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Risk perception of cigarette and e-cigarette use during pregnancy: A qualitative postpartum perspective

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ABSTRACT

Aim: The aim of this exploratory qualitative analysis is to assess the perceptions of risks of cigarette and e-cigarette use during pregnancy.

Background: An important public health aim is a reduction of smoking at time of delivery (SATOD) from 10.6% to less than 6% by 2022 in the United Kingdom (UK). In order to successfully meet this target, we need to have a better understanding of the perceived risks associated with cigarette smoking. Additionally, the use of e-cigarettes is increasing in the general population, with pregnant women being supported to use such products if it helps them remain smoke free. However, in contrast to cigarette smoking, there is little definitive research assessing the safety of e-cigarette use during pregnancy, with most information disregarding the health of the growing fetus. E-cigarettes are of special interest, given they are an unlicensed product for use during pregnancy, yet women are being supported to use them as a method of harm reduction. A better understanding of perceived risks is essential.

Method: Fourteen interviews were conducted one month postpartum with women who smoked during pregnancy and continued to smoke after the birth. Thematic analysis was conducted.

Findings: Two themes emerged for cigarette smoking; health and justifications. Six themes were identified for e-cigarette use; the unknown, experience, comparison to cigarettes, the product, advice and healthier option. A range of subthemes are discussed.

Conclusion: Women provided a range of justifications for continuing to smoke during pregnancy. Women felt e-cigarettes were a riskier option than continuing to smoke.

Introduction

Smoking throughout pregnancy still remains one of the largest public health concerns across the United Kingdom (UK), with 10.6% of women smoking during pregnancy and in some regions, such as the North East, rates surpass 19% (Public Health England, 2020). In order to reduce the associated negative health effects and cost to the National Health Service (NHS), a public health interim aim for the UK is a reduction of smoking at time of delivery (SATOD) to less than 6% by the end of 2022, a 4.7% reduction within the next two years (Global and Public Health, 2017).

In efforts to reduce the high prevalence of SATOD, a number of regional initiatives have been employed. The babyClear© approach has been rolled out across the North East of England since 2013 and in line with the National Institute for Health and Care Excellence (NICE) guidance includes information regarding the risks associated with smoking

during pregnancy for both the mother and fetus, such as placental abruption and low birth weight (NICE, 2010). Midwives are trained on the delivery of the programme and use a breath test on every pregnant woman. Women who smoke are automatically referred to Stop Smoking Services (SSS) and undergo further intervention through an antenatal clinic with a midwife. The risk perception element of the babyClear© programme for pregnant smokers involves a visual demonstration of risks using a doll and disk representing the placenta designed to illustrate how toxins, such as Carbon Monoxide (CO), from a cigarette affect the developing fetus. To demonstrate the amount of CO is in the pregnant woman's body, mothers undergo a breath test. The device is linked to a computer programme whereby a fetal avatar changes colour from green, to amber to red depending on the levels of CO present in maternal and fetal blood (Fendall, Griffith, Iiiff, & Radford, 2012). This type of visual risk education has been found to have a large impact on women's quitting attempts (Fergie, Coleman, Ussher, Cooper, & Campbell, 2019).

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For pregnant women who continue to smoking during pregnancy, feelings of guilt can arise due to societal pressures to quit to protect their baby from harm (Ebert & Fahy, 2007; Walker, Graham, Palmer, Jaagrop, & Tipene-Leach, 2019). In order to reduce these feelings, women provide a range of justifications, for example they might say that nothing happened to the baby in the first trimester, so it is ok to continue. Some women also argue that smoking provides little risk in comparison to other factors e.g. drinking alcohol and there are additional stressors which would cause more harm to the fetus; furthermore they argue that quitting at a later stage in pregnancy would be pointless (Goszczynska et al., 2016). When discussing smoking in a healthcare setting, women often feel ignored. They feel that in order to be successful in their quitting attempts, the healthcare professional should have an understanding of their background and provide individualised advice (Ebert & Fahy, 2007; Walker et al., 2019). Given these findings, the current study explored maternal perception of risks related to cigarette use associated with themselves, the fetus and infant, in light of the risk education intervention offered within the North East of England.

