HHS Public Access

Author manuscript

Soc Sci Med. Author manuscript; available in PMC 2018 November 01.

Published in final edited form as:

Soc Sci Med. 2017 November ; 192: 30–35. doi:10.1016/j.socscimed.2017.09.027.

Smoking Concordance During Pregnancy: Are There Relationship Benefits?

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Abstract

Objective—Couples often engage in similar patterns of behavior, including substance use, and similarity may benefit relationship quality. Such relationship benefits may be especially salient for adolescent and young couples, whose relationships are often unstable and prone to breakups. This study examined the effect of mutual smoking during pregnancy on relationship quality in pregnant adolescent and young adult couples.

Methods—Couples (N=228; $M_{AgeFemale}$=18.69; $M_{AgeMale}$=21.12) were recruited from obstetrics/gynecology clinics in Connecticut from July 2007 to February 2011. Couples completed measures of recent smoking and relationship quality (i.e. satisfaction, affectional expression, cohesion, and consensus) during pregnancy and at six months postpartum. Data were analyzed using multilevel models to account for interdependence within dyads.

Results—Discrepant smoking patterns were associated with a reduction in satisfaction and cohesion over time (B=−1.14, p=.03, and, B=−2.74, p=.03, respectively), and a reduction in consensus over time for female participants, B=−1.98, p=.07, but not for male participants, p=.51. Discrepant smoking was not related to affectional expression, p=.11.

Conclusions—Results suggest relationship benefits concordant smoking patterns during pregnancy. Interventions should consider potential unintended relationship consequences of changing individual health behavior and instead work to develop couple-level health interventions.

Keywords

couples; relationship satisfaction; pregnancy; smoking; concordance

Introduction

Cigarette use during pregnancy can lead to numerous negative health consequences for infants, including congenital heart defects, low birthweight, and miscarriage (Lee & Lupo,

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2013; Pineles, Park, & Samet, 2014; Wang et al., 2002). Rates of smoking during pregnancy are highest among young women ages 18–25 (~21%), followed by ages 15–17 (Curtin & Matthews, 2016; SAMHSA, 2014; USDHHS, 2014). Understanding the antecedents and consequences of smoking while pregnant, especially in young pregnant couples who are already at risk for poor birth outcomes (Fraser, Brockert, & Ward, 1995), might illuminate avenues for intervention. This study took a couple-level approach to examine the effects of concordant smoking (i.e. both partners smoke or both do not smoke) on relationship quality in adolescent and young adult pregnant couples. Parsing out the relationship consequences of smoking during pregnancy might inform development of couple-based smoking cessation interventions for young pregnant couples.

Couples often engage in similar patterns of health behaviors, including substance use, thus highlighting the need for a dyadic approach to health. Researchers have examined how this similarity arises through processes of assortative mating (i.e. selecting similar partners; Rhule-Louie & McMahon, 2007) and social influence (Cornelius, Desrosiers, & Kershaw, 2016; Fleming, White, & Catalano, 2010). The consequences of within-couple similarity on substance use have also been examined. Newlywed couples who drink or use drugs in concordant patterns are more satisfied than those with discrepant patterns (Mudar, Leonard, & Soltysinski, 2001), and discrepant heavy drinking can contribute to divorce (Leonard, Smith, & Homish, 2014) and lower relationship satisfaction (Homish & Leonard, 2007). This research raises a curious possibility: there might be relationship benefits to engaging in negative health-risk behaviors together.

Shared risk behaviors may contribute to satisfaction and stability within couples. Preserving relationships may especially pertinent for adolescent and young adult pregnant couples because relationships during this developmental period are often unstable (Kershaw et al., 2010). Although smoking poses serious health consequences to both mother and child (USDHHS, 2004), the relationship might suffer during a solitary quit attempt. Because the positive effects of concordance may be stronger for more deviant behaviors (Mudar et al., 2001), and smoking during pregnancy is widely viewed as deviant (Bull, Burke, Walsh, & Whitehead, 2007; Wigginton & Lee, 2013), relationship benefits of concordance might be amplified during pregnancy.

