stevens et al., 2017).

In some articles the level of significance, of intervention was compared to control in form of a percentage (Marsh, & Wirck,1991; Ruch-Ross et al., 1992 Fischer, 1997; Stevens-Simon et al., 1997, Brown et al., 1999; Sims, & Luster, 2002; , Sangalang et al., 2006; Omar et al., 2008; Schaffer et al., 2008, Cox et al., 2012) and in some as a percentage and as a p-value (Key et al, 2008). One was reported as OR (Belzer et al., 2003).

5.2 Level of Evidence

5.2.1 Level I

The Randomized Control Trial (RCT) is a rigorous research design. Recognized as the gold standard of research. It is a planned study that introduces a treatment to study its effect on real patients. The researchers' use methodologies that reduce the potential for bias (randomization and blinding) and that allow for comparison between intervention groups and control groups (no intervention).

We identified 12 RCT. Statistical significance were presented as a percentage (%) (Stevens-Simon et al., 1997; Sims, & Luster, 2002); p-value (Kitzman et al., 1997; Olds et al., 2002; Black et al., 2006; Barnet et al., 2009; Katz et al., 2011; Stevens et al., 2017), OR and p-value (O'Sullivan et al., 1992; Solomon & Liefeld,1998; Cox et al., 2019) and OR only (Belzer et al., 2003). The level of significance ranged from 0.05 to 0.006. The interventions with the highest impact, were those with a comprehensive home intervention that included the use of contraceptives (O'Sullivan et al., 1992; Solomon & Liefeld, 1998; Stevens et al., 2017).

5.2.2 Level II

Quasi experimental Design (QED), falls under level II. A quasi-experiment is an empirical interventional study used to estimate the causal impact of an intervention on target population (Handley et al., 2018). Unlike RCT, QED does not randomly assign participants to treatment or control groups for comparison.

We identified six (6) QED (Marsh, & Wirck, 1991; Rabin et al., 1991; Ruch-Ross et al., 1992; Seitz, & Apfel, 1993; Key et al, 2008 and Kan et al., 2012). Statistical significance was presented as a percentage (%) (Marsh, & Wirck, 1991; Ruch-Ross et al., 1992); p-value (Rabin et al., 1991; Seitz, & Apfel, 1993; Key et al, 2008; Kan et al., 2012), None was presented as OR only or as a p- and OR. The level of significance ranged from 0.05 to 0.001. The intervention with the highest impact, was a comprehensive intervention that included the use of contraceptives in a home and school setting (Rabin et al., 1991; Seitz, & Apfel, 1993; Key et al, 2008, Kan et al., 2012).

The lack of randomization weakens the strength of findings because of the possibility of not being able to predict the same outcome in another group of patients (Schweizer et al., 2016; Handley et al., 2018).

5.2.3 Level III

Clustered under this level of evidence, are non-experimental studies, which include case control and cohort studies. Case control studies are retrospective studies in which patients have a specific condition and are compared to individuals who do not have the condition. In retrospective studies, researcher often relies on medical records and/or patient recall for data collection, these types of studies are less reliable than RCTs, QED and cohort studies (Sutherland 2001; Wyatt G, 2003). Even if the researcher can show a statistical relationship, it is very difficult to determine if one factor caused the other. Cohort studies involve two groups (cohort) of patients where one group will have a certain condition and/or receive a particular treatment then followed over time and compared with another group who are not affected by the condition under investigation or did not receive a treatment.

In this review, we identified four (4) retrospective studies (Fischer, 1997; Key et al., 2001; Sangalang et al., 2006; and Omar et al., 2008) and 1 prospective single cohort study (Cox et al., 2012). Statistical significance was presented as percentage(Fischer,1997; Sangalang et al., 2006; Omar et al., 2008; Cox et al., 2012); OR and p-value (Key et al., 2001;) and none was represented as OR or p- value only. For Key et al., 2001, the p-value was 0.05, with an intervention that is comprehensive, conducted in a school setting.

