

Understanding pregnant women's readiness to engage in risk reducing measures to prevent infections in pregnancy

ABSTRACT:

To develop a conceptual understanding of women's readiness to engage in behaviours to reduce the risk of acquiring infections in pregnancy, using cytomegalovirus (CMV), the most common congenital infection as a case. Thirty-three pregnant women participated in semi-structured interviews. The findings illustrate that for behavioural change to become viable, it is necessary for individuals to consider barriers or facilitators at the individual, inter-personal and system levels. By widening the theoretical lens beyond individual cognitive determinants, the model places sufficient emphasis on factors relevance to pregnant women, such as collective identity, support networks, interaction with the healthcare system and wider community.

Keywords: antenatal care, CMV, infection, pregnancy

Introduction

Pregnant women are more receptive to healthcare messages and highly motivated to adopt lifestyle changes to protect the health of their developing foetus. National Institute for Health and Care Excellence (2018) suggest that pregnant women should initiate, maintain or modify numerous perinatal and pregnancy-specific health behaviours. However, rarely acknowledged is the volume of behavioural expectations placed on women before, during and after pregnancy or the complexity of behaviour change. Health education during pregnancy relies heavily on midwives conveying messages and rarely considers women's capability and opportunity to engage in these behaviours (Olander et al., 2018). Midwives and antenatal teams play an important role in providing education and support for health behavioural changes in pregnancy. However, there is little known about how pregnant women engage with behaviours to reduce risk of infections during pregnancy, which will be the focus of this study.

Infections during pregnancy, such as toxoplasmosis, syphilis, parvovirus, rubella, herpes simplex virus and cytomegalovirus (CMV) can be associated with serious foetal consequences, such as congenital anomalies, stillbirths or premature births (Ishaque et al., 2011). CMV is the most common congenital infection (an infection acquired before birth) in the United Kingdom (UK) causing severe disabilities, developmental delay and sensorineural hearing loss. Congenital CMV is more common than many better-known congenital conditions, such as Down's Syndrome, spina bifida or cystic fibrosis. In the UK, approximately 10 infants are born each day with congenital CMV infection and 2-3 of these infants develop long-term health consequences. CMV is transmitted through bodily fluids and pregnant women most commonly acquire infection through exposure to the saliva and urine of

young children (Cannon et al, 2012). Maternal CMV infection is often asymptomatic or associated with a mild influenza-like illness, making clinical diagnosis challenging. Currently in the US, Europe and UK, there is no national recommendations for antenatal or postnatal screening for CMV, however this has been implemented in some countries on at a local or regional level. In the UK, there are no licensed CMV vaccines to prevent infection and no routine treatment of CMV infection in pregnancy. Prevention of CMV by behavioural modification and adoption of risk reduction measures are therefore the only feasible option to reduce the risk of women acquiring CMV during pregnancy. Women are not routinely counselled about how to reduce the risk of CMV infection in antenatal care in the UK. Measures to prevent CMV can be summarised as: *Don't share* (dummies, cutlery, food or drink and don't share kisses on the mouth or cheek of young children); *Wash with care* (wash hands); *Do Wear* (condom during sexual intercourse after conception).

Studies revealed that despite awareness of CMV being low (Price et al., 2014), pregnant women hold positive attitudes towards CMV preventive behaviours and perceive them as feasible and acceptable (Thackeray and Magnusson, 2016). Hygiene-based interventions have the potential to reduce CMV infection rates (Adler et al., 2004). These existing studies were conducted in different healthcare settings, which limit their applicability in the UK context and do not include any extended consideration of psychological theory in the development of the intervention.

The use of psychological theory to explain health behaviour change and inform interventions has been found to have significant benefits when applied to pregnant women. The most commonly cited theories in this context are the Health Belief Model (HBM), Protection Motivation Theory (PMT), Theory of Planned Behaviour (TPB) and Transtheoretical Model, which focus on individual-level factors

that facilitate or inhibit the uptake of health behaviours in pregnancy (e.g. Aziz et al., 2016; Bennett and Clatworthy, 1999; Gaston and Prapavessis, 2009; Lawrence and Haslam, 2007). Overall, social cognitive models of behaviour change have been criticised for not addressing the gap between intention and behaviour (Sheeran, 2002). In the context of behavioural change during gestation, social cognitive models fail to account for maternal fear and anxiety and stress in pregnancy. Furthermore, it may be that pregnant women view some health behaviours as more important or easier to change, potentially linked to social expectations (e.g. reduction in alcohol consumption). Social support and partners, in particular, play an important role in increasing the uptake of behaviour change (Torkan et al., 2018). Adopting a harm reduction approach, pregnant women find modifying existing behaviours, rather than changing behaviours, more favourable (Graham, 2014). The changes in pregnancy, such as increased fatigue and nausea may also influence women's perceived capability for health behaviour change and may differ in each pregnancy.

