Online medication purchasing behaviour in pregnancy

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I confirm that the word count for this thesis is less than 100,000

Dedication

To Andy, Anna, Callum, Amelia, Clara

My everything xxxxx

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Abstract

Background

Many pregnant women present with or develop co-morbidities in pregnancy such as cardiac disease, diabetes or mental health issues and take at least one medication. The internet has provided the option for pregnant women to purchase medications online without healthcare advice. However, we do not know what factors or online features influence purchasing behaviour.

Aim

To explore factors influencing pregnant women's intention to purchase medication online.

Methods

An exploratory descriptive design was used with multistage, mixed methods. Phase 1 was a cross-sectional online survey underpinned by the Theory of Planned Behaviour (TPB). Phase 2 involved three online focus groups conducted using asynchronous communication on closed Facebook groups exploring medication purchasing behaviour. Phase 3 used eye tracking technology and a think-aloud protocol to capture real time, online purchasing behaviour using simulation. Data were subject to descriptive, regression and correlation analyses. Ethical approval was obtained from Ulster University.

Results

Analyses were conducted on 409 completed surveys. Women were from 20 countries and 24% had purchased medication online. Attitude, subjective norm and perceived behavioural control explained 55% of the variance in purchasing intention.

Phase 2 involved three online focus groups with 23 women from six countries. Strong predictive factors influencing purchasing behaviour included the importance of rapid retrieval of information, convenience and cost-effectiveness. Online purchasing enabled women to avoid consultations with healthcare providers and helped them feel more in control.

In phase 3, 33 women participated in the eye tracking study. Women's online choices were influenced by their previous medication experience, product reviews, star ratings, familiarity of websites and trust. Practical influences were the 'easiness to navigate the website' and 'confidence in financial security'.

Conclusion

Medication history-taking requires a new approach with 1:4 women purchasing medication online. This study presents a unique contribution to knowledge using TPB to identify predicting factors that influence a pregnant women's intention to purchase medication online. This research knowledge is important to health professionals who need to get safety messages to mothers using targeted information and robust evidence.

Abbreviations

AOI	Area of Interest
ET	Eye Tracking
FC	Fixation Count
FD	Fixation Duration
FDA	Food and Drug Administration
GP	General Practitioner
GSL	General Sale Listing
ITU	International Telecommunications Union
MHRA	Medicines and Healthcare products Regulatory Agency
NHS	National Health Service
NI	Northern Ireland
ONS	Office for National Statistics
OTC	Over the Counter
PBC	Perceived Behavioural Control
PEO	Patient Exposure Outcome
PPP	Pregnancy Prevention Programme
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Randomized Control Trial
SHSCT	Southern Health and Social Care Trust
SN	Subjective Norm
T1F	Time to First Fixation
TAM	Technology Acceptance Model
TFD	Total Fixation Duration

TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TVD	Total Visit Duration
UK	United Kingdom
US	United States
UKTIS	UK Teratology Information Service
UTI	Urinary Tract Infection
VC	Visit Count
VD	Visit Duration

Declaration

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Chapter 1 - Introduction

1.1 Changing demographic and clinical profile of pregnant women

Over the last 25 years there has been a noticeable change in the demographic and clinical profile of women of childbearing age (Council of Deans of Health 2017). An increasing number of women are starting their families and becoming pregnant later in life, this has led to an increase in assisted conception and rates of multiple births (Northern Ireland Statistics and Research Agency 2018; Information Services Division Scotland 2019; Office for National Statistics 2019a). There is also poorer general health for some women at the start of pregnancy associated with smoking, alcohol consumption, obesity or drug addiction (Klonoff-Cohen 2017). Many women are presenting with or developing co-morbidities in pregnancy such as cardiac disease, diabetes, mental health concerns to name a few (Hirshberg and Srinivas 2017; Knight 2019). These factors all have an impact on the medication women are taking before or during their pregnancy.

1.2 Medication use in pregnancy

Medication use in pregnancy can encompass a broad range of treatments from prescription based pharmaceutical products to herbal, homeopathic and vitamin supplements. The term “Medicinal Product” is defined in Article 1 of Directive 2001/83/EC (European Parliament and of the Council 2001):

> *‘Any substance or combination of substances presented as having properties for treating or preventing disease in human beings…*
>
> *Any substance or combination of substances which may be used in, or administered to, human beings, either with a view to restoring, correcting or modifying physiological functions by exerting pharmacological, immunological or metabolic action, or to making a medical diagnosis.’*

As such most herbal and homeopathic remedies fall under the remit of this definition of a medicinal product (MHRA 2016a), and for the purpose of this study will be included within the context of discussion on medication.

The literature demonstrates during pregnancy more than 80-90% of women will take a prescription or over the counter (OTC) medication (Mitchell et al. 2011; Lupattelli et al. 2014; Mulder et al. 2018). Most pregnant women take at least one medication during their pregnancy despite limited evidence on the safe use of many medications (Mitchell 2011; Hartman et al. 2016). For many medications, there is a lack of evidence regarding specific recommendations for use by pregnant women (EUROmediCAT 2011; Thorpe et al. 2013). The inclusion of pregnant women in randomized controlled trials (RCT's) raises ethical concerns, thereby creating a dependence on post-marketing epidemiologic studies to provide insight into the benefits and risks of medication use during pregnancy (Van Gelder et al. 2019a).

When deciding to take a medication a pregnant woman must negotiate a complex health system that involves concerns of risk versus benefits, safety and responsibility for the baby along with her own needs (Meurk et al. 2014). This lack of evidence regarding the safety of medications for use in pregnancy creates a challenge for healthcare professionals and pregnant women that can impact on their ability to make informed decisions (Hansen et al. 2016). This creates a challenge for mothers and HCP in creating a balance on having an effective therapeutic level of medication without a detrimental outcome on fetal development. The lack of evidence regarding the safety of medication

use during pregnancy creates challenges for women and healthcare professionals when discussing or purchasing medication (Sinclair et al. 2016).

1.3 Women's concerns regarding using medication during pregnancy

The use of thalidomide in pregnancy during the 1960's led to general concerns around medication use in pregnancy and the teratogenic effects impacting on the fetus (Plank 2011). The concerns raised from this tragedy have continued in the present day with many women demonstrating fear regarding the use of medication in pregnancy. Women who need to take medication during pregnancy often fear the behaviour will lead to the birth of a child with a congenital anomaly, a miscarriage or a child with allergic disease (Mulder et al. 2018). This has resulted in many women and healthcare professionals over-estimating the teratogenic risk of most medications (Nordeng et al. 2010; Csaijka et al. 2014; Petersen et al. 2015). Women's risk perception and disparity of beliefs regarding medication indicates a potential lack of awareness of the appropriateness of medicines which was demonstrated in a study by Twigg et al. (2016) who reported that some women experiencing symptoms heartburn and urinary tract infections (UTI) did not treat their conditions. A high-risk perception of medication use in pregnancy has been shown to lead to poor medication adherence (Lupattelli et al. 2014). All medicines should be assessed for risk versus benefit and used sparingly during pregnancy to minimize potential adverse risks to the developing fetus (Bisson et al. 2019).

1.4 Global rise of the use of the internet

The internet is now an accepted part of our daily lives with most people unable to imagine modern day life without online access (Ofcom 2019). With more access to computers and an increased utilisation of smart phones and mobile technology, there is more opportunity to access the internet with relative ease and convenience. In 2019, approximately 4.48 billion people worldwide were active internet users, which is approximately 58% of the global population, with China, India and the US ranking as the highest users (Clement 2019). In the UK virtually all adults aged 16-44 yrs. old (99%) used the internet regularly (Office for National Statistics 2019b). Developing countries who demonstrate lower percentages of the population using the internet have also seen a significant rise in online usage in recent years (International Telecommunications Union 2019). An average internet user spends 6 hours and 42 minutes online every day with Google, YouTube and Facebook ranking highest for visited sites (Kemp 2019). Rates of internet access and use are predicted to grow more in the future (Clement 2019).

1.5 Use of the internet for health seeking information

The increasing availability of the internet has allowed women to communicate and seek health related information for private or personal use on a daily basis (Slomian et al. 2017). Several research studies have highlighted that pregnant women use the internet to search for health-related information (Weston 2014; Lupton 2016; Wallwiener et al. 2016) particularly regarding which medications are safe to take during pregnancy (Hamëen-Anttila et al. 2013; Twigg et al. 2016; Sinclair et al. 2018). Women use information they obtain from the

internet to supplement information they receive from healthcare professionals, acknowledging that additional information influences their decision making (Lagan et al. 2010). However, healthcare professionals are not always willing to talk about information found on the internet with mothers (Slomian et al. 2017).

1.6 Online options for purchasing medications

For the pregnant woman, the internet has also provided a convenient channel to purchase medication online with the growing prevalence of online or e-pharmacies (Fittler et al. 2013). An online pharmacy is a website that can facilitate delivery, distribution and dispensing of medications online over the internet directly to a consumer (Mackey et al. 2016). The evident ongoing virtual market of online pharmacy provision has been facilitated with the rapid expansion of the internet. An increase in digital e-Health, a movement towards self-diagnosis and self-medication has increased the general consumer experience of retail purchasing online, with easy accessibility of mail order trade and provision of access to products from different countries (Gabay et al. 2015; Mackey et al. 2016; Fittler et al. 2018).

Online pharmacies have increasingly become beneficial to women as they offer convenience, privacy, free access to information and comparison shopping (Fittler et al. 2013; Miyatake et al. 2016; Jain et al. 2017; SivaKumar and Gunasekaran 2017). However, the literature identifies multiple issues surrounding online medication purchasing for pregnant women in relation to a lack of knowledge about the validity of the products and not knowing if they

were counterfeit, unapproved, or illegal (Orizio et al. 2011). However, with the global online pharmacy market predicted to be worth approximately 128 billion dollars in 2023 (Statista 2015), worldwide sales will continue to increase in the future.

Over the counter (OTC) medications and general sales listing medications (GSL) are now readily available to purchase in drug stores, health food stores and traditional retail outlets such as supermarkets and department stores (Holtgräfe and Zentes 2012). All these outlets have now online purchasing options which enables a pregnant woman to make an online medication purchase without any meaningful engagement with healthcare professionals for guidance. This has the potential to increase the purchasing risk for all consumers, including pregnant women.