As part of the smoking reduction initiative, women are referred to SSS where nicotine replacement therapy (NRT) is offered in cases where quitting without these methods had been unsuccessful (NICE, 2010). However, even when women are motivated to quit, uncertainty about the products and how to use it can hinder the success of NRT during pregnancy (McDaid et al., 2020). Furthermore, in the general population adults find NRT unsatisfactory in their quitting attempts and in fact many claim that e-cigarettes provide beneficial long term support and hence they have become popular within recent years (Tamimi, 2018). Therefore, SSS are e-cigarette friendly and advocate quitting attempts by whichever means are necessary, including the use of e-cigarettes during pregnancy.

Research from Action on Smoking and Health (ASH) (Action on Smoking and Health, 2019) reports a growing trend of e-cigarette use in the UK population, rising from 7000,000 in 2012 to 3.6 million in 2019. ASH is a public health registered charity in the UK who campaign to change policy in order to reduce harm associated with tobacco. Generally, there appears to be a division amongst healthcare organisations regarding the safety of such products. For example, Public Health England (PHE), ASH and the Royal College of Physicians support claims that e-cigarettes are 95% safer than traditional cigarettes. However, NICE and the World Health Organisation (WHO) appear much more cautious in their approach and recommendations of such products (Farrimond & Abraham, 2018).

The safety of e-cigarette use during pregnancy is currently debated, with most information derived from animal studies or an extrapolation from general adult health information, disregarding the health of the growing fetus (Smoking in Pregnancy Challenge Group, 2019; Spindel & McEvoy, 2016). In fact, e-cigarettes are being recommended, by organisations such as PHE and ASH, as a method of harm reduction without peer reviewed research on the effects on the fetus and subsequently the infant. In 2019, studies indicated that in the general population, 27% of individuals approached could not say how harmful e-cigarettes were and 26% believed e-cigarettes to be more harmful than cigarettes. In contrast, when asked about licensed products of NRT, 35% were unsure about the risks but only 6% thought they were more harmful in comparison to cigarette smoking (Action on Smoking and Health, 2019).

With respect to pregnancy, it is impossible to estimate the number of pregnant women using e-cigarettes, as these women are recorded as 'non-smokers' in maternity notes, similar to those who have quit (Smoking in Pregnancy Challenge Group, 2019). Furthermore, there is little clarity regarding the effects of e-cigarette use during pregnancy, even for information provided to healthcare professionals. The Smoking in Pregnancy Challenge Group (2019) highlights that there is little evidence regarding the safety of e-cigarette use during pregnancy and draws on cases from the general adult population. It is recommended that a woman should use a licensed NRT product. However, if a woman chooses to use an e-cigarette then she should be supported to do so if

it helps her stay smoke free. Hence, pregnant women should not be discouraged from using an e-cigarette (Smoking in Pregnancy Challenge Group, 2019).

To be successful at meeting the aim of a reduction to 6% or less SATOD by 2022, an understanding of maternal risk perception of cigarette use is essential, particularly for pregnant women who live in a region where risk education is provided. Additionally, with the growing trend of e-cigarette use, and the support of these products being offered without acceptable levels of scientific evidence, it is essential to assess the perception of risk of e-cigarette use by a group of women who are targeted for smoking cessation support in the future. Undertaking a qualitative approach may aid the development of a maternal focused intervention for supporting smoking cessation in pregnancy in order to meet the public health target of <6% SATOD.

Method

Recruitment

Fourteen women volunteered to participate in a semi-structured interview. These women were recruited from a larger sample of pregnant women taking part in a study assessing fetal and newborn behavioural effects of nicotine exposure during pregnancy. The larger study used 4-dimensional ultrasound scans at 32- and 36-weeks gestational age to assess fetal mouth movements across four groups of women; non-smokers, light smokers, heavy smokers and e-cigarette users. At one-month post birth, a neurobehavioural assessment was conducted with the newborns, of which 29 were exposed to cigarettes prenatally. All cigarette smokers were invited to participate in the interview, with 14 volunteering. All women were cigarette smokers throughout their pregnancy and continued to smoke following the birth of their baby. All infants were born healthy with no identified health conditions. Ethical approval was granted by the Durham University Ethics Committee (PSYCH-2018-05-08T11:27:21-flbm2).