The effects of smoking concordance on relationship quality during pregnancy may vary depending upon whether it is concordant use (i.e. both smoking) or nonuse. Previous research shows a positive association between relationship satisfaction and odds of smoking cessation for female partners (this was true for male partners only if their partner had quit as well; Foulstone, Kelly, & Kifle, 2017) and a negative association between relationship quality and smoking unrelated to partner smoking (Fleming et al., 2010). Findings suggest that, for some couples, there may be no relationship benefits when both partners smoke. However, these studies did not separate the interrelationships between satisfaction and smoking for pregnant couples, and smoking during pregnancy carries additional health and social consequences. If concordance in smoking behavior is associated with greater relationship satisfaction and discordance is associated with less satisfaction, potential consequences of quitting alone may include a reduction in relationship satisfaction.

Smoking concordance may also have different effects depending on which aspect of relationship quality is considered. Findings suggest that feeling like a “team” within a relationship context, rather than satisfaction, shapes responses to pressure to quit smoking (Scholz et al., 2013). We therefore adopted a multidimensional conceptualization of relationship quality – dyadic adjustment –to gain a nuanced understanding of the consequences of concordant smoking behaviors among young pregnant couples. Dyadic adjustment (Spanier, 1976) consists of four dimensions of relationship quality: satisfaction (happiness), cohesion (feelings of companionship), consensus (agreement on values or life decisions), and affectional expression (affectionate behavior). To our knowledge, no previous studies have examined whether similarities in smoking behavior are differentially associated with dimensions of relationship quality, particularly among young pregnant couples.

This study examined the effects of smoking concordance during pregnancy on four dimensions of relationship quality postpartum: satisfaction, cohesion, consensus, and affectional expression. We hypothesized that concordant smoking patterns would lead to higher relationship quality. No hypothesis was made regarding patterns of concordant use versus nonuse, given inconclusive research support for patterns in either direction (Fleming et al., 2010; Foulstone et al., 2017; Mudar et al., 2001). Gender differences were also explored given previous research (Foulstone et al., 2017) and health and social consequences of smoking specific to pregnant women (e.g., stigmatization; Bull et al., 2007; Wigginton & Lee, 2013). This study advances knowledge on smoking behavior during pregnancy by using a dyadic approach to understanding health-risk behavior in couples and adopting a multidimensional conceptualization of relationship quality, which could highlight important couple-level avenues for interventions.

Methods

Participants

Participants were pregnant young women and their male partners recruited from obstetrics/gynecology clinics and an ultrasound clinic in four university-affiliated hospitals in Connecticut between July 2007 and February 2011 (see Kershaw et al., 2013). Inclusion criteria were (a) the pregnant partner is in the second or third trimester of pregnancy, (b) women between ages 14–21 and men at least 14 years old, (c) both members of the couple report being in a romantic relationship with each other, (d) both report being the biological parents of the unborn baby, (e) both agree to participate in the study, (f) neither reports HIV + status, and (g) both speak English or Spanish.

A total of 429 individuals (72.47%) from 228 couples (77.03%) provided full data. Female participants, OR=1.48, p=.03, younger participants, OR=.95, p=.05, Latinx participants, OR=1.54, p=.04, and smoking less during pregnancy, OR=.87, p=.05, related to providing full data.

Female participants were younger than male participants, M=18.69, SD=1.62 and M=21.12, SD=3.66, respectively. Female participants were 38.94% Black, 42.48% Latinx, 14.16% White, and 4.42% other. Male participants were 47.29% Black, 39.90% Latinx, 9.36%

White, and 3.45% other. Median household income was $5,000-$9,999, mean relationship length was 2.11 years (*SD*=1.52), 60.37% lived together, and 17.02% were married.