1.7 Rationale for the study

Much of the online consumer literature to date has focused on general online shopping behaviour (Kennedy and Wilson 2017; Katta et al. 2018; Sharma et al. 2019). Several studies have looked at medication use in pregnancy specifically prescription drugs (Weng et al. 2013; Haas et al. 2018; Leong et al. 2019) and outcomes in cases of acetaminophen (most commonly referred to as Paracetamol or Tylenol) (Liew et al. 2014), antihypertensives (Bateman et al. 2012), antidepressants (Huybrechts et al. 2014), asthma (Hansen et al. 2013) to name a few. The use of over the counter medications during pregnancy (Verstappen et al. 2013; Servey and Chang 2014; Abduelkarem and Mustafa 2017) and the use of herbal medications in pregnancy (Kennedy

et al. 2013; Kennedy et al. 2016) or general medication usage (Lupattelli et al. 2014; Twigg et al. 2016; Lynch et al. 2018) have also been explored. More recent studies have explored women experience of online purchase of abortion medication through telemedicine services (Aiken 2017; Aiken et al. 2019a; Endler et al. 2019). However, there are limited studies that have explored online medication purchasing in pregnancy as part of a larger study (Sinclair et al. 2018; Ceulemans et al. 2019). There are no published studies exploring general online medication purchasing in pregnancy exclusively or exploring the factors that influence a woman's online medication purchasing behaviour in relation to human computer interaction.

With the growing importance of the internet as a source of information and option to purchase medications online without prescription, research is required to address the knowledge gap and determine the factors that influence pregnant women's behaviour regarding the purchasing of medications online.

It is vital that we understand the clinical and public health implications for pregnant women who purchase medication so that women are safeguarded in their decision-making processes in the future, and healthcare professionals provide evidence-based advice to women. However, currently very little is known regarding the motivational factors that influence a pregnant woman to purchase medication online or the processes involved through human computer interaction that lead to the procurement to medications.

There are limited studies conducted directly focusing on the online medication purchasing behaviour of pregnant women and none on what modifiable factors can influence a pregnant woman's purchasing behaviour. Understanding what, how and why women purchase medication online is important to shape future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service provision.

1.8 Study aims and objectives

The aim of this study was to explore the multiplicity of factors that influence a pregnant woman's intention to purchase medication online. To achieve this the following objectives were identified:

1. To describe and analyse online medication purchasing in pregnant women, locally, nationally and internationally.
2. To explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online.
3. To use eye-tracker technology to determine modifiable features of online interfaces or websites that influence pregnant women's decision to purchase medication online.
4. To confirm data interpretation of theoretical constructs and explore tentative recommendations for research, education, policy and practice.

1.9 Thesis Structure

This section provides the structure of the thesis and a brief summary of each chapter.

Chapter 1 introduces the thesis and a background literature in relation to online medication purchasing in pregnancy. It provides a rationale for the study outlining the aims and objectives.

Chapter 2 provides a review of the literature on online medication purchasing in pregnancy. The first section of the literature review explores the factors that influence online medication purchasing in pregnancy demonstrated in the literature from 2007-2018. It details the search strategy and article selection processes followed by an analysis of the literature, highlighting gaps in the knowledge base. A literature review paper was published in a peer reviewed journal (Appendix 1):

Little, A., Sinclair, M., Zheng, H., Gillen, P. (2018) Online medication purchasing behaviour in pregnancy: a structured review of the literature. *Evidence Based Midwifery,* 16(1), 13-20.

This chapter also presents the results of an updated review of the literature undertaken from January 2018 to December 2019.

Chapter 3 presents the philosophical underpinning of the study. It identifies how pragmatism was chosen for this mixed methods study. The chapter also includes a reflexive account to identify the researcher's values, attitudes, beliefs and potential biases that could influence the research study.

Chapter 4 presents the theoretical framework that underpins the study. It discusses identification of several consumerism models and theories from which the Theory of Planned Behaviour (TPB) (Ajzen, 1985) was selected to theoretically underpin the study.

Chapter 5 presents the multistage mixed methods research design and study methodology (Fetters et al. 2013). The three-phase multistage mixed methods approach is detailed with the ethical considerations and data analysis strategies implemented for the study.

Chapter 6 presents the finding from phase 1 of the study which included a cross sectional internet-based survey underpinned by the TPB to identify pregnant women's online medication purchasing behaviour and the factors that influenced that behaviour.

Chapter 7 presents the findings from phase 2 of the study which involved thematic analysis of online focus group discussions regarding the factors that influenced women's experiences of purchasing medication online during pregnancy.

Chapter 8 presents the findings from phase 3 of the study where an eye tracking study was carried out to observe pregnant women's online purchase of medication in a simulated environment.

Chapter 9 presents the discussion and integration of the research findings with recommendations for policy practice and education.

Chapter 10 presents the final chapter and conclusion of the study. The strengths and limitations of the study are identified. The chapter also details the study's original contribution to the body of knowledge, recommendations for future research and concluding comments.

Chapter 2 - Literature Review

In Chapter One, the general literature on the topic was presented which identified growth in the online pharmaceutical industry and the increasing potential for pregnant women to purchase medication online. However, it is important to understand factors that are likely to influence pregnant women to purchase medications online and therefore it was necessary to conduct a structured review of the literature. This chapter presents the findings from the structured review of the literature published in 2018 and updated in December 2019.

Little, A., Sinclair, M., Zheng, H., Gillen, P. (2018) Online medication purchasing behaviour in pregnancy: a structured review of the literature. *Evidence Based Midwifery,* 16(1), 13-20. (Appendix 1)

2.1 Background

Over recent years there has been changing dynamics in the pregnant population. Women are becoming pregnant at an older age (Kenny et al. 2013) and there is poorer general health at the start of pregnancy associated with lifestyle factors such as smoking, alcohol consumption, recreational drugs, obesity, reduced physical activity and a recognised increase in IVF pregnancies (Klonoff-Cohen 2017). These factors along with pre-existing medical conditions increase the need for some women to continue taking medication during pregnancy, with more than 90% of pregnant women taking a prescribed or over the counter (OTC) medication at some stage during their pregnancy (Mitchell et al. 2011). For many medications, there is a lack of evidence regarding specific recommendations for use by pregnant women

(EUROmediCAT 2011; Thorpe et al. 2013). When taking a medication, a pregnant woman must negotiate complex health-based, decision-making, that includes concerns involving risk, safety and responsibility for the baby along with her own health needs (Meurk et al. 2014). A lack of evidence regarding the safety of medications for use in pregnancy creates a challenge for healthcare professionals and pregnant women. Ultimately this may impact on women's ability to make informed decisions (Hansen et al. 2016).

In recent years the internet has developed widespread attention as a source of health-related information for women during pregnancy (Lagan et al. 2010; Gao et al. 2013; Song et al. 2013; Gilmartin et al. 2018; Sinclair et al. 2018) and a purchasing channel for medication (Holtgräfe and Zentes 2012; Sinclair et al. 2018). Women are self-medicating and buying paracetamol, opiate based drugs such as codeine and anti-inflammatory medication for lower back pain (Sinclair et al. 2014). There is also a body of evidence that women are using herbal medication during pregnancy (Kennedy et al. 2013; Kennedy et al. 2016).

For the pregnant woman the internet has now provided the option to purchase over the counter (OTC) medications, herbal/homeopathic medications and prescription-only medicines online (Fittler et al. 2013). The literature regarding the increasing prevalence of e-pharmacies in use would suggest the online medication industry is a growing economy (The Centre for Safe Internet Pharmacies 2016).

With the growing importance of the internet as a source of information and provision of options to purchase medications online, research is required to address the gap in the knowledge and to determine what modifiable factors influence a pregnant woman's behaviour regarding the purchasing of medications online. Being able to signpost women and healthcare professionals to access valid and reliable online information about medication usage, and online purchasing in pregnancy is our shared responsibility (Sinclair 2014). Understanding what, how and why women purchase medication online is important to shape future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service provision.

2.2 Aims and Objectives

The aim of this chapter is to critically analyse and synthesise published research studies in a transparent and reproducible way in order to increase knowledge of online medication purchasing behaviour in pregnancy.

- To describe and analyse patterns of online medication purchasing by pregnant women, locally, nationally and internationally.
- To explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online.

2.3 Research question

The literature review research question was developed using the approach recommended by Khan et al. (2003), Patient, Exposure and Outcome (PEO) and led to the following question:

"What modifiable factors influence a pregnant woman's intention to purchase medication online?"

2.4 Methods

The 12-step guideline by Kable et al. (2012) was used to provide a structured and replicable literature review. This structured approach was used to document the search strategy prior to the critical analysis and synthesis of the data retrieved (Table 2.1). This structure was also chosen as it provided a framework for publication. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were also followed during the review to ensure credibility and transparency in the review process (Shamseer et al. 2015).

Table 2.1: A 12 step guideline for authors for literature reviews (Kable et al. 2012)

A 12-step guideline for authors (Kable et al. 2012)
1. Provide a purpose statement 2. Document the databases or search engines used in your search strategy 3. Specify the limits applied 4. List the inclusion criteria and exclusion criteria 5. List the search terms used 6. Document the search process 7. Assess retrieved articles for relevance 8. Document a summary table of included articles 9. Provide a statement specifying the number of retrieved articles 10. Conduct quality appraisal of retrieved literature 11. Critical review of the literature 12. Check the reference list for accuracy

The research question was broken down into component parts to identify the appropriate search terms (Table 2.2).

Table 2.2: Research Components: Population, Exposure and Outcomes (PEO)

P Population and their problem	E Exposure	O Outcome or themes
Pregnant women	Internet	Intention to purchase medication
"pregnan*"	"internet" or "online" or "website*" or "web" or "w.w.w" or "web-based.mp" or "medical" or "clinical" or "health informatics"	"purchas*" or "buy*" or "consumer behavi*" or "choice behavi*" or "intention" "medication*" or "medicine*" or "medicament*" or "drug?" or "exp pharmaceutical preparations/" or "self-medication" or "e-pharmac*" or "drug pharmac*' or "prescription"

The search strategy was created with the assistance of the University Librarian who had expertise in systematic review searching specialising in Life and Health Sciences. The search terms were tested to verify their effectiveness in locating papers consistent with the inclusion and exclusion criteria for the review, prior to applying to all searches. After the MEDLINE strategy was finalised, it was adapted to the syntax and subject headings of the other databases. Literature search results were transferred to the Refworks reference management software package to facilitate collaboration with reviewers during the study selection process.

The databases MEDLINE (Ovid), CINAHL Plus, PyschInfo, Web of Science and Scopus were searched in April 2017 and the search was updated in January 2018 to locate published research regarding online medication purchasing behaviour in pregnancy. MEDLINE (Ovid) was identified as one of the key databases for the topic of interest in this review and the search strategy was initially trialled on this in order to test that the MeSH and keyword terms retrieved relevant papers.

Searches of the grey literature were carried out using Google Scholar for any other published or unpublished material such as conference presentations. Searches for thesis were under-taken by searching Ethos which provides a list of theses stored by the British Library. Manual searches for references were undertaken by searching for relevant citations of selected articles. PROSPERO was searched for any ongoing or recently completed systematic reviews. Alerts were set up on the first author's personal account for each database in order to receive notifications of new publications during the period of the review.

2.5 Inclusion and exclusion criteria

The following inclusion/exclusion criteria was applied to the search. Papers from peer reviewed journals were only included. Only papers from 2007 were included as the topic is a relatively new phenomenon within the last decade. The papers in the review were limited to articles written in English due to time and financial constraints of the PhD study and the researchers inability to carry out translations.