Semi-structured interview

A semi-structured interview was conducted one month following the birth of their baby. Questions included reasons for smoking, risks associated with cigarette and e-cigarette use and perceived behavioural differences between infants exposed to cigarettes or e-cigarettes and those infants born to non-smokers/e-cigarettes users. Questions were based on a review of the literature and an unpublished master's dissertation project. For the purpose of this study, the focus is on the two questions relating to risks of cigarette smoking and risks of e-cigarette use, see Table 1. Questions associated with risks were the focus for this study due to the high rates of SATOD in the area, despite risk-based educational interventions being part of routine antenatal care. Understanding perceived risk may help with the development of new smoking cessation interventions. Women were asked to elaborate their responses by providing reasons for their answers.

Analysis

Interviews were audio recorded, transcribed verbatim and imported into NVivo for data management. An inductive thematic analysis approach was used (Braun & Clarke, 2006). The six-stage process of the thematic analysis was conducted in line with Braun and Clarke's method. Themes and subthemes were discussed and agreed with by the second author.

Results

Sample characteristics

Maternal characteristics were recorded for this interview study. Mean maternal age was 26.35 years (S.D.=5.22 years), with nine light

Table 1
Questions associated to risk.

Do you believe there is any harm associated with smoking during pregnancy as
A risk to you?
A risk to the fetus?
A risk to the newborn?
Do you believe there is any harm associated with e-cigarette use during pregnancy as
A risk to you?
A risk to the fetus?
A risk to the newborn?

smokers (<10 per day) and five heavy smokers (11-20 cigarettes per day). The highest level of education attainment was recorded, with variability; four women had no qualifications, seven women obtaining GCSE's, one woman received college education and two women receiving a degree. In relation to their infants, eight were male. The average gestation at birth was 39 weeks and one day (S.D.=1.38) and birthweight was 3166g (S.D.=382.43). Only two women were first time mothers. As part of their routine antenatal care, women received a risk-based educational intervention through their midwife in an antenatal clinic appointment, using methods outlined by the babyClear© approach.

Two key topic areas were discussed in relation to risks during pregnancy and in the immediate postnatal period; cigarette smoking and e-cigarette use. Three questions were asked for each topic area; risk to self, risk to the fetus and risk to the newborn.

Cigarette smoking

Regarding cigarette smoking, when asked about risks of use to self, there was an equal division of responses, seven participants stating there was no risk and seven claiming there is a risk of cigarette smoking to themselves. In terms of risk to the fetus, two women claimed there was no risk, six stated there were risks and six said they were unsure about the risks. All women, irrespective of their view of risks, provided justifications for their smoking behaviour. Regarding risks to the newborn, eight women said there was no risk. However, of those eight, three proceeded to state that there was no risk as they took measures to ensure the baby was not exposed to smoke. Six women felt there was a risk to the newborn baby, again these women proceeded to outline steps they took to reduce the risks. Two key themes emerged from the thematic analysis; health and justification. A range of subthemes were created within each theme.

Health

Two subthemes resulted from the discussions of the women regarding the health effects associated with smoking during pregnancy and the immediate postnatal period. These subthemes were general health and infant health outcomes.

General health

For women who felt there were risks, they discussed the generic health effects that can occur through smoking, highlighting they were aware of the health implications.

"Obviously you can get cancer and like lung cancer" (P4)

"You're just going to have loads of risks aren't you with smoking, with your health, cancer, so you're going to have risks whether you are pregnant or not pregnant aren't you" (P10)

"It's not really a healthy option is it. Everybody knows that" (P12)

Infant health outcomes

Women were also able to identify a number of negative effects on infant health associated with smoking during pregnancy.

"Yes, possible breathing problems" (P1)

"Still birth, early, so that's obviously like at the time I think still births and the small miscarriages too" (P3)

"On a night if she's going to sleep as well (be)cause you hear a lot of things of erm, SIDs (sudden infant death syndrome) is it called? If you breath on a child, like on a baby, it could cause cot death, so yeah I do believe" (P9)

"They're going to be small, more crying don't they, I don't know I haven't really thought about it much, I just carried on smoking didn't I" (P13)

Justifications for continued smoking

Six subthemes emerged within justifications for continued smoking. These were pregnancy experience, previous experience, other's experience, quantity of cigarettes, cigarettes do not harm and following advice.

Pregnancy experience

This subtheme relates to the experiences some women have had throughout their pregnancy that suggested to them there were risks associated with smoking during this time in their lives.

