

Feasibility Study of Smoking Cessation in Pregnant and Postpartum Adolescents in Rural Appalachia

Ilana R Azulay Chertok*

Department of Nursing Research and Scholarship, Ohio University, Ohio, USA

*Corresponding author: Dr. Ilana R Azulay Chertok, Professor, Associate Director of Department of Nursing Research and Scholarship, Ohio University, USA, Tel: 7405931000; E-mail: chertok@ohio.edu

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Abstract

Objectives: Pregnant and postpartum adolescents living in the rural and mountainous Appalachian region face health disparities that impact their health behaviors and health outcomes. The purpose of the study was to facilitate the accessibility of a smoking cessation intervention among a group of at-risk pregnant and postpartum adolescents living in a residential group home to examine its feasibility in this vulnerable population.

Methods: Feasibility study evaluating the implementation of a developmentally appropriate 5 as smoking cessation intervention designed to reduce smoking and provide perinatal healthy lifestyle education among a small group of vulnerable pregnant and postpartum adolescents living in a residential home in the Appalachian state of West Virginia. The study examined smoking status, tobacco resistance self-efficacy, and coping behavior measurement.

Results: The program facilitated improvement in the participants' perception of ventilating feelings and perception of seeking professional support. Additional modifications to the smoking cessation program are needed to appropriate the program to this vulnerable adolescent population living in a residential group home.

Conclusion: Recommendations for program adjustments when working with vulnerable pregnant and postpartum adolescents in West Virginia includes developing trust and adapting program delivery methods to meet the needs of this at-risk population.

Keywords: Adolescent pregnancy; Smoking cessation; Rural Appalachia

in Central and Southern Appalachia are at higher risk for poor health outcomes [1]. Conducting health intervention research, following recruitment, and maintaining retention in the rural mountainous areas with limited public transportation accessibility presents challenges, particularly, when working with high-risk populations such as adolescents [2]. Additional challenges with adolescent participation include obtaining parental consent, ensuring privacy, respecting autonomy, and creating a culturally and developmentally relevant and accessible intervention [3,4]. Furthermore, participation may be limited and challenged in situations where the adolescents do not live with their families for physical, emotional, social, or safety reasons, and are placed in residential settings [5].

While the United States (USA) birth rate among adolescents aged 15 to 19 has reached a historic low in 2010 with an overall rate of 34.2 per 1,000, the adolescent birth rate in the Appalachian state of West Virginia is relatively high at 44.8 per 1,000 and has not been experiencing a recent decline [6]. Among pregnant women in the USA, adolescents and young women are at highest risk for prenatal smoking [7]. West Virginia has the highest overall prenatal smoking prevalence rate in the nation of 31.9% compared to the overall national rate of 11.7% [8]. Among pregnant adolescents in West Virginia, the prenatal smoking rate is 34.1% [9], higher than the national average prenatal smoking rate of 20.7% among pregnant adolescents [10]. Furthermore, external influences such as culture related to smoking in the region along with internal influences such as biochemical dependence reinforce the embedded behavior of smoking among adolescents in West Virginia [11]. Prenatal smoking is a risk factor for poor health outcomes as it leads to decreased placental oxygen and reduced nutrient transfer [12]. Specifically, in rural regions of the US, prenatal smoking has been identified as a primary predictor of low birth weight and adverse pregnancy outcomes [13,14].

Smoking is a modifiable risk factor that should be addressed during pregnancy as this period is a motivating time and "teachable moment" for helping women to choose to engage in healthy behaviors [15]. Prenatal smoking cessation interventions can reduce the risks of low birth weight and preterm delivery [16]. Implementation of the 5 As program in an accessible manner among pregnant women in West Virginia has been found to be effective [17]. Limited evaluations of

Introduction

The Appalachian region faces relatively high rates of health disparities and limited health resources, especially in the designated distressed counties where infants born to women

evidence-based interventions have been published that specifically target health behaviors in pregnant adolescents, especially in at-risk areas such as Appalachia. An evaluation of a smoking cessation program for non-pregnant adolescents identified facilitators of successful recruitment and retention including proactive selection of smokers, protection of privacy, respect for autonomy, program relevance, and program accessibility [3]. When working with pregnant adolescents, it is especially important to provide education of the risks associated with prenatal smoking as research has indicated this population lacks knowledge regarding the negative impact of smoking on fetal and maternal health [18]. The teen fresh start plus buddy smoking cessation intervention was adapted for pregnant adolescents from the American Cancer Society's Fresh Start program and was shown to have short-term cessation success, although it lacked long-term postpartum effectiveness [19]. Key elements of the intervention were using both a one-on-one intervention by medical staff trained in smoking cessation along with an eight-session group intervention offering peer support, role-modeling, and education.