Inclusion criteria:

- Studies involving pregnant women purchasing medication online
- Papers from peer reviewed journals published from January 2007 to January 2018
- Primary quantitative, qualitative, mixed method studies and literature reviews
- Articles written in English
- Studies involving only human subjects

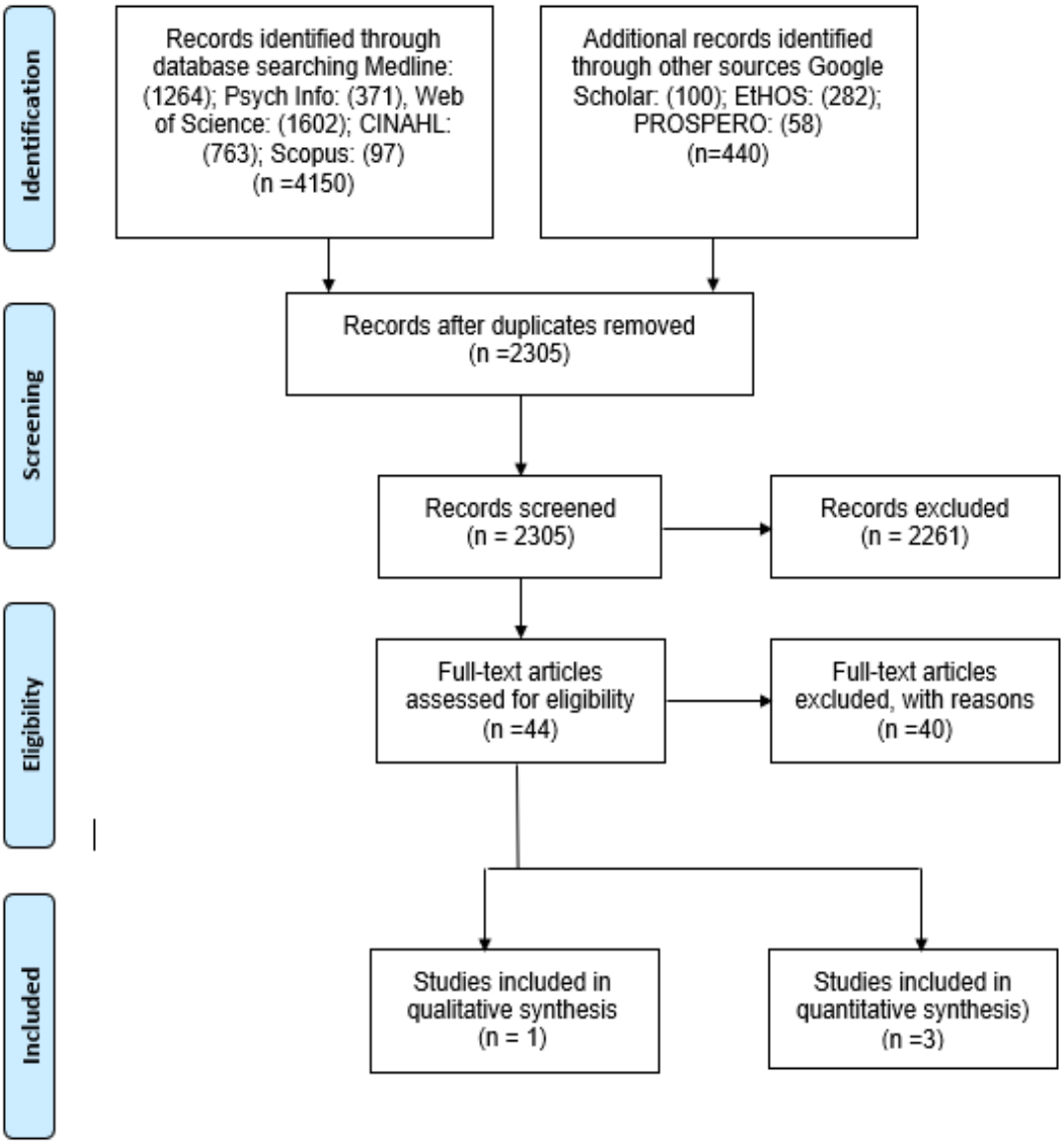
Exclusion criteria:

- Studies that do not focus specifically on pregnant women purchasing medication online
- Studies focusing on online purchasing of contraception
- Non peer reviewed studies
- Studies not written in English

The PRISMA flow diagram (Figure 2.1) demonstrates the strategy used for the selection of the papers included in the review. The Refworks reference management software package was used to remove all duplicate references. All remaining relevant papers were screened by title and those not meeting the criteria were removed. Where there was uncertainty regarding the relevance of the study by title, the abstract was read to determine if the study met the inclusion criteria. In cases where It was unclear from the abstract if

the article had relevance to the review, the full paper was downloaded and reviewed.

Figure 2.1: PRISMA flow diagram for literature selection process on factors influencing pregnant women's online purchasing behaviour



2.6 Quality appraisal of the selected papers

Quality appraisal of the retrieved articles was assessed using the Checklist for Analytical Cross-Sectional Studies (The Joanna Briggs Institute 2016a), the

Checklist for Qualitative Studies (The Joanna Briggs Institute 2016b) and the Checklist for Diagnostic Test Accuracy Studies (The Joanna Briggs Institute 2016c).

In the EUROmediCAT (2011) study, methodological limitations were identified with only 2 focus groups having been carried out. There is no reference to data saturation, and this could have had an impact. However, the study was valuable and was included. The study by Sinclair et al. (2018) included in the review identified 5% of the population were using the internet to purchase medication online, though the data were collected in 2013 so an update is required for today's population of pregnant women. There was no breakdown of the specific medications purchased by the pregnant women over the internet. None of the studies retrieved addressed the social factors that may influence medication purchasing behaviour online such as family and friends and their impact on a pregnant woman's intention to purchase medication online. Furthermore, there were no studies focused on purchasing intention in relation to human computer interaction and it is important to determine whether factors such as website navigation and interpretation of information provided on the web influences purchasing intention.

2.7 Results

The PRISMA flow chart summarises the results from the literature review search (Figure 2.1). In total, 4590 hits were obtained from the search strategy. After screening, 44 full text papers were accessed for eligibility and 4 papers met the inclusion criteria. Three of the papers retrieved from the literature

search all related to the EUROmediCAT (2011) four phase, multi-method scoping study conducted between March 2011 and December 2013 (Table 2.3). EUROmediCAT was a European research consortium dedicated to improving medication safety in pregnancy with the aim of building a European system for the evaluation of safety of medication use in pregnancy in relation to the risk of congenital anomalies (EUROmediCAT (2011).

Table 2.3: Summary of the papers selected for inclusion in the review

	Author (year) country	Study Design	Sample size and sites	Design/Data collection methods	Comments/key findings	Quality appraisal
1	Lagan et al. (2014) Assessing the availability of the teratogenic drug isotretinoin outside the pregnancy prevention programme: a survey of e-pharmacies	Cross sectional survey Online purchase of isotretinoin	n=50 e-pharmacies	Quantitative Phase 1: cross sectional survey identifying e-pharmacies Phase 2: Purchasing isotretinoin from subset of phase 1 to access PPP policy adherence, purchasing procedures and check samples for chemical authenticity	Tetrogenic compounds isotretinoin was accessible to purchase online whilst pregnant without prescription. n=43 (86%) e-pharmacies did not have authentication logo Isotretinoin could be purchase from 42 sites without valid prescription Information missing on birth defects n=25 Information on not taking isotretinoin in pregnancy missing in n=24 Information missing on not taking isotretinoin if planning pregnancy missing n=33 Of 8 attempted purchases n=7 arrived. All were verified as isotretinoin	Checklist for Analytical Cross-Sectional Studies (The Joanna Briggs Institute, 2016a)
2	EUROmediCAT (2011) W7 Implications of the Internet in Relation to Medication Access and Safety Information.	Four phase multi-method approach	Phase 4: 2 focus groups of women (n=11 and n=15)	Phase 4: Online focus groups	Phase 4: Findings substantiated the data from the literature about accessibility, affordability, convenience and the need to check medication safety information	Checklist for Qualitative Studies (The Joanna Briggs Institute, 2016b)
3	Sinclair et al. (2018) An assessment of pregnant women's knowledge and use of the internet for medication safety information and purchase.	Cross sectional survey	N= 284	Quantitative: Online survey	5% of women reported buying medication online. 46% of women with higher levels of education consider buying medication online as safe	Checklist for Analytical Cross-Sectional Studies (The Joanna Briggs Institute, 2016a)
4	Murtagh et al. (2017) Exploring the feasibility of obtaining mifepristone and misoprostol from the internet	Online purchase and chemical assay of mifepristone and misoprostol	n=18 websites identified to purchase mifepristone and misoprostol online	Quantitative: n=20 mifepristone-misoprostol combination products and n=2 misoprostol products purchased online	Online abortion medication can be purchased online in the US without prescription Mifepristone tablets purchased had within 8% of the labelled amount of active agent (200mg mifepristone tablet contained between 184.3mg and 204.1mg) Misoprostol 200mcg tablets contained between 34.1mcg and 201.4mcg of active ingredient	Checklist for Diagnostic Test Accuracy Studies (The Joanna Briggs Institute, 2016c)

The findings from the included papers were explored and thematically analysed using the framework by Braun and Clarke (2006) in table 2.4.

Table 2.4: Phases of thematic analysis (Braun and Clarke 2006)

Phase	Description of the process
1	Familiarizing yourself with your data
2	Generating initial codes
3	Searching for themes
4	Reviewing themes
5	Defining and naming themes
6	Producing the report

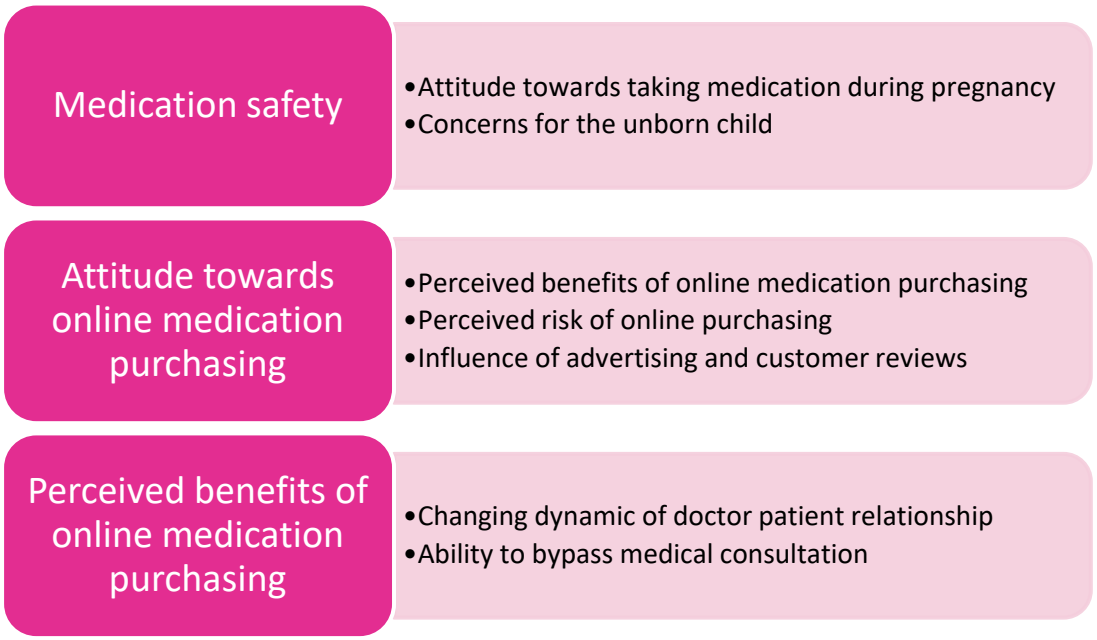
In phase one the papers included in the review were read and re read with preliminary potential codes and ideas being noted. In phase 2 initial codes were generated from the papers after the researcher had read several times for to become familiar with the content. The researcher then manually coded the papers. Phase 3 involved the interpretative analysis of collating all the codes into potential themes and gathering all the data that was relevant to each potential theme (Braun and Clarke 2006). The formation of the coding structure was refined and categorised into codes and themes in discussion with the researcher's supervisors. In phase 4, all of the themes were reviewed and a thematic map was used to form a visual tool to map out the facets of

the developing analysis and to identify themes, subthemes, and interactions between themes and subthemes.