"I got told that was a bit disgusting when it come out was my placenta...I think it was black, quite mucky, my partner pulled a face, he said 'that's disgusting', I said why and he said that it was your smoking" (P2)

"I know it is (be)cause I could tell when I was like, especially pregnancy, I got more out of breath" (P3)

"The increase chance of blood clots and like there is anyway when pregnant and smoking like on my own and because that's what they thought as well at first when I'd gone into hospital, they thought it could have been a blood clot, but it wasn't" (P7)

Previous experience

Women drew upon their experiences and observations from their own previous pregnancies as well as their current pregnancy to justify their continuation of smoking.

"I haven't had any problems with both of them, they've been perfect, height wise and everything and weight" (P6)

"No, well I know there is risks but with me having three of them, there's been no complications, so probably a no, in my opinion anyway" (P9)

Others experience

In addition to their own experiences, women recalled experiences of friends and other family members who also smoked during their pregnancies and did not experience any adverse effects.

"Like my nanna and everyone said to me like 'oh they didn't tell us we couldn't do anything when we had ours, we could smoke and drink' and I know there wasn't much research back then, but I think it could be other things. I think there are a lot of things blamed on smoking, I've has three babies and smoked through all of them" (P7)

"I've got a lot of family members who smoked through them and I know it sounds stupid but like nothings ever happened to any of them kids" (P12)

Quantity of cigarettes

Women justified their behaviours by stating that they smoked less therefore posing less of a risk, and the amount of harm is dependent upon the number of cigarettes smoked throughout the pregnancy.

“I think there could be if you are sitting smoking one after the other, but that’s what I convince myself, just couple off, she won’t get much, she won’t get that, I think you end up convincing yourself there won’t, but if you sat and smoked all day long, then definitely” (P3)

“I think it depends how many, I think there’s a lot of different factors with it, like me, I’ve always tried to cut down as much as I could, do you know what I mean, I’ve never just stopped. There’s a big difference between someone smoking ten a day and someone smoking thirty a day” (P12)

Cigarettes won’t harm

Within this subtheme, women expressed that their smoking behaviour was unlikely to have a negative impact on the infant.

“You sort of think that it won’t harm them” (P4)

“Obviously there is risks like lung cancer and that but not that anything is going to happen to any of them just because I go and have a fag (cigarette)” (P7)

“For me I don’t feel like there was any risk, erm I lessened it myself, I cut down myself, my intake of it because I know there is concerns there...it was cut down and because of pregnancy that was it... I know it’s damaging to myself” (P11)

“If I thought it was a big risk I would have stopped” (P13)

Following advice

A way in which women justified their smoking behaviour in the newborn phase was to state that they follow the advice from healthcare professionals and did not smoke in the presence of the infant.

“I’ll make sure I have my 5 minutes before I go grab her and you know what I mean, and I always sterilise my hands” (P3)

“I wouldn’t hold him and smoke, I don’t smoke around him anyway. I put something over the top, a coat, a cardigan something like that that’s just going to keep that smell away from him as well. I wash my hands when I come back in so he’s completely distant from that” (P11)

E-cigarette use

When asked about the risk associated with nicotine in e-cigarettes to themselves, four women thought there was no risk, six stated there was a risk and four women were unsure of the risks. Women were asked whether they thought the e-cigarettes posed a risk to the fetus. Only one woman thought that e-cigarettes posed no risk, whilst eight women felt there was a risk, and five women being unsure about the risks. Of the ten women asked whether e-cigarettes would be harmful to the newborn, six claimed it would not pose a risk and four stated there was a possible risk.

The unknown

The women argued that e-cigarettes were new products and that the long-term effects were unknown and therefore more research was required. From the discussions, two subthemes emerged.

Long term effects

This subtheme relates to the lack of knowledge regarding e-cigarettes and that the implications of the health effects are unknown.

“These people who are smoking e-cigarettes, how do they know the actual complications what’s going to come in 30 years’ time, where you know what you’re getting with a cigarette, they’ve been out that long” (P12)

“You don’t know how and what the effects are in the future” (P12)

“There’s the unknown... there could be things in that e-cigarette that could affect the brain and anything” (P12)

Research

Women recognised the need for further research to be conducted on e-cigarettes in order to provide accurate advice for use during pregnancy.