Previous studies in the field of behavioural change in pregnancy often lack a theoretical focus and have concentrated on individual cognitive predictors, whereas the different social, cultural and environmental perspectives on behavioural change has been ignored. The current study, using a qualitative approach is the first to examine determinants of behaviour change in pregnancy related to prevention of infection assessing dimensions of behaviour change that lie outside individual cognitive predictors (e.g., social and environmental determinants). The study aimed to develop a theoretical understanding of the processes underlying pregnant women's perspectives towards engaging in risk reducing behaviours to prevent infections in pregnancy. The study aimed to address these issues, asking what factors impact pregnant women's attitudes and behaviours towards infections in pregnancy with an

emphasis on CMV. This is also the first U.K based study that addressed pregnant women's attitudes and behaviours towards CMV.

Methods

Design: The study is underpinned by a constructivist perspective, in which participants are viewed as creators of their own social world, which the researchers subjectively interpret (Payne, 2007). Dyadic interviews (n =10) and individual interviews (n=23) were conducted with 32 pregnant women and one male partner. Dyadic interviews, comprising of two pregnant women create the opportunity to gather data in more depth and detail from the participants, while allowing participants to “co-construct” their version of the research topic and allow participants to stimulate ideas that might not have been either recognised or remembered (Morgan et al., 2013). Individual interviews were favoured as it allowed the researchers to interview participants who had busy schedules.

Recruitment and participants: Upon receiving approval from (INSERT AFTER REVIEW) pregnant women were invited to participate via antenatal clinics in a large South London hospital and through the community directly, including mother-baby groups, pregnant women coffee mornings, pre-school and toddler playgroups. If pregnant women were accompanied by their partners, we included them in the interview. The aim of this method was to attract ‘naturally occurring’ groups of individuals, already known to one another, and thus facilitate a supportive atmosphere (Morgan et al., 2013).

Posters advertising the study were placed in antenatal clinics in a South London hospital. Pregnant women were approached and given an information sheet explaining the purpose of the study. Those who were interested in participating

contacted the researchers and were provided further information about the study. Eligibility criteria were: (a) pregnant (any gestation); (b) ability to comprehend and speak English to a sufficient level in order to understand instructions; (c) willing to sign a consent form; (d) availability to be interviewed face-to-face or via Skype or phone call. A total of 33 participants were interviewed. Details of their demographic and relevant background information are presented in Table 1.

[Insert table 1 here]

Data Generation: The semi-structured interview schedule was developed collaboratively by the research team and iteratively moderated as data collection progressed. The questions were used to facilitate discussion on health concerns during pregnancy, knowledge and attitudes towards CMV, feasibility and motivations to adopt hygiene based risk reduction behaviours in pregnancy and the social and cultural barriers to behavioural change. Given that the majority of our participants had not heard about CMV, participants were presented with information about CMV, the ways of transmission and ways of preventing CMV. This information was adapted by already available information from National Health Service (2017) and CMV Action (2019). The research team met regularly during fieldwork to review progress and ensure a consistency of approach and once 33 interviews had been conducted, the team agreed that theoretical saturation had been achieved (i.e. with additional collection and analyses of data, no new concepts are developed and additional data do not require changes in conditions, characteristics, or consequences of the existing categories (Strauss and Corbin, 1990).

Participants were offered the option of face-to-face interviews, telephone interviews and the use of video calling. The disadvantages of traditional face-to-face interviewing in terms of time, financial constraints, geographical dispersion, and the

physical mobility boundaries of research populations have somewhat been rectified with the use of internet and telephone calling interviews, which have become much more commonplace in social science research (Haw and Hadfield, 2011). Interviews lasted between 60 and 90 minutes and were audio-recorded and transcribed.

Analytic Framework: Data collecting and analysis proceeded concurrently. Data were collected and analysed using a grounded theory approach (Glaser and Strauss, 1967) and employing the methodology proposed by Gioia et al. (2012). Grounded theory was the preferred method of data analysis as it is an inductive research approach that is intended to inform and develop theory that is “grounded” in participants' data (Charmaz, 2004).