In phase 5, the themes were reviewed and refined with clear names being given for each theme. The themes were identified to elicit what modifiable factors influence a pregnant woman's intention to purchase medication. The researcher took care in identifying themes that were reflective of what was portrayed in the data.

The final phase 6 involved writing up the findings to tell the story of the factors that influence pregnant women purchasing medication online. Extracts from the papers where included in the final write up to support the development of the themes and subthemes and highlight a clear audit trail. The main themes and sub themes that emerged are demonstrated in figure 2.2.

Figure 2.2 Main themes and subthemes in the literature



2.7.1 Medication safety

2.7.1.1 Attitude towards taking medication in pregnancy

Attitude towards taking medication in pregnancy is a key determinant of whether a pregnant woman will decide to purchase medication online. Sinclair et al. (2018) identified that 87% would only take a medication if it was necessary to maintain their health status. Furthermore, in their study 40% of the sample (*n*=82) had a prior history of a chronic health condition and 39% where taking at least one medication when they became pregnant.

2.7.1.2 Concerns for their unborn child

Sinclair et al. (2018) identified that, regardless of age, 90% of women would reconsider taking medication if they were to become pregnant due to the potential risk to their unborn child. This is in stark contrast to the study by Murtagh et al. (2017) that demonstrated there is a cohort of pregnant women at the other end of the spectrum who can avail of the option to purchase medication online with the intention to end their pregnancy.

2.7.2 Attitude towards purchasing medications online

2.7.2.1 Perceived benefits of online medication purchasing

Sinclair et al. (2018) identified that 5% of the pregnant population purchased medications online. A qualitative study by EUROmediCAT (2011) found that women perceived the benefits of online medication purchasing as being cheaper than other retailers, convenient, and accessible without prescription or unavailable in the UK. Sinclair et al. (2018) identified that women with a higher educational attainment were more likely to consider purchasing

medication from online pharmacies to be safe (42% vs. 26% p< .001) and would purchase medication online from an e-pharmacy while pregnant if they could not buy the medication from a local pharmacy or doctor (54% vs 46% p= .008) or if it was cheaper (41% vs 23% p=.004) compared with women with lower educational attainment. In addition, they reported that 71% of pregnant women who purchased medication had been asked ‘sometimes’ or ‘never’ by the online pharmacy for a prescription and only 57% had been asked ‘sometimes’ if they were pregnant; the remaining 29% were not able to remember if they had been asked. Forty-three percent of women in this study were never asked to complete a medical questionnaire. None of the online pharmacy websites in the study by Murtagh et al. (2017) asked for a prescription.

2.7.2.2 Perceived risk of purchasing online

A pregnant woman’s perceived risk plays a major role in the intention to purchase medication online. Sinclair et al. (2018) identified that, regardless of demographic status, 85% of women would not purchase medications online if they were pregnant due to fear surrounding legitimacy of the e-pharmacy, safety, quality, dosage and whether they would receive the product. Of the women who purchased medication online, 50% always received their order, while the rest only received them occasionally or never. This study also reported 46% of women with higher levels of educational attainment thought that buying medications online from e-pharmacies as safe and acceptable; however only 5% of the population had done so during pregnancy.

The study by Lagan et al. (2014) provided evidence that women of a child-bearing age, who were potentially in early pregnancy, had the opportunity to purchase online the teratogenic drug isotretinoin for severe acne without any form of risk assessment, pregnancy prevention advice, or warning of the potential teratogenic effects associated with the consumption of the drug. This drug is a known teratogen and it should not have been available for online purchase without a prescription as the recipient, if female, must be on double contraception and have medical counselling.

In relation to verifying illegitimacy of an online pharmacy, Sinclair et al. (2018) found 200 (70%) of women had never seen a symbol or warning message indicating a medication may be harmful to a baby 'if taken in pregnancy' or 'do not take in pregnancy'. Lagan et al. (2014) assessed eight e-pharmacy sites that displayed a pharmacy accreditation seal and one of these was not authentic; also, if the site displayed an 'authentic' accreditation seal, it did not necessarily follow that governance procedures were in place to minimise the risk of harm for consumers who purchase medication online. Regardless of age and educational attainment 75% of women stated they would be unable to differentiate between a legitimate and illegitimate online pharmacy.

EUROmediCAT (2011) identified that pregnant women have concerns regarding the quality of the product they order, what country it is from and whether the product they receive is safe. Lagan et al. (2014) found that almost half (41% *n*=21) of 50 e- pharmacies had a home and purchasing page hosted on servers in different countries and although 94%, (*n*=47) displayed a policy

on medication quality assurance, 68% (*n*=34) did not verify what country the medication was manufactured, with only 30% stating the medication was manufactured in India and one in the UK. Murtagh et al. (2017) found that all the products were labelled as having been manufactured in India. They also found evidence of multiple websites being run by the same vendor, with one website disappearing and reappearing several days later during the data collection period. Fittler et al. (2013) had similar findings and found one in five online pharmacy websites closed and reopened again within a 4year period, presumably to avoid prosecution from regulatory bodies or unsatisfied customers.

A major concern identified by pregnant women was whether the medication they received would be of a good quality (Sinclair et al. 2018). EUROmediCAT (2011) also highlighted concerns from pregnant women regarding whether the medication was effective or not for their condition. Lagan et al. (2014) conducted laboratory tests on *n*=7 samples of isotretinoin purchased from online pharmacies and of these the quality of the compound in all samples was verified to be authentic. Murtagh et al. (2017) also conducted chemical assay testing on samples of mifepristone and misoprostol tablets purchased online, without prescription. They found the mifepristone tablets contained mifepristone within 8% of 200mg, ranging from 184.3mg to 204.1 mg/tablet and misoprostol between 34.1mcg to 201.4mcg, causing concerns regarding the correct dosage women were purchasing and the subsequent therapeutic effect.

Lagan et al. (2014) found that the medication purchased online had minimal information supplied and none had a patient information sheet. None of the samples were supplied in a box or container, two samples were wrapped in bubble wrap and one tapped between two pieces of cardboard. However, four samples did highlight a warning to female patients that the medication may cause severe birth defects and should not be taken if pregnant or are likely to become pregnant during treatment. Three samples contained no reference or warning regarding pregnancy. Murtagh et al. (2017) found that none of the samples of medication they purchased online came with any form of instruction or written communication. All the tablets in this study did arrive in blister packs however eight of the products had small pin prick holes and one product arrived damaged with the blister packs split open and some of the tablets broken.

Another concern of online purchasing is whether the product will be received. Murtagh et al. (2017) ordered 22 products online from 18 websites and received 20 products from 16 websites. Lagan et al. (2014) found of the eight online purchases of medication, seven resulted in the delivery of the product, with one purchase being blocked by the credit card company, as it was on their fraudulent blacklist.

2.7.2.3 Influence of advertising and reviews

Pregnant women have acknowledged that they have read testimonials and blogs provided by other customer reviews to inform their decision to purchase medication online (EUROmediCAT 2011). Pregnant women have also

identified that they use Google as a search engine to identify pharmacy websites and other purchasing channels such as eBay and Amazon to obtain medication (EUROmediCAT 2011). Lagan et al. (2014) identified statements on e-pharmacy websites that were misleading and openly encouraged the online purchase of isotretinoin by promoting the purchase without a prescription and being as easy to obtain as a ‘click of a mouse’. Lagan et al. (2014) also highlighted there was little to no adherence of the Pregnancy Prevention Programme (PPP) as a condition of licensing to safeguard pregnant women and women of a childbearing age from the teratogenic effects of isotretinoin.

2.7.3 Mothers relationship with healthcare professionals

2.7.3.1 Changing dynamic of doctor patient relationship

The accessibility of online pharmacies has altered the dynamic of the doctor-patient relationship and the consumer can directly bypass the safeguards provided by this relationship and go online to purchase prescription only medication without a prescription (Lagan et al. 2014). Murtagh et al. (2017) also recognised that purchasing medication online does not require a prescription and provides privacy and self-agency in countries where often restrictive laws, clinic closures and financial barriers inhibit a pregnant woman desiring an abortion.

2.7.3.2 Ability to bypass medical consultation

Murtagh et al. (2017) identified that none of the 18 websites they ordered online medication from required a prescription or medical documentation, with

only 2 requiring an online medical history questionnaire to be completed. Also, none of the questions on the questionnaire asked about gestational age or specific contraindications for mifepristone. Pregnant women have voiced concerns that by purchasing medication online and not having a consultation with a healthcare practitioner, something harmful could be missed (EUROmediCAT 2011).

2.8 Discussion

A pregnant woman must take into consideration the effect of a medication on her unborn child. This alters the decision-making process from that of a general purchase, often generating reservation in not only purchasing medication online but on whether to take medication in general. Twigg et al. (2016) identified the safety of their baby as one of the main concerns for pregnant women when deciding not to take medication. Clemow et al. (2014) found pregnant women routinely overestimated the teratogenic risks of taking medication which subsequently effected whether the woman took medication during her pregnancy. Earlier research by Thorpe et al. (2013) also discussed the other potential reason for not taking medication as being a lack of evidence and accessible safety information. However, the majority of literature regarding the online information seeking behaviour of pregnant women would suggest that safety information was readily available and accessed regularly by the pregnant population (Hamëen-Anttila et al. 2014; Sayakhot and Carolan-Olah 2016; Sinclair et al. 2018). However, earlier studies by Stephansson et al. (2011) and Widnes et al. (2012) suggested women with underlying co-morbidities are not compliant with taking prescribed medication

during pregnancy. Further insight from Sinclair et al. (2018) attributed this to the possibility that a pregnant woman's own online research regarding prescribed medications influences their informed decision making.