5.2.4 Level IV

Level IV evidence includes Qualitative and Descriptive study. Qualitative study gathers data on human behavior to understand why and how decisions are made while descriptive study, provides background information on the what, where, and when of a topic of interest (Kim et al., 2017).

In this review, we identified 2 descriptive studies (Brown et al., 1999; Schaffer et al., 2008). The level of significance, for these intervention was compared to control in form of a percentage. (Brown et al., 1999; Schaffer et al., 2008) only.

5.3 Intervention

Govender et al. (2018) conducted a scoping review aimed to gather relevant information from national and international sources to inform practice and to provide an understanding of what is known about the risk factors of and the interventions for adolescent repeat pregnancy. Their result showed that a single ‘one-size-fits-all’ intervention for adolescent repeat pregnancy prevention is unlikely as different strategies were employed by the intervention programs.

This review is consistent with other reviews including Govender et al 2018, Maravilla et al. 2016, suggesting that many interventions have been employed in repeat teen pregnancy. These vary from home visitation, peer support, school based and comprehensive interventions including contraceptive use. Of the studies we reviewed, the majority were home visits eight with level 1 evidence (Kitzman et al., 1997; Stevens-Simon et al., 1997; Solomon & Liefeld, 1998; Olds et al., 2002; Sims, & Luster, 2002; Belzer et al., 2003; Black et al., 2006; Barnet et al., 2009).

Norton et al., 2017, reviewed interventions that were designed to prevent rapid repeat pregnancies among adolescents. Their study revealed that effective interventions that prevent rapid adolescent childbearing link clinical contraceptive services with non-clinical activities such as those that include planning skills, enhance understanding of the role that contraceptives can play in determining positive life outcomes, and provide mentoring and goal setting. Our report supports their finding. We found that the intervention with the highest impact, was a comprehensive home intervention that included the use of contraceptives (O'Sullivan et al., 1992; Solomon & Liefeld, 1998; Stevens et al., 2017, Lewin et al., 2019).

5.4 Follow-ups

The World Health Organization (WHO) recommends 24 months of spacing between births, as shorter pregnancy intervals are associated with adverse maternal and child health outcomes

We found disparities in the follow-up after providing an intervention. Follow-ups, range from 12 months to 24 months. In articles with level I evidence, we found some studies were followed for less than 24 months (O'Sullivan et al., 1992; Belzer et al., 2003; Stevens et al., 2017). Eight studies were followed for 24 months (Stevens-Simon et al., 1997; Kitzman et al., 1997; Solomon & Liefeld, 1998; Olds et al., 2002; Sims, & Luster, 2002; Barnet et al., 2009; Black et al., 2006; and Katz et al., 2011). One was for over 24 months (Cox et al., 2019).

For level II, some studies were followed for 24 months (Ruch-Ross et al., 1992; Seitz, & Apfel, 1993; Key et al., 2008 and Kan et al., 2012). Two studies were followed for over 24 months (Marsh, & Wirck, 1991; Rabin et al., 1991).

For level III, three studies were followed for 24 months and over (Key et al., 2001; Sangalang et al., 2006; Cox et al., 2012). Two were less than 24 months (Fischer 1997; Omar et al., 2008).

Level IV, one study was followed for 5 years (Brown et al., 1999) and another for 9 years (Schaffer et al., 2008).

6. Conclusion

Interventions can be categorized into: home visitation, peer support, school- based and comprehensive interventions including contraceptive use. There were also disparities in the intervention follow-ups, components, study location, statistical analyses and persons conducting the intervention. These disparities, made it difficult to compare and contrast the different interventions. We were able to successfully assign levels of evidence to each intervention. We identified Twelve (12) Level I; Six(6) Level II; five (5) Level III and two (2) Level IV.