The transcripts were read and line-by-line coding was applied - by hand and then using NVivo software. The data emerging from the initial transcripts were then used to modify the schedules for subsequent interviews. Open coding was done independently by two researchers (VB & TV) and discussed in meetings to maximise coherence and credibility of the analysis. Focused coding was then applied by re-examining the open codes to identify the most frequent and/or significant codes to further focus the data and to compare participants' perspectives. Once a list of codes had been established, the codes were reassembled into categories by axial coding: relating and making connections (comparisons) between the codes. We made active use of our 322 memos of the various processes and structures that emerged (collective, systemic and individual). Memos were informally written observations about the participants' experiences, offering initial reflections on any potential relationships between events and individuals and between emotional and attitudinal responses exhibited in the talk. For example, we discussed how the pregnant women interacted with the healthcare system and wider community and what this revealed

about agency (taken from the viewpoint of different social and individual lenses). The researchers then continued, and systematically collated together our memos and reflective notes by exploring individual interpretations through an analysis of key themes that formed a basic framework. Theoretical constructs were then used to examine and formulate properties of, and links between, the axial codes in order to develop them into ‘aggregate dimensions’ (Gioia et. al., 2012). The open codes, axial codes and aggregate dimensions were then arranged into a comprehensive ‘data structure’ (fig. 1): a graphic representation of the analytical process, which illustrates the progression from participants’ quotes to theoretical concepts. Aggregate dimensions were then used to develop a dynamic grounded theory model (fig 2). In the extracts, (...) indicates that material has been omitted, material in brackets () was added for clarification by the authors and pseudonyms are used to protect the anonymity of participants involved in the study. FP refers to first time pregnancy and SP refers to second or subsequent pregnancy. Pregnant women who have frequent contact with young children, such as those pregnant for the second or subsequent time are deemed to be more at risk.

Results

In our final stage of analysis the earlier more static codes identified in figures 1 and 2, were developed in an attempt to add ‘three-dimensional’ relational dynamics and intertwined movements, showing how the themes identified related to each other to create a model to understand how pregnant women engage in risk reducing behaviours to reduce infections in pregnancy (see figure 2). The following results section unpacks this model.

[Insert figure 1 and figure 2 here]

Disease Identity

Participants' conceptualisation of the condition (CMV) played a significant role in their attitudes towards engaging in risk preventing behaviours. The majority described their knowledge of CMV as low. Perceptions of CMV's severity varied amongst participants with some participants perceiving CMV statistics or prevalence of CMV as '*shocking*' and therefore a serious virus. There were differences in participants' perceptions of how personally susceptible they were to contracting the virus and were comforted by the perceived low risk of infection. Given the potential severity and potential impacts, all participants were surprised that midwives did not routinely discuss CMV with pregnant women.

What hit home for me was two to three a day. Every day, a baby is born with a deficit, some sort of permanent problem due to CMV (Mary, 25-40 years, FP)

It's surprising that I haven't heard of it, given obviously it affects two to three babies a day (Grace, 25-40 years, FP)

Participants described CMV as '*life threatening*' and '*terrifying*', when describing the impact of having a child with a disability (as a result of the virus). This disease identity intensified the perceived severity of CMV for many participants, who were alarmed by the silent, swift and seemingly irreversible decline CMV caused for families.

They are severe, aren't they? They are permanent things that would have a massive impact on your child's life...The statistic is even more than Down's syndrome and I am quite surprised. (Izzie, 25-40 years, SP)

The extent to which CMV could be controlled factored into perceptions of the condition and attitudes towards adopting risk-preventing behaviours. The fact that

CMV cannot be detected (without screening) and that pregnant women could pass the virus to the foetus, without knowing, was particularly concerning.

Obviously, you don't know whether you have the virus or whether you can pass it on or not. And then the consequences of that, that's pretty scary. (Jane, 25-40 years, SP)

Given the mode of transmission of CMV (urine and saliva), some participants (particularly first-time parents) perceived CMV as relatively preventable, but second time parents felt that adopting some of the risk preventing behaviours were more challenging. The majority of women held a realistic viewpoint about the level of control they held over preventing CMV. For the most part, women perceived the behaviours as a way of reducing the risk of CMV rather than preventing it completely.

All you can do is kind of just reduce the risks of coming into contact - that's it, really (Kate, 25-40 years, FP)

Pregnancy Identity

Participants reported that they were more health vigilant during pregnancy, with the motivation of keeping themselves and their unborn baby safe and healthy. Participants commonly reported making changes to their diet (eating healthier food or avoiding certain foods), as well as increasing hygiene behaviours during pregnancy (such as washing hands). Taking these extra precautions during pregnancy were considered the social norms or expectations during pregnancy. The main motivations for adopting healthy behaviours during pregnancy were to keep the baby (and self) healthy and safe.