The papers from the review highlighted the benefits of online medication purchasing for pregnant women as being cheaper, convenient, accessible, non-prescribed, and the ability to purchase across geographical boundaries contrary to regulation (EUROmediCAT 2011; Lagan et al. 2014; Murtagh et al. 2017; Sinclair et al. 2018). These factors are not new and there is similar data from the general population (Fittler et al. 2013; Assi et al. 2016; Kennedy and Wilson 2017). There is now a recognised growing trend for people accessing over the counter medication, herbal and homeopathic medication in drug stores, health food stores and supermarkets (Holtgräfe and Zentes 2012). All these outlets now have online purchasing options without any meaningful engagement with healthcare professionals for guidance and can be a cause of concern, creating a potential increase the purchasing risk for the pregnant women.

Sinclair et al. (2018) identified that only 5% of the pregnant population have purchased medication online during pregnancy which is a relatively small percentage. However, our recent pilot data of 44, shows that now almost 25% of pregnant women are purchasing medication online (Little et al. 2018) a sharp increase from the data collected in 2013 in the UK study by Sinclair et al. (2018). This is indicative of the growing number of pregnant women who have purchased medication online in the past five years. Further research is

required to examine the online purchasing behaviour currently in a larger, more international sample. In the UK most prescription medications are free, therefore there is not the same inclination on the purchaser to have to look for alternative more cost-effective treatment. Conversely, in the US one in four people who take prescription drugs have difficulty affording them and turn to more cost-effective means of procurement (Cox et al. 2016).

Healthcare in the UK is rapidly changing. Press coverage has highlighted NHS England are cutting low-value medicines such as indigestion and heartburn medication from prescriptions (National Health Executive 2017). With these trends and ever looming budget cuts, it will not be long before more pregnant women in the UK are starting to turn to the internet to obtain medication for pregnancy as a more cost-effective means.

The dangers associated with illegitimate online pharmacies has been recognised by the NHS Choices (2015) and the US Food and Drug Administration (2018) who have provided online advice and guidance on how to purchase medication safely online. However, Kennedy and Wilson (2017) highlighted that consumers have difficulty in recognizing the signs of an illegitimate pharmacy and that advice alone may not prevent them from accessing such sources. Sinclair et al. (2014) also identified 71% of women had never seen pregnancy warning symbols on online medications.

Lagan et al. (2014) study demonstrated that women of a childbearing age or pregnant women can potentially purchase teratogenic medication online

without any risk assessment, pregnancy prevention advice or adequate warnings of the dangers associated with taking teratogenic medication on a pregnancy. This highlights a strong concern regarding the safety of purchasing medication online with the potential teratogenic risk on the fetus. As such pregnant women and women of a childbearing age need educated on the effects of potentially teratogenic medications and how to purchase medication safely online from legitimate websites.

The studies by Lagan et al. (2014) and Murtagh et al. (2017) both indicated that medications purchased online fall short of the Medicines and Healthcare Products Regulatory Agency (MHRA) guidance on medicines regarding packaging, labelling and patient information leaflets (MHRA 2016b). This evidence is consistent with studies by Fittler et al. (2013) and Berard et al. (2014) that found pharmaceutical products packaging falls short of what is to be expected, thus validating fears regarding the quality of products and potential risks associated with online purchasing for the pregnant woman. Ultimately, if purchasing a medication online the consumer wants to receive the product ordered. Sinclair et al. (2018) have highlighted pregnant women have reservations regarding the quality of the product they receive. However, Lagan et al. (2014) found that all the medications purchased online were chemically verified as isotretinoin, as per order. Murtagh et al. (2017) study verified the active ingredient of the medication purchased online was mifepristone. However, the dosage of mifepristone tablets purchased had a range within 8% of the labelled 200mg amount of active chemical agent (ranging from 184.3mg to 204.1 mg/tablet), which is a lower range than would

be expected. Berard et al. (2014) found misoprostol stored outside a blister packet exhibited a 5% loss in the active ingredient within 48 hours and 10% decrease in the active ingredient dosage when exposed to 25 °c/60% relative humidity for one week, thus having the potential to adversely impact on the clinical efficacy of the product.

With the emphasis on empowering women in maternity care to make decisions, the use of the internet has facilitated women seeking information for themselves. It has also facilitated women to bypass the healthcare professional consultation and allow the direct purchase of medication. The emerging trend for self-medication through online medication purchasing has been highlighted in the literature by Mehmood et al. (2016) as giving patients an opportunity to take responsibility and build confidence in their ability to manage their own health. However, this must be balanced with an individual's level of knowledge, information and healthcare support to avoid issues of misdiagnosis or availing of inappropriate treatment.

Bypassing the doctor-patient consultation can also be an advantage to pregnant women who have decided they no longer wish to continue with a pregnancy (Murtagh et al. 2017). A simple Google search with the search terms 'purchasing medication in pregnancy' produces several thousand 'hits'. However, the information provided was not on over the counter, prescription or herbal medications, rather it focused on the medication's women do not conventionally want to discuss with their healthcare practitioner; those that relate to termination of pregnancy. Media releases have identified that women

have bought termination of pregnancy medication over the internet and in places such as Northern Ireland (NI) where the termination of pregnancy is illegal, they have been prosecuted for their choices (McDonald 2017). As such, further research is required to address these sensitive issues that have ethical and legal implications for women and healthcare practitioners.

2.9 Strengths and weaknesses of the review

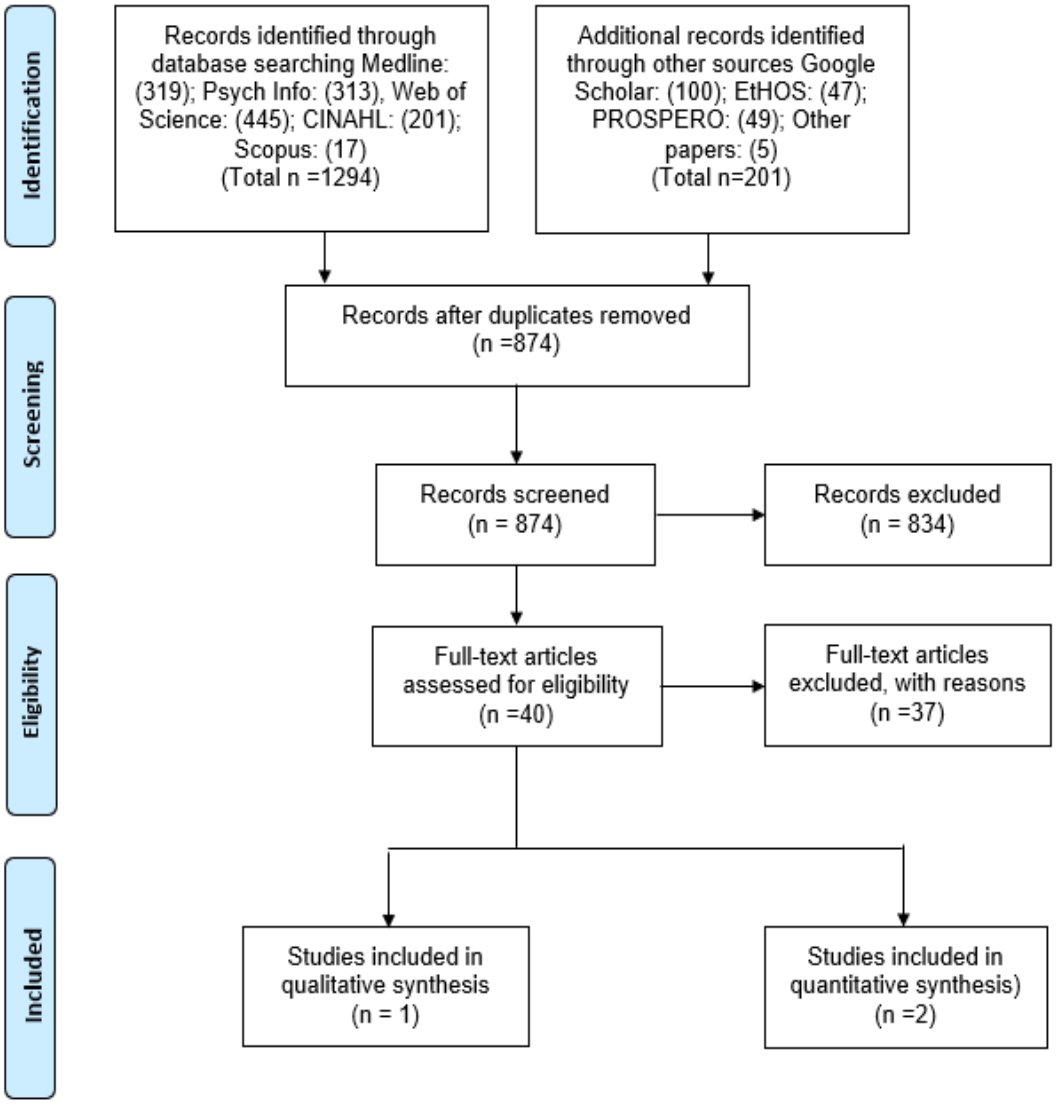
The methodology adopted for the structured review of the literature has allowed the researcher to critically analyse and synthesize what modifiable factors influence a pregnant woman's intention to purchase medication online. The robust method adopted has also enabled the search strategy to be conducted in a transparent and reproducible way. Critical appraisal was carried out on the articles included in the review using the Joanna Briggs Critical Appraisal Tools (The Joanna Briggs Institute 2016a; 2016b; 2016c).

The review has several limitations in that only literature reviewed from January 2007 onwards and in English were included and as such additional papers outside this language and timeframe that could contribute to the body of knowledge may have been excluded. Given the small number of studies that met the inclusion criteria discovered in the search, the findings from the review are limited and further research is required to fill the knowledge gap to discover more information that can be generalized to a pregnant population. Also given the different study designs, the researcher was unable to extract meaningful comparisons from the data.

2.10 Updated literature review

The literature search was updated on 8th October 2019, to determine if any further papers were eligible for inclusion in the review. The previous searches carried out on the initial databases and search terms were updated from the previous search date of January 2018. The PRISMA flow diagram (Figure 2.2) demonstrates the strategy used for the selection of the papers included in the updated review. Alerts remained active on all databases following the update to keep the researcher updated of any relevant papers prior to examination of the thesis.

Figure 2.3: PRISMA flow diagram for literature selection process on factors influencing pregnant women's online purchasing behaviour: Literature review update 2018-2019



2.10.1 Quality appraisal of the selected papers

Quality appraisal of the retrieved articles was assessed using the Checklist for Analytical Cross-Sectional Studies (The Joanna Briggs Institute 2016a), Checklist for Qualitative Studies (The Joanna Briggs Institute 2016b), Critical Appraisal Checklist for systematic reviews and research syntheses (The Joanna Briggs Institute 2017).