Procedure

Written informed consent was obtained by a research staff member at baseline, which occurred during the second or third trimester. Parental consent was waived because participants were parents and legally able to consent for care for themselves and their child. Participants completed structured interviews via audio computer-assisted self-interviews (ACASI) at baseline, 6-month postpartum, and 12-month postpartum (here, we used data from the baseline and 6-month interviews). Participation was voluntary and confidential and did not influence provision of healthcare or social services. All procedures were approved by the Yale University Human Investigation Committee and by Institutional Review Boards at study clinics. Participants were reimbursed $25 each per assessment.

Measures

Cigarette use—Smoking during pregnancy was assessed with the question, "During the past 3 months, how often did you smoke cigarettes?" rated from 1, never, to 4, every day. Smoking discrepancy was calculated as the absolute value of the difference between couple members' cigarette use.

Relationship quality—Relationship quality was measured using four subscales adapted from the Dyadic Adjustment Scale (DAS; Spanier, 1976). *Dyadic satisfaction* was measured with ten items, such as, "Please mark which best describes the degree of happiness, all things considered, of your relationship," α = .83. *Dyadic cohesion* was measured using five items, such as, "How often would you say the following events occur […] Laugh together," α = .74. *Affectional expression* was measured using four items, such as, "Please mark if the next 2 items caused differences of opinions or were problems in your relationship […] Not showing love" (reverse coded), α = .53. *Dyadic consensus* was measured using 13 items, such as, "[…] Please mark how much you […] agree or disagree about the following items. Handling family finances," α = .88.

Data Analysis Strategy

Data from couple members are interrelated, violating the statistical assumption of independence of observations. The Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006) accounts for this using a multilevel framework, with individuals nested within couples. In the APIM, each couple member is both an *actor* and a *partner*, and his or her outcome can be influenced by his or her own predictor variables (e.g., own smoking predicting satisfaction – an *actor effect*) and by his or her partner's predictor variables (e.g., partner smoking predicting satisfaction – a *partner effect*).

The effects of actor smoking during pregnancy, partner smoking during pregnancy, and discrepancies in smoking during pregnancy on relationship quality were examined using the package nlme in R (Pinheiro, Bates, DebRoy, Sarkar, R Core Team, 2017). Covariates included gender, race/ethnicity, age, relationship length, and pregnancy-level relationship quality. Control variables and variances were tested for distinguishability across gender

using nested chi-square comparisons. In the full model, interactions between cigarette use discrepancy and cigarette use and gender were examined using chi-square comparison tests. When comparing models, maximum likelihood (ML) estimation was used because these models differed in fixed effects. Final results are reported using restricted maximum likelihood (REML) to improve precision of random effects estimates (Kenny et al., 2006).

Results

Most (86.28%) female participants reported never smoking in the past 30 days, 4.42% smoked rarely, 5.31% smoked sometimes, 1.33% smoked often, and 2.65% smoked every day. For male participants, these percentages were 54.19%, 13.79%, 10.84%, 9.85%, and 11.33%, respectively. Relationship quality is detailed in table 1.

Tests of Distinguishability

Omnibus tests of distinguishability were significant or marginally significant across all models, indicating that the effects of control variables and variances differed across gender: relationship satisfaction, $\Delta\chi^2(7)=25.54$, $p<.001$; cohesion, $\Delta\chi^2(7)=12.22$, $p=.09$; affectional expression, $\Delta\chi^2(7)=12.97$, $p=.07$; consensus, $\Delta\chi^2(7)=14.30$, $p=.05$. Differences were therefore retained in the final models.

Final Models

Dyadic satisfaction—In the main effects model, actor smoking was not associated with changes in dyadic satisfaction, $B=.63$, $se=.52$, $p=.17$, and partner smoking was associated with a marginally significant increase in dyadic satisfaction, $B=.84$, $se=.46$, $p=.07$. Smoking discrepancy was associated with a significant decrease in dyadic satisfaction, $B=-1.14$, $se=.52$, $p=.03$ (see figure 1).

Although the omnibus test for interactions with gender indicated that some of these relationships did differ between males and females, $\Delta\chi^2(3)=10.51$, $p=.01$, the effect of smoking discrepancy on dyadic satisfaction did not differ between males and females, $B=-.02$, $se=.83$, $p=.98$.