Table 3. Author, publication year, study design, sample size, follow-up, type of intervention/description of intervention, and outcome and level of evidence

	Citation	Study design/ Sample size/Age	Measure of repeat pregnancy (Follow up)	Type of Intervention/ Description	Outcome	Level of evidence
1	Barnet; 2009	RCT 235 Adolescents	Birth 24 months	Community/Home Visits. Computer-assisted motivational interviewing intervention: counseling, (personal goals and self-efficacy) c home visitation to prevent rapid repeat pregnancies.	Controlling for baseline group differences, the HR for repeat births was significantly lower in 1 of 2 intervention groups vs. control; HR=0.4 (P<.05)	I
2	Belzer, 2003	RCT A total of 160 Adolescent (ages 14–20 years)		Contraceptive/ Home Visits. Intervention include: completion of a baseline questionnaire, education on the use and access to Emergency Contraceptive (EC), access to primary contraception. Randomization into- (1) intervention group participants received an advanced supply of levonorgestrel-only emergency contraception,(2) control group received education only. Youth were contacted by phone at 6 months to answer a slightly abbreviated 10-minute questionnaire, primarily directed to assess hormonal contraception, condom use, sexual activity, episodes of uncontracepted sex,	Odds ratio (CI)-0.33 (0.097-1.13) Odds ratios and 95% confidence intervals were calculated to determine the association between contraceptive use and group assignment at baseline and follow-up. EC utilization was significantly higher in the intervention group (85%) compared to 19% in the education only, control subjects (p .001). There were no statistically significant differences in reported primary contraception use between the groups, OR .77 (CI .47–1.25) nor in condom use, OR .71 (95% CI .32–1.57) Clinicians to educate adolescent mothers about EC use and availability. These women should receive EC education and be	I

				use of EC, reasons for not utilizing EC, and pregnancy since their baseline interview.	offered an advanced supply of EC when accessing family planning services. Concerns about the provision of an advanced supply of EC reducing condom use and primary contraception appear unwarranted.	
3	Black; 2006	RCT 149 Adolescents	Birth 24 months	Postpartum home-visitation, mentoring intervention: curriculum delivered every other week until infant's first birthday. Curriculum emphasized negotiation skills, adolescent development, and parenting. Intervention, provided by women from community who served as mentors.	I=8/70 (11%) C=19/79 (24%) P<.05	I
4	Jack Stevens 2017	RCT 598 10-19	6 and 18 months	Clinic Based. Intervention includes: Contraceptives, self-report survey, Facilitated birth control access, transportation assistance	There was an 18.1% absolute reduction in self-reported repeat pregnancy in the intervention group relative to the control group (20.5% vs 38.6%%; P < .001).	I
5	Joanne E. Cox, 2019	RCT 140 <19	12,24,36	Clinic. Intervention include: Parenting and life skill- education, Maternal self-esteem, parenting attitude.	Repeat pregnancy by 36 months was significantly lower for intervention versus control participants. Follow up(36); (N) 100 ; ©66.7; (Int)42.3 .(p)015; OR(95% cl) 0.20 (0.06–0.75);(OR,P) .017.	I
6	Katz; 2011	RCT 249 Adolescent 15-19	Pregnancy 24 months	Community/Home Visits. Cell phone-based counseling Intervention: Intensive cell phone counseling intervention to prevent subsequent teen pregnancies by strengthening healthy relationships, reproductive practices, positive youth assets, and teen's own goals and needs.	Ages 15–17: I=26% C=39% Participants ages 15–17 at delivery showed significant reduction in subsequent pregnancy with increased levels of intervention exposure (P<.01). but not those ≥18 years. Adolescents ≥18 years faced considerable challenges to treatment success.	I
7	Kitzman 1997	RCT 1139 Adolescents	Pregnancy 24 months	Home visitation by nurses to improve newborn and child health and mental development, prevent injuries, and rapid repeat pregnancies.	I=36% C=47% P<.01	I
8	Olds; 2002	RCT 735 Adolescents with no	Pregnancy 24 months	Nurse home-visitation. Intervention: plan the next pregnancy, improve health behaviors, prevent rapid repeat	I=29% C=41% P<.02	I