I wash my hands all day, it's also for the safety of the baby, because there is not only just CMV virus, there are other bacteria and germs that babies can catch. (Rahmi, 18-24 years, FP)

Modifying or adopting some behaviours such as washing hands were considered easier, while some risk reducing behaviours were harder to implement as it impacted the way participants viewed themselves as mothers. To stop kissing children on the mouth or cheek was commonly reported as a challenging behaviour to implement during pregnancy.

I do think that the kissing one is a lot harder to enforce, just because a parent sort of natural reaction is well, mine is to constantly kiss my child. I would feel a bit restricted if I was just limited to just kissing her on the head. (Charlotte, 25-40 years, FP)

Other participants felt that changing behaviours around kissing children on the mouth to kissing them on the forehead or cheek to show affection could be an acceptable “modification” of an existing behaviour rather than adopting a new one.

I mean, those changes are very easy enough and again with small kids under five they are not necessarily in the habit whether you give them a kiss on the head or a kiss on the lips, you are still showing the same amount of affection. You just amend the way that you are providing that affection. I think if more women knew about CMV then they definitely alter their small habits, because they can make a big difference in terms of risk. (Sarah, 25-40 years, FP)

To stop sharing food with children was also reported by some participants as a difficult behaviour to change, due to its associations with a parental bonding experience. Sharing food with children was a deeply engrained behaviour and some

participants felt that changing behaviours, which were associated with being a “good and loving” parent, were harder to implement.

Your mum has probably done it to you ... you would feel very weird—you would kind of feel like you were distancing yourself a little bit from your child, if you weren't doing the normal things that mummies do with their child, like testing their food and sharing food. I think that would be a harder one to do.

(Sharik, 25-40 years, FP)

Participants often referred to their pregnancy as a relatively ‘short period’ of time to adopt risk preventing behaviours and pregnant women were highly motivated to ‘do their best’ to protect their baby.

Readiness to Engage

Readiness to engage in risk preventing behaviours was reliant on pregnant women feeling that they had the knowledge and felt empowered to make the necessary changes or modifications required. In contrast, an increase in anxiety and fear were perceived as barriers to effective behavioural change. Participants’ knowledge of CMV was very low and the majority of participants heard of CMV for the first time during their participation in the study. Participants seemed upset, annoyed and even angry with their midwives who had failed to discuss CMV and the devastating consequences for their unborn child with them. Knowledge about the condition and how to reduce risk was considered as empowering and participants felt that not knowing took away their choice and control.

Knowledge is power, knowing reduces anxiety... I think, if I'd have known this, it would have been my choice then and I would have known what I am risking by kissing (son's name) on the lips. (Nancy, 41-50 years, SP)

Providing relevant information needed to be balanced with not over burdening and overwhelming pregnant women with too much information. The majority of the participants discussed the importance of this balance when conveying messages about CMV, which are likely to be rather emotive and causing high levels of anxiety.

You do want to sort of hit the message home. At the same time I think you have got to be aware that you dealing with very hormonal, pregnant women, literally worried about slipping over on a banana skin. It's a hard one. I do think that people shouldn't shy away from the harsh reality of what it can do.

(Maddy, 25-40 years, SP)

Pregnancy was often referred to as a worrying and anxious time where women were concerned about the health of their babies. Additionally, they felt that they heavily relied upon knowledge and advice from their health care professionals, particularly midwives. It was therefore an important balancing act to deliver the messages relating to CMV prevention without overburdening and increasing anxiety and fear. Our participants were aware that knowledge and empowerment alone did not lead to behavioural change. It was important that women felt confident to adopt the risk reducing measures. Knowing that these changes were for a relatively short period of time (nine months of pregnancy) motivated them.

Support Networks

Pregnant women had a high level of trust in the healthcare system and were reassured by routine scans and tests provided by the NHS. They believed that any issues or concerns with the foetus would be highlighted and felt privileged to have access to excellent maternal services.

And I kind of trust that, the checks that they throughout the pregnancy they would be able to identify anything they can so that we would be aware of it.

(Rani, 25-40 years, SP)

Despite a trust in the healthcare system, all of the participants believed that women have a right to know about CMV and were 'shocked' they had never been informed about the risks that CMV posed. As previously discussed, pregnant women have considerable trust in midwives and rely heavily upon them for advice during pregnancy.