Dyadic cohesion—In the main effects model, actor smoking was associated with a marginally significant increase in dyadic cohesion, $B=2.04$, $se=1.19$, $p=.09$, and partner smoking was associated with a marginally significant increase in dyadic cohesion, $B=2.17$, $se=1.18$, $p=.07$. Smoking discrepancy was associated with a significant decrease in dyadic cohesion, $B=-2.74$, $se=1.25$, $p=.03$ (see figure 2).

Omnibus tests for interactions with gender and cigarette use were not significant.

Affectional expression—In the main effects model, actor smoking was not associated with affectional expression, $B=.11$, $se=.14$, $p=.43$; neither was partner smoking, $B=.15$, $se=.14$, $p=.28$. Smoking discrepancy was not associated with a significant decrease in affectional expression, $B=-.23$, $se=.15$, $p=.11$, although the association trended in the expected direction.

Omnibus tests for interactions with gender and cigarette use were not significant.

Dyadic consensus—In the main effects model, actor smoking was not associated with changes in dyadic consensus, B=.43, se=.65, p=.50; neither was partner cigarette use, B=.55, se=.64, p=.39. Smoking discrepancy was not associated with a significant decrease in dyadic consensus, B=−1.04, se=.67, p=.12, although the association trended in the expected direction.

The omnibus test for interactions with gender was significant, $\Delta\chi^2(3)=8.50$, p=.04, revealing a marginally significant interaction between smoking discrepancy and gender, B=−2.75, se=1.54, p=.07. For male participants, smoking discrepancy was not related to dyadic consensus, B=.77, se=1.17, p=.51. For female participants, the effect of smoking discrepancy on dyadic consensus was negative and marginally significant, B=−1.98, se=1.07, p=.07 (see figure 3).

Discussion

This study examined the effect of couples' smoking concordance during pregnancy on relationship quality. Pregnant adolescent and young adult couples with discordant patterns of smoking tended to have lower relationship quality postpartum than those with concordant smoking patterns. These effects were largely consistent across different facets of relationship quality and did not vary for concordant patterns of cigarette use versus nonuse.

Discordant smoking had a significant, negative effect on dyadic satisfaction and dyadic cohesion and trended in the same direction for affectional expression and consensus. Numerous qualitative accounts from pregnant smokers and ex-smokers highlight a loss of social contact and "protected" time together when smoking is reduced or eliminated (Flemming, Graham, Heirs, Fox, & Snowden, 2013). This reduction of time together (smoking) may create conflict and disconnection in a relationship, especially if partner pressure to quit smoking leads to less quality time during a time when relationship strain is common, particularly for young couples (Doss, Rhoades, Stanley, & Markman, 2009; Manzi, Vignoles, & Regalia, 2010). Although pressures to quit smoking and quit attempts were not assessed in this study, future research might incorporate dynamic models that examine reciprocal effects between pressures to quit, compliance with pressures, and changes in smoking concordance and satisfaction. Future studies should also explicitly consider where smoking occurs (e.g., together or apart).

The effect of discordant smoking on dyadic consensus differed for male and female participants, although this difference was only marginally significant and should therefore be interpreted with caution. Discordant smoking did not affect male participants' feelings of consensus or agreement about important values within the couple, but did tend to reduce female participants' feelings of consensus. Some have posited that women drive quit attempts during pregnancy (Bottorf et al., 2010), whereas others have found that women exert more influence in this domain postpartum (Cornelius et al., 2016). If a pregnant woman does not smoke during pregnancy, she might be attuned to discordance in health behaviors. Conversely, if she smokes and her partner does not, she may feel pressured or

stigmatized by her partner (Bull et al., 2007; Wigginton & Lee, 2013), which could lead to conflict within the relationship. Indeed, women who smoke during pregnancy report the highest pressure to quit from nonsmoking partners (Pollak et al., 2001).