		previous live birth		pregnancies, improve parent care of children, and maternal life course development		
9	O'Sullivan; 1992	RCT 243 Adolescent	Pregnancy 18 months	Education in baby clinic for teen mothers: The control group received routine well-baby care. The experimental group received routine care services, rigorous follow-up, plans for return to school, use of family planning methods, health teaching, immunizations, and reduced use of emergency room.	I=13/108 (12%) C=32/113 (28%) P<.003 ; Odds ratio (CI) 0.35(0.17-0.70)	I
10	Sims; 2002	RCT 99 Adolescents	Pregnancy 24 months	Community/Home. Intensive family support services, include: weekly home visits from paraprofessional family advocate. with the goals of high school completion, limiting further childbearing; barriers to using contraceptives were removed (e.g., free medical and transport services).	I=58% repeat pregnancy C=63% repeat pregnancy	I
11	Solomon and Leifeld (1998)	RCT • N = 88 • Intervention = 88 • Control = 39	Follow-up was done at 24 months.	Contraceptive Intervention included: home visits, health education, infant care, contraception education and access, life skills orientation, community outreach services, sexuality, HIV and STI education and behavior skills development.	Odds ratio (CI) 0.11(0.03-0.36) At 24 months, 3 repeat pregnancies (10%) occurred in the intervention group in comparison to 11 (33%) in the control group (p = 0.006).	I
12	Stevens-Simon; 1997	RCT 286 Adolescents	Pregnancy 6, 12, and 24 months	Community/Home Incentive Participants were randomized to 4 interventions: monetary incentive and peer-support group; peer-support group only; monetary incentive only; or no intervention	Incidence of repeat pregnancy in 3 intervention groups at 24 months: (1)=34/97=35.1% (peer and incentive) (2)=13/23=56.5% (peer only) (3)=35/84=41.7% (incentive only) C=15/44=34.1%	I
13	Kan; 2012	QED 1,038 Adolescents	Pregnancy within 12 months and after 12 months of program intake 6-24 months	Community/Home Visits Cross-site evaluation of 12 projects required to offer 10 comprehensive health, child welfare, and contraceptive services.	Impact achieved within 12 months but not after 12 months. Within 12 months: I=9.8% C=19.5% P<.05 After 12 months: I=16.4%	II

					C=12.8%	
14	Key; 2008	QED Subjects = 63 Propensity-matched comparison group=252 adolescents 16	Births. Followed mothers for at least 24 months	Contraceptives School based Comprehensive: Comprehensive services including intensive case management by school social worker, home visitation, peer education, and medical care.	Births by 30 months: I=14% C=26% P<.05 The rate of subsequent births was lower in participants (17%) than in the comparison group (33%) (p = .001, hazard ratio = 2.5). This difference was similar over time and became significant by 30 months after the initial birth (p = .05) (For 24 months follow up: participants 11%, comparison group 20%; For 30 months follow up: participants 14%, comparison group 26%	II
15	Marsh 1991 US	QED 335 adolescents Institutional cohort	Pregnancy 3 years	Comprehensive service program for adolescents: health, nutrition, family planning, child care, job training, housing assistance, parenting and life skills. Program goal was to delay initial and repeat pregnancies.	The number of repeat pregnancies in one year was completely unaffected by the program. Over 3 years, the average number of repeat pregnancies was 18%.	II
16	Rabin; 1991	QED 589 adolescent	Pregnancy occurring over 9 program years	Comprehensive services: include sexual education, contraceptive education, sexual responsibility, contraceptive availability and utilization/postpartum family planning provided by multidisciplinary team.	For all 9 years of the program: I=9% repeat pregnancy C=70% repeat pregnancy. Pregnancy declined significantly with each successive year of the program (P<.001).	II
17	Ruch-Ross; 1992	QED Analysis of participant records/comparison group drawn from National Longitudinal Survey of Youth 1,794. Adolescents	Birth 12 -24 months	Home visitation for 2 years after birth, peer-support model; goal setting to include delaying subsequent pregnancy.	After adjustment, comparison participants were about 1.4 times more likely to experience a subsequent pregnancy at 12 months after program enrollment than intervention participants.	II
18	Seitz; 1993	QED 102 Adolescent	Birth 24 months	Separate school for pregnant students integrated into the city school system. social and medical services were provided in addition to educational classes. Counseling included helping parents plan for immediate and long-term future, and for adolescents participating >7 weeks, a requirement for postpartum checkup before exiting the school.	I=6/50 (12%) C=19/52 (36%) P<.005;	II