The midwife or anybody hasn't mentioned this when they give you a lot of information when you get pregnant. You get all these packs and all this, but there's nothing. Shocking. (Sarah, 25-40 years, SP)

Participants were also concerned about the lack of CMV screening routinely offered within the NHS.

And knowing that there is a test for it (CMV) and that they don't want to do the test. They test for things like Down's syndrome where the consequences are the same or similar. It's life-long changes for the foetus or the baby. I think that's quite important, quite significant. (Jane, 25-40 years, SP)

Some women believed that the lack of screening and information about CMV within the NHS was a result of funding cuts and that care within the service is being compromised.

Maybe it all boils down to funding and the NHS's ability to include it. ... You hear all the other things about the cuts and so on and you just wonder about your health if it's getting compromised because of the cuts. (Mary, 25-40 years, FP)

It is clear that the health care service plays a key role in the pregnancy journey and women have an expectation that they will be informed of anything that could pose a risk to them or their baby. When this expectation is not met, pregnant women and families feel let down and a certain level of trust is diminished. Many felt that the lack of discussion about CMV, and the silence about the condition, made them mistrust the healthcare system.

Partner and family support played a crucial role in making changes to and maintaining their behaviours during pregnancy. It was important for education about CMV to also include partners, rather than exclusively put the onus on pregnant women. Participants suggested that pregnant women were the ones to drive change and therefore women need to feel confident and empowered to initiate these changes in their homes.

I think yes, it should go to partners and also I think partners can help support these measures to be put into place...I think the thing is for my husband to change his behaviour that needs to come from me. I need to give him the information. It's about me being confident to tell my family about it and changing the rules of your house. (Izzie, 25-40 years, SP)

Participants felt that conversations about CMV and messages on ways to keep their unborn child safe needed to be “more mainstream”. Women believed that society was more accepting of changes in behaviours during pregnancy and these social norms enabled them to make changes to their behaviours. They hoped that open dialogue about CMV, avoiding kissing on the mouth and not eating their children’s leftovers became the accepted norms during pregnancy.

If I went to a restaurant and said, can I please have a Jack Daniels and Coke, everyone would look at me like it was something that was completely wrong.

Whereas if I wiped my godson's nose and then got my hand sanitizer out, it would be weird. (Mary, 25-40 years, FP)

Women also reported a fear of causing offence to other parents and family members if they were to adopt these behaviour changes. For women to engage in risk reducing behaviours to prevent CMV in pregnancy, there needs to be a societal shift around the awareness of CMV so that women and families feel comfortable and supported when adopting these behaviours. This would increase their engagement in the risk reducing behaviours, as behaviours and conversations about CMV would become the norm and they would feel supported by the wider community.

Discussion

Our study sought to develop an inductive theory to explain the process underlying pregnant women's readiness to engage with their risk of infection and adopt risk reducing behaviours. Rather than adapting the more commonly used socio-cognitive models, such as the HBM or TPB, which rely primarily on individual cognitive factors, we developed a new theoretical model embedded in research findings that also consider broader socio-cultural and socio-structural barriers that perpetuate behavioural change in pregnancy. It is proposed that for behavioural change to become viable, it is necessary for an individual to progress through potential barriers or facilitators at the individual, inter-personal and system levels. Knowledge, empowerment and self-efficacy facilitate behavioural change, while fear and anxiety act as barriers to pregnant women's readiness to engage in behavioural change. By widening the theoretical lens beyond individual cognitive determinants, the proposed model places sufficient emphasis on inter-personal and system factors (see Figure 2), that are of particular relevance to pregnant women, such as the

collective identity, support networks, interaction with the health care system and support from the wider community. The important role of social identity, social connectedness and social integration plays in health has been recently highlighted (Haslam et al., 2018), however these concepts have not been previously been applied to behavioural change.

At the individual level, our model is consistent with other prevailing conceptualisations of theories of behavioural change, which still almost exclusively focus on individual-level processes. Readiness to engage in behavioural change is influenced by pregnant women's perceptions of CMV, their susceptibility of contracting CMV and their perceptions of the controllability of the virus. Our findings corroborate previous research that suggests that increase in perceived severity, susceptibility, self-efficacy and perceived norms increase engagement in prenatal behavioural interventions to reduce risk of maternal CMV infections (Hughes et al., 2017). The significant contribution of our study is that it highlights that these individual factors are not sufficient to bring about behavioural change and the importance of the social process in behavioural change.