Results suggesting a negative effect of discordant smoking patterns on relationship quality over time highlight the importance of couple-level interventions to promote health and well-being during pregnancy. If only the pregnant partner quits smoking following a smoking cessation intervention, discordance may result and the relationship may suffer. Because satisfaction is associated with quit attempts (Foulstone et al., 2017), there may be complex, reciprocal relationships between discordant smoking patterns and relationship quality over time. Couple-level interventions that promote mutual engagement in positive health behaviors and bolster relationship quality among young pregnant couples could reduce health-risk behaviors. Higher relationship quality has also been associated with more supportive coparenting relationships, a critical factor for healthy child development (McHale et al., 2002) and for maintaining engagement in child rearing among young fathers (Fagan & Lee, 2011; Young & Holcomb, 2007).

Limitations

Smoking amongst female participants was low, although the percentage of smokers was in line with statistics reported by Curtin and Matthews (2016). However, results were consistent, and regression diagnostics (e.g., VIF statistics) indicated that these estimates were trustworthy. Still, there may have been insufficient power to detect significant interaction effects, and the low reliability for the affectional expression measure may have masked significant results. Future studies should replicate these results with larger samples. It is also not clear if these effects generalize to nonpregnant couples, given that the implications of smoking differ during pregnancy and potential effects of pregnancy on relationship quality. Future studies should include young couples across various stages of a relationship, such as nonpregnant couples, newly parenting couples, or older couples. A measure assessing knowledge of risks associated with smoking during pregnancy should be included in future research, along with a more nuanced measure of cigarette use.

Conclusion

Discordant patterns of smoking during pregnancy can be detrimental to relationship quality for adolescent and young adult couples. Given that relationships are often fragile during this time period, findings underscore the importance of couple-level interventions for changing smoking behavior. Incorporating intervention content to improve relationship quality and reduce cigarette use as a couple could boost intervention effectiveness and benefit health for both parents and their children.

Acknowledgments

This research was funded by The National Institute of Mental Health (#5R01MH075685; PI: Kershaw). Talea Cornelius was funded on a T-32 pre-doctoral training grant from The National Institute of Mental Health (#T32MH074387; PI: Kalichman).

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- Shared behaviors within couples may benefit relationship quality over time.
- Solitary attempts to quit smoking during pregnancy may harm relationships.
- Discordant smoking reduced relationship satisfaction and cohesion.
- Discordant smoking reduced feelings of consensus for female participants.
- Interventions targeting couples may improve both relationship quality and health.

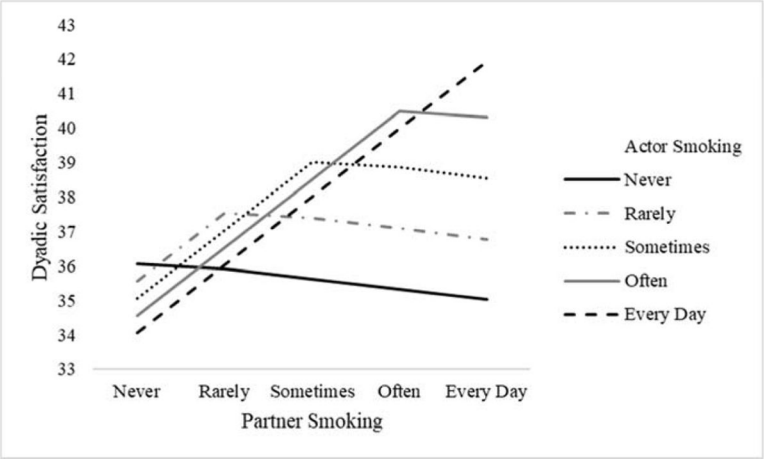

Figure 1.

The effect of smoking discrepancy during pregnancy on dyadic satisfaction six months postpartum at different levels of partner smoking and actor smoking. Satisfaction peaks at a given level of actor smoking (noted by the lines) when it matches partner smoking on the x-axis (i.e. is concordant).