19	Cox; 2012	Prospective single-cohort demonstration project 144 Adolescents	Pregnancy 24 months	Clinic. Comprehensive medical and social services for teen mothers provided in a “medical home” case management, promoting/ prevention of subsequent pregnancies, and improving life skills.	I=24% Compared with higher 24-month pregnancy rates found in other studies	III
20	Fischer; 1997	Analysis of program data. School setting=311 Health setting=230 Adolescents adolescents	Pregnancy 12 months	School and Health Setting Social work and Case management delivered, help teen mothers complete high school, develop parenting skills, and avoid additional pregnancy.	In school setting, 9% of 311 subjects experienced repeat pregnancy, while in health setting 3% of 230 subjects experienced repeat pregnancy.	III
21	Key et al; 2001	A retrospective case-controlled cohort study n = 50; control subjects, n = 255)	3 years	Comprehensive School based. Intervention includes: contraception use, weekly group meetings-parenting, career planning, adolescent issues, case management, home visits, medical care.	Odds ratio (CI) 0.11(0.03-0.36) Repeat births occurred in 3/50 (6%) of participants and 95/255 (37%) of controls ($p < .05$).	III
22	Omar and McClanahan; 2008	Retrospective review of clinic data. 1,004 program participants compared with 790 adolescent mothers included in national survey. Adolescent : 11-19	Pregnancy 12 months	Comprehensive: Intervention: Clinical health services, comprehensive care for teen mother and baby, including prenatal, postnatal care, mental health services, extensive contraceptive counseling prior to start of contraceptive use and at every clinic visit.	Of 1,386 mothers, only 11 (0.79%) experienced repeat pregnancy during 3-year program period.	III
23	Sangalang; 2006	Retrospective study using North Carolina birth certificate records. 1,260 first-time Adolescent mothers	Births 24 months	Home visits/ Case management by social workers and health professionals. Intervention Include: goal setting to prevent repeat pregnancy, prenatal care use.	Risk of 2nd birth was about 20% less in intervention group 88% of intervention mothers did not have a second birth 85% of control mothers did not have a second birth	III
24	Brown; 1999	Descriptive 65 Adolescents	Pregnancy 5 years	Community/Home Weekly meetings and an informal program based on needs of members with an award of $1 for each day that participants did not become pregnant.	Of 65 adolescents enrolled in the program, 10 became pregnant (15% repeat pregnancy rate). This rate was substantially lower than the 30%–35% rates reported by other programs.	IV
25	Schaeffer; 2008	Descriptive study 276	Pregnancy 9 years	US school-based model. Daily presence of Public Health nurses in the school. Intervention:	Over 9 years, 20 pregnancies occurred among 276 participants, resulting in a repeat pregnancy	IV

adolescents	planning the next pregnancy, monthly pregnancy testing and repeated asking of question: How many children do you want to have? Serves delivered through collaboration of multidisciplinary services provided by school, health department, community hospital, case management, counseling, referral, and classes in school on contraception.	rate of 7.2%.

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