The review of the literature by Ender et al. (2019a) did not provide any formal quality assurance assessment as part of the review, as such did not allow the paper to be graded high quality. Due to the nature of the population of women accessing abortion medications online many of the papers included in the review were noted to have loss of sample in follow up as well as an element of selection bias which was recognised by the authors. However, the paper does gather scientific reports on this relatively newly researched area in the literature and identifies gaps in the current literature, providing the best evidence available at the present time. This paper also includes reference to the papers by Aiken et al. (2018) and Biggs et al. (2019) that were included in the literature review update.

Aiken et al. (2018) paper had sound methodological rigor and demonstrated ethical approval highlighting factors that influenced women purchasing abortion medication online. Findings however where noted to have limited generalizability as the sample was self-selected and was specific to women from the US.

Biggs et al. (2019) paper demonstrated a large sample of women completing an online survey assessing women's support for three alternative models of medication abortion. The study did not report any limitations and only a third of the data presented was relevant specifically to women's interest in purchasing abortion medication online without a prescription. However, the survey was distributed to by a market research organisation who financially

reimbursed participants for completion of the survey creating potential sampling bias.

2.10.2 Updated literature review results

In total 1490 hits were obtained from the search strategy update. After screening, 40 full text papers were accessed for eligibility and 3 papers met the inclusion criteria to be included in the review (Table 2.4).

The updated literature highlights women are increasingly using the internet to access abortion medication (mifepristone and misoprostol) which is easily available to purchase online (Aiken et al. 2018; Biggs et al. 2019; Endler et al. 2019a). Biggs et al. (2019) found 29% of women supported the online purchase of abortion medication. Women found a lack of availability of trusted websites selling abortion medication often led them to research and consider alternative options to end their pregnancy, without any strong evidence of their effectiveness (Aiken et al. 2018). Women found information on alternative non evidence-based methods to end pregnancy easily accessible online including strenuous exercise, physical trauma, use of sharp objects, ingestion of alcohol or cleaning substances (Aiken et al. 2018).

Women preferred ordering abortion medication online as they preferred the idea of self-managing their abortion instead of seeking care in a formal healthcare setting (Aiken et al. 2018). Women cited preferences to purchasing medication online as convenience, privacy and being in the comfort and familiar surroundings of your own home (Aiken et al. 2018; Biggs et al. 2019).

The ability to end a pregnancy earlier was also identified as another advantage of online purchasing (Biggs et al. 2019).

Women found that most options for seeking medication abortion online did not meet their needs with minimal or inconsistent information being supplied by pharmaceutical websites (Aiken et al. 2018). Women also voiced concerns that they may take the medication incorrectly due to inconsistent information on websites and the safety of the medication (Biggs et al. 2019). Women expressed concerns regarding the legitimacy of online pharmacy websites along with fears of being sent fake pills or a product that was safe and could potentially cause harm (Aiken et al. 2018; Biggs et al. 2019; Endler et al. 2019a). Concerns identified by women of online scams, misinformation and limited reliable online resources had the potential to delay care provision added to the desperation felt by women searching for abortion medication online (Biggs et al. 2019; Endler et al. 2019a). Other women found that the price to purchase abortion medication was too expensive forcing them to search for alternative methods (Aiken et al. 2018). Other concerns identified in purchasing abortion medications were in relation to women often not trusting sites due to unusual billing processes which impacted on their online purchase intention (Aiken et al. 2018). Women also felt reassured by online testimonials and stories shared by other women from various locations worldwide who had self-managed medication abortion.

A major perceived risk of purchasing abortion medication online was in relation to legal implications of by-passing state laws, with women referencing

barriers to access clinics as reasons for purchasing medications online (Aiken et al. 2018). Where there was restrictive access to health professionals and healthcare clinics women were more likely to seek purchasing abortion medications online (Aiken et al. 2018). Of the women who purchased abortion medication online, Endler et al. (2019a) found women had feelings of distress from a lack of medical guidance, highlighting a demand for more interactive services. Majors barriers to care provision were highlighted as due to restrictive abortion laws and the high cost of clinic care for abortion as well as large distances to travel to clinics combined with difficulty finding transportation (Aiken et al. 2018). Women also found access to medical consultation intersected with concerns regarding harassment by anti-abortion protestors when trying to gain entry to abortion clinics which made them more inclined to search for online medication (Aiken et al. 2018).

Purchasing medication online for self-management of abortion was also viewed more favourable by women to avoid a medicalised environment (Aiken et al. 2018). Other women voiced concerns that they would not see a clinician when purchasing abortion medication online (Biggs et al. 2019). Women who had a history of abortion and had trouble in accessing health services had greater support for alternative models of obtaining abortion medication including purchasing online (Biggs et al. 2019).

Table 2.5: Summary of the papers selected for inclusion in the updated review.

	Author (year) country	Study Design	Sample size and sites	Design/Data collection methods	Comments/key findings	Quality appraisal
1	Aiken et al. (2018)	In depth interviews	n=32 (30 women and 2 men) from 20 US states	Qualitative Ethical approval obtained	Women seek abortion medication online due to restrictions on clinic access Self-managed abortion can be a preference over clinical care Online options tend to offer either information or medications, not both Lack of trusted online options delays care and leads to consideration of ineffective/ unsafe alternatives	Checklist for Qualitative Studies (The Joanna Briggs Institute 2016b)
2	Endler et al. (2019a)	Literature review	n=35 selected studies	Literature review on the self-use of abortion medication after online access. Included studies of online services led by healthcare staff (n=14), non health care staff (n=4) and ones providing non interactive access (n=17) Outcomes were frequency and demand for services, acceptability for women, safety and success rate	Women are using the internet to access abortion medication Women accessing abortion medication online report feelings of distress relating to lack of medical guidance There is a demand for interactive guidance through the abortion process	Critical Appraisal Checklist for systematic reviews and research syntheses (The Joanna Briggs Institute 2017)
3	Biggs et al. (2019)	Cross sectional online survey To assess women's interest and support of 3 models of medical abortion provision	n=7022 women aged 18-49 in US	Quantitative Online survey (Carried out by market research organisation) Ethical approval obtained	29 % of women supported online access to abortion medication Advantages of online access were- privacy, convenience, being able to end the pregnancy earlier. Disadvantages included- not taking pills correctly, not seeing a healthcare practitioner before the abortion and safety	Checklist for Analytical Cross-Sectional Studies (The Joanna Briggs Institute 2016a)

2.10.3 Discussion

In total three papers were eligible for inclusion in the updated review. It was observed from the updated literature search there has been a large increase

in the volume of published papers relating to acquisition of misoprostol/mifepristone or abortion pills online during 2018-2019. On further examination, the majority of these papers were in relation to women purchasing abortion medication online using telemedicine (Aiken et al. 2019a; Aiken et al. 2019b; Kerestes et al. 2019a; Kerestes et al. 2019b). As such these papers did not meet criteria to be included in the review. This review was specifically looking at independent purchase of medications online during pregnancy.

The three papers included in the review were all in relation to purchase of abortion medication online. Factors that influenced online medication purchasing in pregnancy fell under the original themes identified from the initial literature review. No new themes or subthemes were identified. The paper by Endler et al. (2019a) was a literature review and contained the findings from the other 2 papers by Aiken et al. (2018) and Biggs et al. (2019) that were included in the literature review update.

A further paper by Ceulemans et al. (2018) was extracted from the updated literature search, which explored pregnant women's general medication usage, it highlighted that 0% of the pregnant women in the sample purchased medication online, 0.5% purchased vitamins online and 2% purchased other healthcare products online. However, this paper did not explore the factors that influenced a pregnant woman's online purchasing behaviour as such was not included in the review update. This paper does highlight women are using the internet to purchase vitamins and other health related products and

demonstrates researchers are now acknowledging online purchasing as a method women are utilizing to obtain medication that previous papers in the literature on general medication consumption during pregnancy have not (Mitchell et al. 2011; Lupattelli et al. 2014).

Endler et al. (2019a) highlights a unifying theme in the literature was the fear of misinformation and the demand for medical guidance through the abortion procedure. Women find the vast amount of health-related information available on the internet creates difficulty in determining what is reliable guidance and this makes choices difficult (Hansen et al. 2016). Pregnant women can become saturated by reading the same information online that is repeated and can become overwhelmed (Prescott and Mackie 2017).

Aiken et al. (2018) identified the greatest requirement for women was an online service that not only provided online information on abortion but provided access to genuine medications in the correct dose at an affordable price. Lack of affordability, proximity to clinics and residence in countries with restriction on legalised abortion create an environment where women often seek alternative methods of termination of pregnancy including via online sources. Kerestes et al. (2019) highlight women tried to end their pregnancy by a variety of means including consuming vitamin C, black cohosh, dong quai amongst other various herbal remedies. Oyeniran et al. (2019) report findings of women taking misoprostol in combination with over the counter medication and alcohol to attempt termination of pregnancy as a result of inappropriate

guidance. The concern here is we do not know what harm is caused to the baby if the pregnancy continues.

Restrictions on access to abortion care can negatively affect quality of care and safety of women leading to detrimental implications for physical health and emotional wellbeing (Aiken et al. 2019b). Women in these situations find themselves turning to online medication options. Having the option to self-manage care has the potential to increase women's autonomy in their productive decision making and increase availability of access to services for women experiencing barriers to care (Biggs et al. 2019).

2.11 Gaps identified in the literature

Overall this review has highlighted there are limited empirical research studies that have investigated online medication purchasing behaviour in pregnancy. Sinclair et al. (2018) identified 5% of the pregnant population were using the internet to purchase medication online, however the data were collected in 2013 and an update is required to gauge the extent of online medication purchasing in today's population of pregnant women. This study also had no breakdown of what actual medications pregnant women specifically purchase from the internet which requires further investigation.

There are no papers in the literature in relation to the safety and success rate of women who self-use abortion medications obtained online. Endler et al. (2019a) also suggest the mapping of incidence, consequence and experience

of women who misused misoprostol for abortion should be explored to limit misuse and provide alternative options for care.

None of studies extracted from the literature address social factors that influence medication purchasing behaviour online such as the influence that family and friends have on a woman's intention to purchase medication online. In addition, none of the studies explored or examined purchase intention in relation to human computer interaction between the mother and website, or if factors such as website navigation, interpretation of information provided on the site could influence purchase intention.

Therefore, it is important to carry out research that not only looks at what and why a pregnant woman purchases medication online but also examine how a pregnant woman interacts with the computer and if this has influence on purchasing intention.

2.12 Summary

Although there is a dearth of evidence regarding the availability and increasing trend towards the online purchase of medication, this structured review of the literature has highlighted there is a paucity of empirical studies that specifically provide evidence on the general online medication purchasing behaviour of pregnant women.

The updated literature search has highlighted a growing interest in the subject area in 2018-2019 and the availability of misoprostol for purchase online for

women who self-manage abortion outside formal healthcare settings and women's experiences of using this to carry out abortions. This review reveals that pregnant women are purchasing medication online, often bypassing information and advice from midwives and other healthcare professionals. As such, midwives and healthcare professionals need to have an awareness that women are now purchasing medication online and so be able to guide women and their families to effective and accurate information on purchasing medication safely via the internet.