When working with pregnant adolescents, specific attention must be given to their psychosocial needs, particularly to developmental tasks such as positive self-identity development and the negotiation of social pressures from peers, dating partners, and family members [20]. Reasons for smoking during pregnancy include coping with stress, weight management, body image, and reduction of the pain of labor and delivery [20]. Adolescents may experience stress with health decisions and their cognitive and emotional maturity can lead to decreased rational thinking and continuation of risky behaviors, which can be compounded by pregnancy [18]. Additional obstacles for pregnant adolescents living in rural areas, particularly in Appalachia, include limited resources, poverty, increased stigma, lack of transportation, and lack of access to healthcare providers, thereby contributing to health disparities [2,9,21]. The primary aim of the study was to evaluate the feasibility of implementing a smoking cessation intervention among pregnant and postpartum adolescents living in a residential setting in rural Appalachia.

Methods

A feasibility study was conducted aimed at implementing an evidence-based smoking cessation program among a group of pregnant and postpartum adolescents living in a residential home in West Virginia. The intervention program provided developmentally appropriate, psychoeducational group support, and prenatal smoking cessation education through in-person meetings by an interdisciplinary team of nursing and social work researchers to comprehensively address the biobehavioral and psychosocial needs of the participants. Using a different evidence-based approach to prenatal smoking cessation among adult women in rural Appalachian communities, teams of nurses and social workers have been effective in facilitating reduced smoking exposure among pregnant women [22], thereby supporting the interdisciplinary

collaboration. Institutional review board approval was obtained prior to implementation.

The smoking cessation portion of the intervention program utilized the American College of Obstetricians and Gynecologists (ACOG) adapted 5 As prenatal smoking cessation intervention that has been effective at facilitating smoking cessation and reduction in pregnant women [23,24]. The 5 As program is an evidence-based program that was provided by a trained healthcare provider using the 5 steps: 1) Ask about tobacco use, 2) Advise to quit, 3) Assess willingness to make a quit attempt, 4) Assist in quit attempt, and 5) Arrange follow-up [24]. In addition to delivering the healthy lifestyle content by the intervention team, a weekly psychoeducational support group was facilitated with program activities over eight weeks as a psychosocial intervention for the adolescents at the residential home. Based on existing research [19], peer support was given high priority within the group model.

Several outcome measures were completed at initiation, midpoint, and conclusion of the program. The Adolescent Coping Orientation for Problem Experiences (A-COPE) measures coping behavior through a self-reported questionnaire regarding ability to cope through the following mechanisms: ventilating feelings, seeking diversions, developing self-reliance and optimism, developing social support, solving family problems, avoiding problems, seeking spiritual support, seeking professional support, investing in close friends, engaging in demanding activity, being humorous, and relaxing [25]. To measure tobacco resistance self-efficacy, a brief 4-question tool was adapted from the Alcohol Resistance Self-Efficacy Scale [26], with questions on resisting, reducing, quitting, and limiting smoking. Participants self-reported their smoking status throughout the program with recommended validation using a carbon monoxide breath detector [27].

Results

Participants included eleven female adolescents living in the residential group home; three participants were pregnant throughout the duration of the study, three gave birth during the study, and five were postpartum. The eight adolescents who delivered by the completion of the study were parenting their infants in the home. The mean age was 17.5+1.0 years (range 16-19 years), the mean number of years of education were 10.4+2.0 (range 8-15 years), and 90% of the participants were Caucasian. One of the young women had two children while the remaining participants had one child or was expecting her first child. Among the seven participants who answered the question about smoking status at the initiation of the program, three (33.3%) had stopped smoking since finding out they were pregnant and four (66.6%) were still smoking, although they had reduced the number of cigarettes they smoked during pregnancy. The average age of initiating smoking was 12.8+1.8 (range 11-16). All of the participants (100%) reported that their parents smoked. Of the three participants with boyfriends, the adolescents reported that all of the boyfriends smoked. Among the seven postpartum

participants who completed the postpartum survey, there were 57.1% (n=4) boys and 42.9% (n=3) girls born, with an average gestation of 38.8±1.3 weeks (range 38-41 weeks) and average birth weight of 3377.9±255.2 grams (range 2892-3657 grams). Two of the postpartum participants were breastfeeding their infants.

Regarding changes in smoking behavior, there was a reported reduction in smoking rates and in the number of cigarettes smoked, although, it must be noted that smoking was prohibited at the residential home, which may have contributed to a reporting bias. The participants reported that they had not smoked any cigarettes in the past week while in the residential home, although the carbon monoxide testing did not confirm reports of smoking abstinence. The

participants' overall tobacco resistance self-efficacy scale scores increased from a median of 2.5 at time 1 to a median of 4.0 at times 2 and 3 (on a 4-point scale), indicating a high level of perceived self-efficacy, although the repeated measures ANOVA test result was not statistically significant (p=0.30).

Results of the one-way repeated measures ANOVA tests conducted on the data from the A-COPE coping behavior measurement tool indicate significant improvement in the participants' perception of ventilating feelings (p=0.02) (**Table 1**). The participants' perception of seeking professional support showed an improved trend with time (p=0.07). Changes in the other coping subscales were not statistically significant.