“More research and to see if they were allowed to be used in pregnancy” (P2)

“They haven’t had enough time to be tested properly and like to see the long-term effects” (P7)

“I don’t think they’ve been looked into enough. I don’t think there’s been enough research on them, I think everyone’s going to start falling down dead in about 15 years off them” (P10)

Experience

Women drew upon their own experiences and that of others to evidence potential risks associated with e-cigarette use.

Past experience

Prior to pregnancy, some women had tried using an e-cigarette and they discuss the negative effects from it.

“I’ve tried them in the past...I’ve felt worse on them...them oils were going in my mouth...they are in your mouth and then you’re swallowing that actual oil” (P3)

“I didn’t agree with it, it made me feel like my chest and throat was closing up and I just don’t like them” (P7)

Others’ experience

One woman described the experience of someone she knows regarding the negative health consequence of using an e-cigarette.

“I actually know someone who quit cigarettes with an e-cigarette, and they got popcorn lung and the doctor in the hospital told them that their lung collapsed and that was through the e-cigarettes” (P12)

Comparison to cigarettes

Many of the women discussed e-cigarettes in comparison to cigarettes.

“Supposed to be just as bad as cigarettes” (P5)

“For years they’ve been making fags (cigarettes), do you know what I mean cigarettes and they know what’s in them and all of that, but I think these e-cigarettes they’ve only just randomly been made” (P7)

“Smoking that (e-cigarette) was more harsh on my throat than a cigarette, so it was a lot stronger” (P9)

“No if you weren’t around the child...you would treat it the same as a cigarette, you would go outside and away from the child, again you don’t know what’s in it, it could be more harmful than a cigarette” (P9)

“I think it’s the same with smoking, there’s that slight risk there with yourself as well with the baby while you’re pregnant” (P11)

“You can smoke a cigarette and you know what like obviously it can affect their lungs and stuff like that and the size, but you don’t know what the other things it could do” (P12)

“They’re worse than smoking a fag (cigarette)...the nicotine, the thing that goes in them... probably more harmful for him” (P14)

The product itself

Three subthemes emerged relating to the product itself.

The chemicals

A concern was expressed by the women that there is little information regarding what chemicals and toxins are in e-cigarettes.

"I thought they would be worse being the chemicals" (P3)

"You don't actually know what is in them, so you don't know what you are inhaling" (P9)

"The e-cigarettes as well because there's stuff in there is toxic, so there's always going to be a risk" (P11)

"We don't know much about them really do we, the e-cigarettes, we don't even know what's in them or what" (P13)

Physical product

Women also described the dangers of the product itself and reflected on stories they had heard.

"Just all the stories I've heard about them as well, like blowing up and killing people and stuff like that" (P9)

"They blow up, they pop in your face don't they, I've seen loads about them e-cigarettes, they're dangerous" (P14)

Quality

One woman stated that an e-cigarette might be ok for use, depending on the quality of the product, suggesting that some are better than others.

"I think obviously if you get a good one and you're alright, but if you're swallowing, it's probably worse" (P3)

Advice

A clear concern was related to the advice that women were offered from healthcare professionals regarding the safety of e-cigarettes in terms of use for during pregnancy.

"I got told that obviously you can use them and then I got told you can't, obviously I never touched them" (P2)

"Well they told me when I was doing the growth scans and stuff they could put us with the non-smoking, like to help me quit smoking (be)cause I said at the beginning I couldn't smoke (be)cause I'd be sick and I was on the e-cigarette, but they're saying that there's no proof that it can't harm the baby yet" (P6)

"With e-cigarettes, I'd do the same thing, it's just one of them thing, just keep away from that sort of seeing it, smelling it, tasting it sort of thing" (P11)

Healthier option

Two women felt that e-cigarettes might be a healthier option due to less toxins in the product.

"Suppose it would be better than smoking normal cigarettes" (P13)

"It would probably be more healthy wouldn't it... it's not going to affect him much like with smoke (be)cause they haven't got the chemicals and stuff in them like the smoke have they, but like I don't smoke in the house anyway" (P13)

Discussion

The purpose of the study was to explore maternal perceptions of risks associated with both cigarette and e-cigarette use during pregnancy and the postpartum period. By exploring themes, which became apparent during the interviews, the voices of women are heard and can be used to inform future interventions. The present thematic analysis indicated

that for assessment of cigarette smoking, two key themes emerged; justification and health. For e-cigarettes, six key themes emerged; the unknown, experience, comparison to cigarettes, the product, advice and healthier option.