Psychological and other accounts that focus only on the individual are limited in scope because they fail to account for the social underpinnings of health and wellbeing. The study emphasised the important role of group membership (and the social identities associated with them), which play an important role in determining behavioural change. Our findings suggest that women take on the identity of a pregnant woman and the social expectations and social norms that accompany this role. Pregnant women were motivated and more receptive to the idea of behavioural change as it was for a relatively short period of time. There is evidence here that social identity takes precedence over their personal identity (i.e. the whole "us" takes

precedence over the individual “I”). Theoretical framing of behavioural change should therefore appropriately understand the power of collectives, and fully appreciate their influence (whether positive or negative) to optimally harness their curative potential.

At the inter-personal level, supportive partners had the potential to offer strength or conversely, unsupportive families led to anxiety which deterred readiness to engage in behavioural change. Social support and partners, in particular play an important role in relieving anxiety in pregnant women and increasing the uptake of behaviour change (Torkan et al., 2018). Other studies have suggested that when assessing salient normative referents, a woman’s spouse or partner exerts the largest influence across behaviours and these social norms are related to behavioural change in pregnant women (Moosavinasab et al., 2018). Considering these beliefs together, it may be especially important for interventions during pregnancy to involve partners and family.

Our findings highlight that pregnant women expected midwives and maternity healthcare practitioners to engage in conversations about CMV and risk prevention. Previous studies have highlighted that there is a lack of CMV awareness in healthcare workers (Wizman et al., 2016), and midwives were on occasions frustrated by constraints of time, training (Olander et al., 2018; Thackeray and Magnusson, 2016) and lacked confidence in addressing and supporting behaviour change in pregnancy (Sanders et al., 2016).

At the system level, the health care system (National Health Service, NHS in the UK) and wider community have the ability to support pregnant women and their families to initiate, maintain and sustain behavioural change. Pregnancy may be the first time women have sustained contact with health services and so presents the ideal

opportunity to influence their lifestyle (National Maternity Review, 2016). Overall, antenatal care in the NHS is organised such that women feel supported, valued and their healthcare needs and health promotion during pregnancy are encouraged and supported and screening for genetic abnormalities are part of antenatal care. In this context of acceptance and trust with the NHS, our study participants were acutely aware about the silence surrounding CMV, the lack of information provided to pregnant women and the absence of screening made pregnant women feel alienated, mistrustful and suspicious of the NHS. Furthermore, deeply entrenched behaviours that are rooted in cultural traditions that depict a strong maternal bond, such as avoiding kissing children on the lips and avoiding sharing food with children were considered harder to follow. However, there have been shifts in other social norms related to maternal and child health, including putting an infant to sleep on its back and placing children in car safety seats. Therefore, open dialogue of the risk needs to take place in society and pregnant women should be supported to make these changes.

The findings reveal several practical applications worthy of consideration for a future intervention to reduce risk of infections in pregnancy. First, behavioural change messages should focus on making modifications of existing behaviours and remind women that these changes are for a relatively short period of time (9 months). For example, rather than exclusively focusing on improving hand hygiene, interventions should place more emphasis on encouraging women to being the first to share food with their children (that is not eating food that has already by tasted by the child, rather tasting or testing it first), rather than focus on not sharing food with children and kissing s their child on the forehead, rather than kissing on the lips. These culturally rooted behaviours can be addressed by suggesting to women adapt their behaviours rather than stopping these behaviours are likely to be effective in reducing

the risk of CMV in pregnancy. Finally, interventions should highlight that making small changes during pregnancy can make a big difference in reducing the risk of infections in pregnancy.

Antenatal policies should therefore support open conversations about the risks of CMV and ways to adopt risk-preventing measures. Digital communication offers unique opportunities for antenatal interventions to empower women in their decision-making, without increasing the burden on health practitioners. There is also an opportunity to train midwives on the risks associated with CMV and the measures pregnant women are willing to adopt to make changes to reduce their risk of infections in pregnancy. The findings of our research draw attention to the importance of the socio-cultural and socio-structural context and barriers to behavioural change related to CMV during pregnancy. However, only the perspectives of pregnant women have been included in this study, future studies should include the views of their partners, family members and healthcare professionals involved with antenatal care.