Table 1 Mean changes in A-COPE scores at initiation, midpoint, and completion of intervention for pregnant and postpartum adolescents living in a rural residential group home (n=7).

A-COPE Subscale	Initiation	Midpoint	Completion	p value
Ventilating feelings	16.3 ± 5.5	13.0 ± 4.9	19.2 ± 6.2	0.02*
Seeking diversions	21.6 ± 6.6	20.8 ± 5.6	22.9 ± 8.2	0.4
Developing self-reliance and optimism	21.3 ± 2.7	21.0 ± 2.7	21.6 ± 4.9	0.88
Developing social support	19.8 ± 3.1	20.8 ± 4.3	20.7 ± 5.4	0.99
Solving family problems	21.2 ± 5.6	20.1 ± 6.6	21.8 ± 6.9	0.4
Avoiding problems	10.6 ± 4.2	9.9 ± 3.0	12.7 ± 6.3	0.82
Seeking spiritual support	6.7 ± 2.9	7.1 ± 3.6	7.6 ± 3.5	0.97
Investing in close friends	7.5 ± 2.3	7.4 ± 2.6	7.0 ± 3.4	0.85
Seeking professional support	4.3 ± 2.1	5.8 ± 3.0	6.0 ± 2.7	0.07
Engaging in demanding activity	11.4 ± 5.2	9.9 ± 3.8	10.7 ± 4.8	0.75
Being humorous	7.1 ± 2.3	6.8 ± 2.0	6.7 ± 2.7	0.74
Relaxing	13.4 ± 3.4	13.3 ± 2.4	13.0 ± 4.0	0.78
*p<0.05.				

Discussion

The developmentally adapted intervention program aimed at smoking cessation was implemented among a group of pregnant and postpartum adolescents living in a residential group home in rural Appalachia where prenatal smoking rates are high compared to national rates. The program demonstrated some level of feasibility based on the results of the group program evaluation. The program facilitated the participants' improved self-efficacy in reducing smoking and desire to quit smoking, although there were challenges to the implementation of the program such as consistency of program participation related to the dynamic nature of pregnancy and delivery as well as high school completion requirements and residential group home program demands. The lack of consistency in program participation resulted in a small sample size for the duration of the program. Nonetheless, results of the feasibility study showed improvement in perception of venting feelings and seeking

professional help which are especially important for this vulnerable population who are often marginalized. Bringing the program to the residential group home aided program accessibility for the participants.

Measurement tools for adolescent behaviors and attitudes such as the A-COPE may require adaptations for those who do not live with their families or attend school or community activities in the manner that reflects most high school youth in the US. Pregnant and postpartum young women living in a group home are especially vulnerable because of the often traumatic circumstances around their living situation, which is associated with a diminished sense of trust [28], although trust was not assessed during the program. Another factor that may have negatively affected recruitment and retention is the potential concern for a lack of anonymity and concern regarding confidentiality given the small, closed community setting [21] that may have increased the risk of response bias. Considering the vulnerable situation of these pregnant and

postpartum adolescents living in a residential group home, it is imperative for similar programs to establish and maintain trust for effective communication and partnership with this at-risk population [29].

An unexpected positive outcome of the study was learned following the intervention program in a debriefing session with the agency staff, executive director, and the researchers. The residential program administration expressed an interest in continuing the group intervention and requested that the researchers deliver the 5 As intervention for the staff members, after recognizing that staff support for smoking cessation was needed to further support the pregnant and postpartum adolescent residents' efforts. The researchers delivered the [5]. As program to the staff members to help them engage in smoking reduction and worked with them to make the transition for the program to be internally delivered while being available for assistance. Having the residential home program staff trained in the 5 As program and engaging in their own smoking reduction and cessation prior to the intervention with the adolescents would have reinforced the intervention program objectives prior to implementation and set the staff as models of successful smoking cessation.

Limitations

Given that these adolescents were in a residential group home for a variable and limited time periods, four of the eleven participants were discharged prior to the completion of the intervention, resulting in participant attrition. The sample size was limited by challenges in the given residential home environment that negatively impacted recruitment, retention, and consistent participation, as has been noted by other researchers who have conducted research with pregnant and postpartum adolescents [30]. As such, it is recommended that such interventions be conducted in a more intense and shorter time period. Additionally, there was a risk of reporting bias related to the restrictions on smoking in the residential home, although the researchers worked to establish and maintain trust with the participants throughout the program.

Conclusion

The developmentally adapted smoking cessation program for pregnant and postpartum adolescents living in a residential group home was feasible as it increased participants' confidence in venting feelings and in seeking professional assistance, despite challenges to recruitment and retention. Pregnant and postpartum young women in rural Appalachia face health disparities. The relatively high rate of smoking poses a risk to maternal-infant health in the region and therefore requires address in a manner that will be effective and acceptable to the participants. When working to change behaviors among vulnerable pregnant and postpartum adolescents, trusting relationships must be established. Intervention programs should be adapted to meet the developmental and social needs of this at-risk population.

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