Research is needed to explore pregnant women's behaviour in relation to purchasing medication online and what factors influence a pregnant woman's intention to purchase medication in relation to human computer interaction and web site usability.

Chapter 3 - Philosophical underpinnings of the study

This chapter examines the philosophical underpinnings of study and the rationale for the selection of the pragmatic paradigm for a mixed method approach. The chapter includes a reflexive section to demonstrate how the researcher's personal history and professional background influenced the philosophical aspects of the study.

3.1 Philosophical World Views

A philosophical approach or worldview is the lens through which one sees the world (Halcomb and Hickman 2015). Worldviews are a general philosophical orientation about the world, the nature of research and how a researcher conveys to a study (Creswell and Creswell 2018). Having a worldview is a way of making sense of the complexities in the real world.

The term 'paradigm' refers to the philosophical assumptions or basic set of beliefs that guide the actions and define the researchers worldview (Lincoln et al. 2011). Introduced by Thomas Kuhn (1970) the term paradigm was used to discuss the shared generalisations, beliefs and values of a community regarding the nature of reality and knowledge. Considering the philosophical underpinning of a study has the potential to strengthen the research design and improve research outcomes (Halcomb 2018).

There are numerous research paradigms recognised in today's literature. Ryan (2018) identified positivism, interpretism and critical theory as common research paradigms. Creswell and Creswell (2018) identified postpositivism, constructivism, transformative and pragmatism. Denzin and Lincoln (2011)

acknowledged, constructivism, interpretivism, feminism, positivism, postpositivism and critical theory. Creswell and Plano Clark (2011) identified four possible paradigms or worldviews that apply to a mixed methods study including postpositivism, constructivism, participatory and pragmatism. All these paradigms can have different implications for research methods when answering research questions. An important component in any research study is that the approach involves not only distinct methods, but also philosophical assumptions (Creswell and Creswell 2018).

The main philosophical dimensions to distinguish between research paradigms or worldviews are ontology (assumptions about how a person perceives a reality), epistemology (assumptions about how we know the world and gain knowledge , the relationship between the knower and the known), axiology (beliefs about the role of values and morals that underpin the research), methodology (the nature of how knowledge is generated); which guide our conduct and interpretation of research (Creswell and Plano Clark 2011; Halcomb 2018). When selecting a research approach, the researcher can be influenced by their ontological, epistemological and methodological assumptions (Creswell 2007). Each paradigm demonstrates different philosophical dimensions.

For the purpose of this study the researcher considered four of the most commonly discussed philosophical worldviews in the literature including positivism/postpositivism, constructivism, transformatory and pragmatism.

3.1.1 Positivism/Postpositivism

The positivist paradigm emerged in the 19th century with Auguste Comte's rejection of meta-physics and assertion that only scientific knowledge can reveal the truth about reality, later establishing as the dominant scientific method in the early 20th century by members of the Vienna Circle (Kaboub 2008). Positivism is defined as scientific methods based on empiricism and rationalism and based on the cause and effect relationship. Positivists believe there are pre-tested theories that can determine the cause and effect and subsequently these theories can be generalised to various settings (Creswell 2009).

Positivism assumes that logic, measurement and deductive reasoning can be used to study a phenomenon (Kelly et al. 2018). Empiricism is a main characteristic of positivism where what is observable is factual, suggesting an objective, universal reality is subject to universal laws and mechanisms (Creswell 2018). These laws are expected to precisely predict the probability of a phenomenon occurring (Parahoo 2014).

A positivist epistemology matches with a 'nomothetic', quantitative research methodology, where research is based on systematic technique and predetermined designs, seeking abstract generalizations from cases (Dillard 2016). Advantages of positivism are the ability to produce replicable findings and generate generalizable results, however it has been criticized for only focusing on measuring observable phenomena (Polit and Beck 2017).

Positivists believe ontologically that facts can be proven and reality is the same for each person, with observation and measuring with quantitative data telling us what the reality is (Ryan 2018). Bryman (2008) identifies four characteristics of positivism including phenomenalism where knowledge is confirmed by science and is genuine knowledge, deductivism where theory generates hypotheses that can be tested, objectivity that science must be value free and inductivism where knowledge is gained by gathering facts that provide the basis for laws.

Positivism came under criticism for ‘naïve realism’ and its appropriateness of using scientific methods to measure social phenomenon, creating the paradigm of postpositivism (Parahoo 2014). Postpositivists believe in universal generalization taking a ‘critical realist’ stance where understanding a social reality needs to be framed within a context of dynamic social structures which have created observable phenomena within the social world (Wahyuni 2012). It emphasizes the importance of multiple measures with the advantage of triangulation to enrich, explain and analyse data and reduce bias (Houghton et al. 2012).

Ontologically, positivism and postpositivism share the common view that social reality is external and objective therefore, axiologically they separate the researcher from the participant by taking an etic approach or an outsider perspective (Wahyuni 2012). Post positivism has been highlighted by Creswell and Plano Clark as a worldview that can inform mixed methods research (Creswell and Plano Clark 2018).

3.1.2 Constructivism

Constructivism or social constructivism is often aligned with interpretism and evolved from the works of Berger and Luckman (1967) The Social Construction of Reality and Lincoln and Guba (1985) Naturalistic enquiry (Creswell and Creswell 2018). Constructivism is a subjective approach that supports ideographic, qualitative methodology, emphasising the role of the participant in guiding the nature and characteristics of the empirical investigation and assuming each individual case as unique (Dillard 2016). The researcher acknowledges the phenomenon may be subjective and interpreted differently by participants at varying points in time or under different circumstances (Halcomb 2018).

Axiologically, researchers take the stance of the emic, insider perspective, studying the social reality from the population's perspective (Lui 2012, Wahyuni 2012). This research adopts a bottom up approach looking at individual perspectives to broad understandings and their meaning (Creswell and Plano Clark 2011). Unlike positivist and postpositivist paradigms, ontology and epistemology are interwoven in constructivism, as a constructivist does not believe one can be considered without the other, as such the researcher must interact with the study participants to access the multiple views of reality in existence (Appleton 1997). Epistemologically, constructivism focuses on 'how we know' and 'what meaning we place on this knowledge', however there is limited agreement about what separates these two perspectives, apart from the emphasis on individual cognition versus social interaction (Kelly 2018).

3.1.3 Transformatory

The transformative worldview arose from the stance that postpositivist assumptions imposed structural laws and theories that did not fit marginalised populations in society or issues surrounding social justice, power, oppression and discrimination (Creswell and Creswell 2018). This worldview emanates from a paradigmatic stance that prioritizes issues of social justice and human rights as overarching ethical principles that need to infiltrate all aspects of the study (Mertens 2013).

Transformative axiological assumptions are characterised by an acceptance of the primary evaluative purpose of promoting human rights and further social justice, with the researcher ontologically identifying with different versions of a reality, interrogating their origins and examining the consequences of accepting one version of reality over another (Mertens 2013). Therefore, the researcher must build culturally appropriate relationships with stakeholders and acknowledge power differentials existing in research relationships whilst identifying constraints of systemic oppression on behaviours and actions, even if participants are unable to identify it themselves (Martinez-Aleman et al. 2015). This research also assumes the researcher will act in collaboration with populations to not further marginalize as a result of the study (Creswell and Creswell 2018). A transformative methodological assumption does not dictate the use of mixed methods but does provide a rationale to capture the complexity of phenomenon under study (Mertens 2013).

3.1.4 Pragmatism

Pragmatism is not based on any one philosophical worldview therefore can utilise multiple methods, various world views and assumptions as well as different data collection and analysis techniques (Creswell 2009). A pragmatic approach assuming subjective and objective perspectives are not mutually exclusive, purports a mixture of ontology, epistemology and axiology are justifiable approaches to explore a phenomenon (Wahyuni 2012).

From an ontological and epistemological perspective, pragmatism reflects a pluralistic emphasis on understanding the world and how research questions can be answered, with methodological openness (Morgan 2007; Patton 2015). A pragmatic philosophy supports the concept that human actions cannot be separated from past experiences and the beliefs that stem from those experiences. Therefore, pragmatists believe that reality is not static and can be changed by the impact of various life events. The pluralist focus of pragmatism is reflected in the various methodological approaches selected to best answer the research question (Creswell 2018).

One of the underpinnings of a pragmatic epistemology is that knowledge is based on experience and where our perceptions of the world are influenced by social experiences (Kaushik and Walsh 2019). To understand the different philosophical concepts for research, the researcher must have a comprehension of how theories and conclusions are identified in the data. Ryan (2018) identifies inductive and deductive reasoning, where postpositivist approaches take a top down, deductive approach from a theory to hypotheses

to data, which can contribute or contradict theory. Comparatively a constructivist works inductively, bottom up using participant's views to build themes and generate theory (Creswell and Plano Clark 2011). A pragmatic approach takes a combined approach to inductive and deductive thinking where the researcher mixes both qualitative and quantitative data (Creswell and Plano Clark 2011).

3.2 Paradigms and mixed methods research

The paradigm debate in the literature stems from the view that that qualitative and quantitative research methodologies could not be combined as they both came from different philosophical paradigms with different underlying assumptions (Bryman 1988; Guba and Lincoln 1988). Some researchers insist that the paradigms cannot be mixed, however, the work of Tashakkori and Teddlie (2010) has advocated pragmatism should be embraced as the best philosophical foundation for a mixed methods study. Recent research by Halcomb (2018) indicate the unique value of mixed methods research is its power to provide a deeper insight into a complex issue and inform a meta-inference about the topic.

Methodological eclecticism is demonstrated when mixed methods researchers creatively integrate the most appropriate quantitative, qualitative and experimental strategies to thoroughly investigate the phenomenon of interest (Tashakkori and Teddlie 2010). By adopting methodological eclecticism, a researcher is a 'connoisseur of methods' who selects the best techniques available to answer the research question and the future of the

mixed methods field should feature an increasing mixture of methods research (Teddlie and Tashakkori 2012).

3.3 Rationale for the selection of the pragmatic paradigm

The pragmatic paradigm for mixed methods research was selected as the philosophical worldview proposed in the study. Derived from the writings of Peirce, Dewey and James in the 19th and early 20th centuries and Rorty in the late 20th century (Hall 2012), pragmatism has gained considerable support from mixed methods researchers (Feilzer 2010; Morgan 2007) and been advocated as an umbrella philosophy for mixed methods research (Tashakkori and Teddlie 2010). Pragmatism presents epistemological justification including values and standards and logic, with the use of a combination of methods to best frame, address, and provide answers to research questions (Johnson et al. 2007).

A pragmatist believes there is a single world but that different people can have different perceptions or views of that world. This varies from positivists beliefs that there is only one single reality that can only be view in one way and post positivists view that inquiry has series of logically related steps making claims of knowledge based on objectivity, standardisation, deductive reasoning and control (Creswell and Plano Clark 2011).