With respect to cigarette smoking, it was evident that some of the women interviewed were aware of some of the health-related risks to both themselves and the infant and were able to provide examples. However, these same women then provided justifications of their behaviour in light of such risks. Women continue to smoke throughout their pregnancy as they reduce the perception of risk by self-justifying (Goszczyńska et al., 2016). Despite advice from healthcare professionals, women who do not modify their behaviour instead adjust their beliefs of the risks associated to smoking during pregnancy. Rather than attempting to quit, they rationalised their behaviour, despite the potential devastating risks. Having an understanding of the risks associated with smoking during pregnancy does not motivate these women to initiate quitting attempts for the sake of the health of their unborn child (Goszczyńska et al., 2016). Given their awareness of risks, it is unlikely that risk education interventions are helpful as women often provide counterarguments to justify their behaviour (Goszczyńska et al., 2016).

Such behaviour can be explained by cognitive dissonance theory. Cognitive dissonance theory (Festinger, 1962) states that we want consistency between our attitudes, thoughts and behaviours which must align to create harmony. When there is a conflict in this system, dissonance occurs. In order to reduce this dissonance, individuals are likely to avoid certain situations in order to reduce the dissonance (Festinger, 1962). Women in the current study voiced the risks associated with smoking, however, they smoked throughout their pregnancy and continued to do so following the birth of their baby. It is likely that these women rationalised their behaviour in order to reduce any dissonance felt, therefore relieving any discomfort they were feeling regarding their smoking behaviour (Orcullo & San, 2016). Although dissonance can be reduced by changing behaviour, individuals instead opt to change their cognitions to align them with their behaviour. With regards to smoking, women feel the risk is negligible in comparison to behaviours carried out by others during pregnancy such as drug and alcohol use (Harmon-Jones & Mills, 2019). Additionally, a paradigm within cognitive dissonance theory relates to the belief-disconfirmation, in that these women, particularly those who suggest that only women who are heavy smokers are causing the damage, are misinterpreting the information in order to satisfy their own behaviours and beliefs (Harmon-Jones & Mills, 2019). Women who have had previous healthy pregnancies are unlikely to change their thoughts and behaviours, due to their past uncomplicated 'risk free' experiences, with denial of smoking harm being the most common theme across such research (Orcullo & San, 2016).

This study suggests that in spite of identifying risks associated with cigarette smoking, women continue to smoke throughout pregnancy and in the immediate postpartum period by justifying their behaviours. In contrast to cigarette smoking, these women view e-cigarettes riskier due to the unknown risks. Hence, these women do not view e-cigarettes as a safe alternative for harm reduction during pregnancy due to a number of reasons.

Six key themes emerged from the discussion regarding e-cigarette use during pregnancy and the immediate postnatal period. These themes related to the unknown risks, experience with e-cigarettes, the product itself, advice for using e-cigarettes, comparison to cigarettes and a suggestion they are a healthier option. Five of these themes had a negative evaluation toward e-cigarette use. The results indicate that women believed e-cigarettes carry significant risks during pregnancy. These women worried about the long-term effects, safety and that the harm of e-cigarettes were equal to or worse than smoking cigarettes. There are many unknown risks, not just for pregnancy, but across the general population, with other research suggesting that a 'stick with the devil you know' concept often being adhered to (Vasconcelos & Gilbert, 2019).

The evidence regarding the safety of e-cigarette use during pregnancy remains unclear (Suter, Mastrobattista, Sachs, & Agaard, 2015),

thus leading to mixed perceptions from the pregnant population regarding the use as a harm reduction method. Previous research suggests that women perceive e-cigarettes to be safer in pregnancy than cigarette smoking (e.g. (Mark, Farquhar, Chisolm, Coleman-Cowger, & Terplan, 2015; Wagner, Camerota, & Propper, 2017). In contrast to these studies, the current thematic analysis of smoker's views of e-cigarette is rather negative. It is suggested that because of both the public and health professionals having a limited understanding of safety and long term impact on the fetus, and child, many women are reluctant to use these products (Bowker et al., 2016). As evidence is contradictory (Schilling et al., 2019), the views expressed in the current study may reduce potential feelings of dissonance caused by cigarette smoking throughout their pregnancy, by emphasising the risk of an alternative 'harm reduction' method.