Conclusion

This study makes a significant contribution to existing literature on risk prevention and antenatal education by providing a dynamic, grounded theory model of the process underlying pregnant women's readiness to engage in risk reducing measures to prevent infections in pregnancy. By widening the theoretical lens to incorporate inter-personal and system level factors, our model takes account of the interlocking relationship between the pregnant women, their partners, families and healthcare practitioners and between the pregnant women and the community and healthcare system that facilitate or impede behavioural change.

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Table 1: Demographic characteristics

Gender	Female	32 (96.97%)
	Male	1 (3.03%)
Age	18-24 years	2 (6.06%)
	25-40 years	30 (90.9%)
	41-50 years	1 (3.03%)
Marital status	Single (never married)	6 (18.18%)
	Married/civil partner	27 (81.82%)
Pregnancies	First pregnancy (FP)	18(54.55%)
	Second or subsequent pregnancy (SP)	14 (42.42%)
	Partner pregnant	1 (3.03%)
Children under the age of 3	Yes	15 (45.45%)
	No	18 (54.45%)
Ethnicity	White English	9 (27.27%)
	Other British	1 (3.03%)
	Other White background	11(33.33%)
	White and Black Caribbean	2(6.06%)
	White and Black African	2(6.06%)
	White and Asian	7(21.21%)
	Other mixed Background	1(3.03%)
	Long term condition or disability	Yes
	No	32 (96.96%)
Work with children	Yes	4 (12.12%)
	No	29 (87.87%)
Qualifications	GCSE/BTEC or equivalent	1(3.03%)
	AS/ A-Levels or equivalent	4(12.12%)
	PGCert/ PGDip or equivalent	1(3.03%)
	BSc/ BA or equivalent	15(45.45%)
	MSc/ NIA or equivalent	10(30.30%)
	PhD or equivalent	2(6.06%)

Figure 1: Data structure, following Gioia et. al., 2012. First-order concepts, second-order concepts, aggregate dimensions