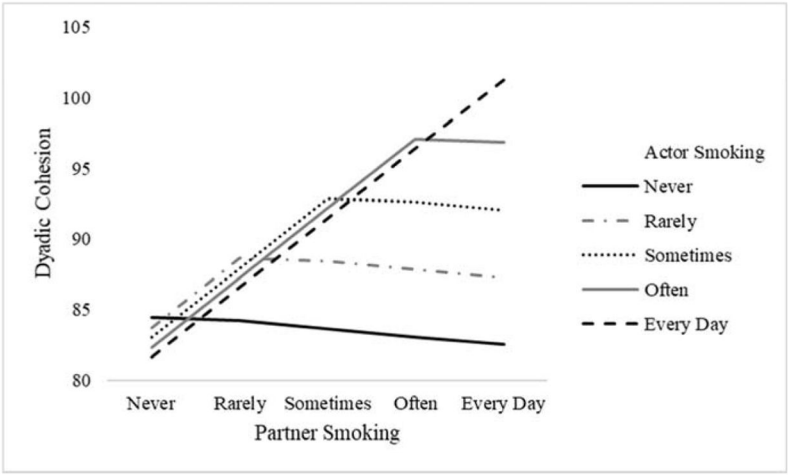

Figure 2.

The effect of smoking discrepancy during pregnancy on dyadic cohesion six months postpartum at different levels of partner smoking and actor smoking. Cohesion peaks at a given level of actor smoking (noted by the lines) when it matches partner smoking on the x-axis (i.e. is concordant).

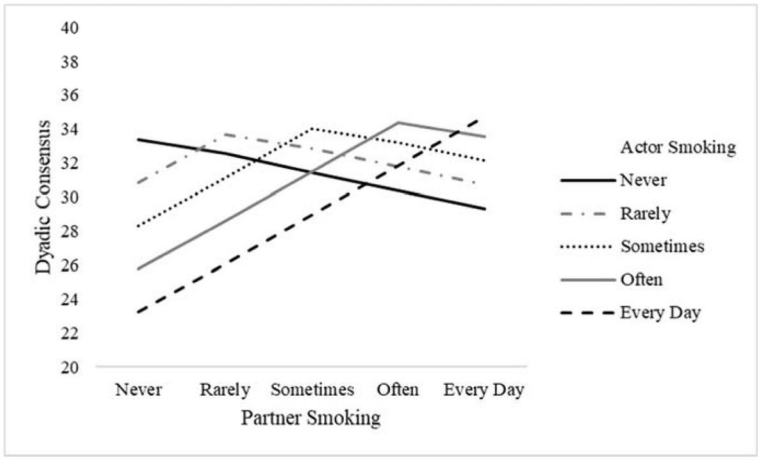

Figure 3.

The effect of smoking discrepancy during pregnancy on dyadic consensus for female participants six months postpartum at different levels of partner smoking and actor smoking. Consensus peaks at a given level of actor smoking (noted by the lines) when it matches partner smoking on the x-axis (i.e. is concordant).

Table 1

Relationship quality during pregnancy and postpartum for male and female participants. Paired t-tests showed a significant decrease ($p < .05$) in all aspects of relationship quality over time except for cohesion (female participants) and affectional expression (male participants). Male participants had lower cohesion than female participants postpartum.

	Pregnancy		**Postpartum**	
	Female	**Male**	**Female**	**Male**
	Mean (SD)	***Mean (SD)***	***Mean (SD)***	***Mean (SD)***
Dyadic Satisfaction (Range 3–51)	38.40 (7.43)	38.03 (7.98)	34.64 (10.40)	35.77 (9.19)
Dyadic Cohesion (Range 0–120)	88.72 (23.87)	88.72 (22.44)	86.46 (26.48)	84.61 (25.61)
Affectional Expression (Range 0–12)	9.46 (2.18)	9.07 (2.85)	9.03 (2.81)	9.03 (2.76)
Dyadic Consensus (Range 0–65)	50.33 (9.66)	49.35 (10.74)	47.39 (13.75)	47.45 (13.13)