Adding to the safety concerns of e-cigarettes is the chemical makeup. Ingredients are variable, with the contents often not clearly labelled. Notably, some e-cigarettes contain ingredients that have been banned in cigarettes, such as ethylene glycol, a highly toxic substance (Hutzler et al., 2014). These concerns were expressed by the women in the present study, commenting that not knowing what is in the product leads to a perception of greater risk. Despite the dangerous chemicals in both cigarettes (Talhout et al., 2011) and e-cigarettes (Hutzler et al., 2014), the perception of risk differs greatly in the sample of women interviewed. Women use cigarettes as a comparison to e-cigarettes when discussing the associated risks, with the suggestion that the unknown risk outweighs the known risk, therefore leading to a continuation of smoking. The concerns outlined by these women are reasonable due to the lack of scientific research and guidance. However, a recent study assessing the effects that prenatal cigarette and e-cigarette exposure has on infant behaviour indicates that birth outcomes were only affected in the cigarette exposed group. With behaviour at one month negatively affected for both cigarette and e-cigarette exposed infants (Froggatt, Reissland, & Covey, 2020). Further research assessing risks of e-cigarette use during pregnancy will help women weigh up the balance of known and unknown risks.

Due to the lack of sufficient guidance on e-cigarette use during pregnancy, women opt to continue smoking cigarettes despite the known risks. This adds to the debate regarding the safety of e-cigarettes. It is evident from the statements that these women are receiving conflicting advice and therefore require access to guidance based on science; hence further research is warranted. The current research highlights the challenges that may be experienced within a midwifery department when supporting smoking cessation. Women in the current study, due to their previous experiences of healthy pregnancies, do not recognise the immediate risk to themselves or their offspring. There is a suggestion that the views regarding e-cigarettes are not shared between pregnant women and healthcare professionals, which indicates the need for further research.

The study reflects the views of women living in the North East of England where SATOD rate is high, 19.3% (Public Health England, 2020). These views are expressed in light of these women receiving risk based educational interventions and referral to stop smoking services. Therefore the suggestion that educational interventions are effective (Fergie et al., 2019), does not appear to apply in this sample of women. Women in the present study place emphasis on their own and others' experience of previous uncomplicated pregnancies as a way of justifying their smoking behaviour. To combat these justifications, providing real life vignettes of women who have experienced the negative pregnancy outcomes as a result of smoking may aid behaviour change in these women. Smoking mothers may be able to relate to such examples supporting their quitting attempts. However, given the support the women in the study were already receiving, it may be possible that we are beginning to reach groups of women who are unwilling to change their smoking behaviour, regardless of the interventions offered. Additionally, the views regarding the use of e-cigarettes in this small cohort of women are in some cases contrary to the literature that suggests e-

cigarettes are perceived as a less harmful than cigarettes. A possible reason for contradictory views across studies may be due to different samples of women assessed together; non-smokers, cigarette smokers, e-cigarette users, dual users (Mark et al., 2015). However, in the current study only cigarettes smokers were assessed, as these women are prime targets for smoking cessation interventions. Although only a relatively small group of women were interviewed, the sample size is similar to a number of other similar studies, suggesting 14 women is an appropriate sample size (Grant, Morgan, Gallagher, & Mannay, 2020; McDaid et al., 2020).

In summary, this exploratory analysis demonstrates that although women are aware of the health associated risks with cigarette smoking, they continue to smoke throughout pregnancy expressing a range of justifications. Healthcare professionals need to target these justifications opposed to providing risk information. Additionally, despite e-cigarettes being supported by healthcare professionals as a harm reduction method, women in the present sample were not convinced of the safety of these products and highlight a number of potential reasons. Women appear to favour the defined possible detrimental risks of cigarette smoking over the unknown effects e-cigarettes may pose. It is possible that risk education alone is not an effective intervention to support women quitting smoking. Furthermore, e-cigarettes require further research to understand the safety and effectiveness during pregnancy in order for women to make an informed choice regarding their smoking behaviours.

Ethical approval

Durham University Ethics Committee (PSYCH-2018-05-08T11:27:21-flbm2).

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Declaration of Competing Interest

None.

CRediT authorship contribution statement

Suzanne Froggatt: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing - original draft. **Nadja Reissland:** Conceptualization, Formal analysis, Writing - review & editing, Supervision. **Judith Covey:** Conceptualization, Writing - review & editing, Supervision.

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