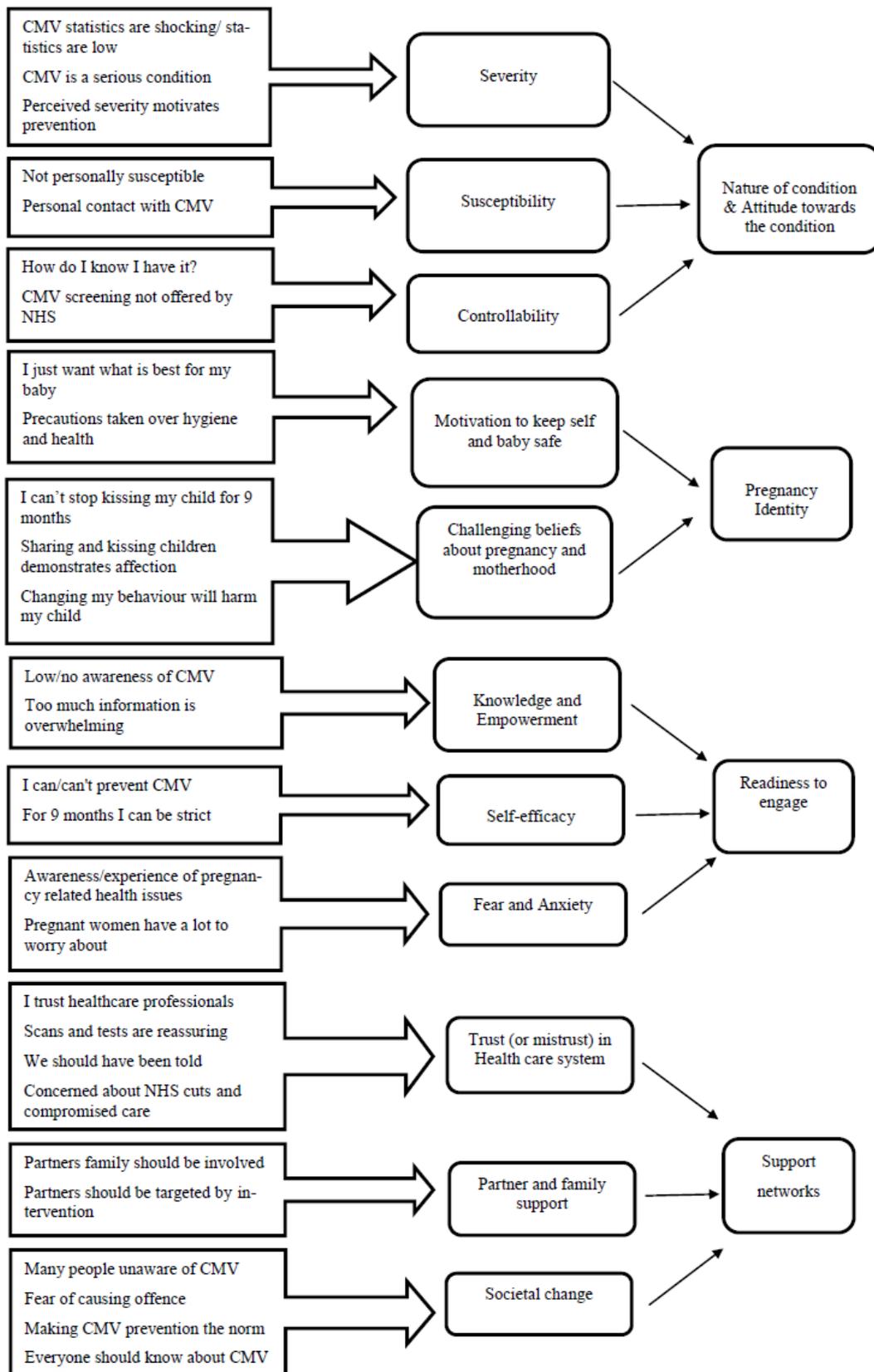
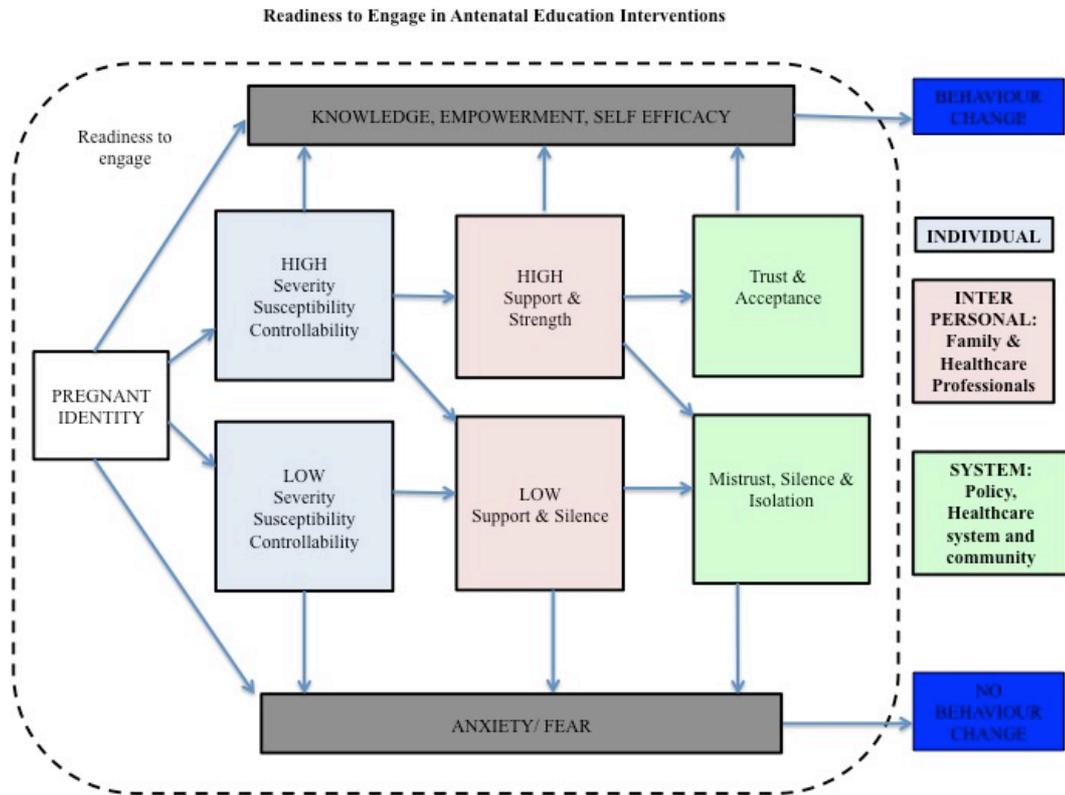


Figure 2: Process of engaging in antenatal behavioural change to reduce risk of infections in pregnancy.



Acknowledgments: The authors are grateful to the participants for their involvement and interest.

Funding details: This paper presents independent research funded by the National Institute for Health Research (NIHR) under its Research for Patient Benefit (RfPB) Programme (Grant Reference Number PB-PG-0215-36120). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Declaration of interest statement: The authors declare that there is no conflict of interest.