Constructivism is associated with qualitative methodologies and informal rhetoric where the researcher relies on the participants view, developing subjective meanings on the phenomena (Kaushik and Walsh 2019). Placed

on a paradigm continuum constructivism and positivism would be at opposite ends. The pragmatic worldview however, bridges the gap between the scientific method and structuralist orientation of older approaches and the naturalistic methods of newer approaches (Creswell and Plano Clark 2011).

Johnson et al. (2007) argue pragmatism is the most useful philosophy to support mixed methods research. Pragmatism focuses on what can be achieved or what works rather than a positivist stance of reality or absolute truth. It does not totally rely solely on an on an interpretivist or positivist approach, but provides flexibility to solve research problems. A pragmatic approach also rejects traditional philosophical dualism of objectivity and subjectivity, thus allowing the researcher to avoid forced dichotomies of post positivism and constructivism (Creswell and Plano Clark 2011). Rather than dispensing post positivism and constructivism into separate ontological and epistemological groups, pragmatism allows the researcher to have flexibility to focus on the two different inquiry approaches (Morgan 2014).

Creswell and Plano Clark (2011) comment pragmatists focus on the consequences of the research with the primary emphasis placed on the research question rather than the methods adopted, using multiple methods to answer the problem, making it pluralistic and orientated to a ‘what works’ vision. Pragmatism accepts there are multiple realities based on individual’s experiences, as such using this worldview to explore a complex phenomenon is logical and ensures methodological rigor (Feilzer 2010).

Pragmatism takes the view that objective and subjective perspectives are not mutually exclusive, and a combination of ontology, epistemology and axiology can be an accepted approach to study a phenomenon (Wahyuni 2012). After examination of the literature and reflection on one's own personal beliefs, pragmatism was selected as the most appropriate overarching philosophical approach to fit the study aims and objectives. Therefore, a combination of quantitative and qualitative research approaches was necessary to meet the study aims and objectives. The overall methodological approach and study design will be discussed in Chapter 5.

3.4 Researchers role and reflexivity

Prior to using any philosophical approach, the researcher should explore the literature around this worldview to understand how it fits with both their own personal perceptions and the proposed project (Halcomb and Hickman 2015). Reflexivity requires the researcher to comment on past experiences and how past experiences may shape interpretations during the study (Creswell and Creswell 2018). The following sections will demonstrate how the researcher's personal history influenced the philosophical assumptions of the study and how her professional background influenced the positioning of the topic and impacted on the relationship with the women in the study.

3.4.1 Influence of personal history on philosophical assumptions

My experience of healthcare began as a child, with my aunt who was an intensive care nurse and being bought a nurse's outfit for Christmas when I was 5 years old. I was partial to a bit of role play and enactment giving my

teddy's injections and putting on bandages. When I was at school, I had a part time job as a domestic in a local hospital for the summer. It was here that I had my first insight into the nursing profession and what it really was about. As a result, I applied for nursing after secondary school and was accepted onto the BSc Hons Nursing course. During my nurse placement I experienced various clinical placements and although I enjoyed the work, I could never really see myself spending my career as a nurse in general medicine or surgery. I dreamt of something more, with more excitement or drama. Shortly after, I was on my maternity placement in delivery suite and involved in an emergency instrumental delivery scenario. Working with an amazing and talented labour ward sister who impressed me with her skill and knowledge, commanding the team to ensure the expedient safe delivery of a baby in distress; it was then I knew, I wanted to be a midwife.

I finished my nurse training and the requirement for intensity and adrenaline followed with my first post being an intensive care nurse. It was during that post I applied for midwifery training and was rejected as I did not have sufficient post registration experience. However, I was undeterred and took up a post in the neonatal intensive care unit to gain some experience with mothers and babies. The second time I applied for midwifery training I was successful.

Throughout my early career I worked in all areas of midwifery but found my 'happy place' was in delivery suite supporting mothers to birth their babies. I found delivery suite a natural career progression and the resuscitation

experience and caring for high dependency patients added to my skill set, in intrapartum care. I remained in delivery suite and become a labour ward sister, which in all honesty was a career aspiration.

Being in charge of a ward is significantly different than caring for a woman one to one in labour. During my time as a labour ward sister I was involved in the unfortunate circumstances of a maternal death. However, it was in the aftermath of the event and I had time to reflect, it was the supportive governance networks that helped me to continue working. It was at that point I began to take an interest in clinical governance and risk management in maternity care; learning from serious adverse incidents and the potential to improve quality of care and support families, patients and staff.

Personal life takes over from professional life on occasions and after having my fourth child, although I loved being a labour ward sister, the night duty, weekends and shift commitments no longer suited my family life. It was at this point that I took on the role of risk midwife specialising in clinical governance and risk management. The role was perfect for me as I love challenges and problem solving. These characteristics influenced me in selecting the pragmatic paradigm.

I am not entirely sure whether my previous experiences moulded my thinking, but I have opportunistic tendencies. I believe there are solutions to problems following a pragmatic stance. I also believe there is probably one reality for certain various situations, but that reality can be perceived differently, and

multiple perceptions of the same phenomena are possible, and these levitate me towards an understanding affiliation of the interpretivist stance. I believe that knowledge is powerful and that is why I have pursued post graduate education and have completed an MSc. However, I know knowledge can evolve and change and working effectively in a healthcare environment demands evidence-based practice as the gold standard, even though it is a constantly changing field of knowledge.

In relation to research methods, I do not have any allegiance to either quantitative, qualitative or mixed methods designs. However, I like quantitative data, but my research experience prior to my PhD was qualitative. The pragmatist in me believes in selecting a method that is fit for purpose and will meet the research aims and objectives. I strongly believe that any research design is more effective and has more targeted impact when it is co-designed with stakeholders.

Having the opportunity to complete a PhD provided me with the opportunity to contribute to the body of knowledge and provide insight into area of pregnancy care that could benefit mothers and healthcare professionals in the future. However, having a background in midwifery and having had four children can raise issues which I will discuss in the next section.

During my pregnancies I used online sources to purchase vitamins and over the counter medications for the element of convenience and it is important for me to make this statement.

The main reason for investigation the area of online medication purchasing behaviour in pregnancy was due to the fact that several women disclosed purchasing vitamins and medications online during pregnancy whilst I was in clinical areas. I was intrigued and wanted to explore their reasoning for doing so. At the same time buying medications online was highlighted in the general news for illegal purchasing of abortion medications. I felt it was also important to explore this topic of online medication purchasing in view of the previous thalidomide tragedies and to find out what medication's women were purchasing online and what factors influenced them to do so. This was important to me as a mother and a midwife. From doing this, healthcare professionals can advise pregnant women on medication usage and how to purchase medications safely online to provide safe care.

3.4.2 Influence of culture and professional background on positioning with the topic and relationship with the women in the study

In this study I have different lenses to view myself from, a mother, a midwife, and a researcher. My previous experience of pregnancy and birth enable me to relate to the factors in the literature such as convenience, privacy and accessibility likely to influence a pregnant woman to purchase medication online. My experience as a midwife means I can relate to a healthcare professional's stance on purchasing medication online and share the concerns about safety for mothers and babies. However, my experience as a researcher requires me to acknowledge my influencing factors and sources of

potential bias so that I can do the best study possible and what I have tried to do in this research… listen to women.

An additional consideration for the study was if women disclosed, they had purchased medications that were detrimental to their baby or legal implications for prosecution in their country. As a researcher it is not my place to judge women's choices but rather gather data on their choices and reasons for decision making. My background in healthcare makes me take more of a stance on how to support women in their choices rather than judge them for it, which is part of my duty of care. My own personal beliefs around the online purchase of abortion medication are neither pro or anti-abortion, rather pro-choice in that I firmly believe women should have choices in general and it is my role to support them in whatever choice they make.

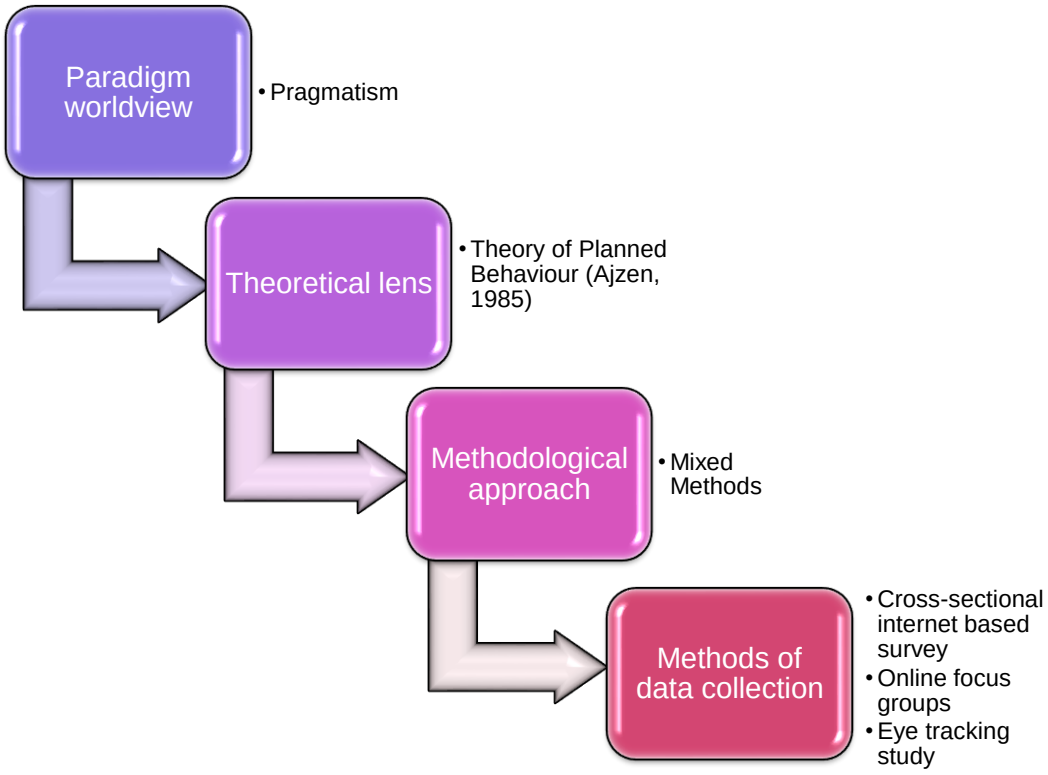
There is also a potential in research for a power imbalance between the researcher and participant, however the sample in this study was obtained from a population of pregnant women using the internet and therefore were unlikely to have any prior reference to the researcher as a midwife. This study did not provide any financial reimbursement for participant therefore, it was assumed that women with a genuine interest in the research would volunteer to participate.

3.5 Summary

This chapter discussed the various philosophical approaches to research and the rationale for the selection of the pragmatic paradigm to underpin the development of the research design and inform the methodological approach.

The pragmatic paradigm underpins the mixed methods approach to the study which will be carried out in three phases and discussed in the next chapter. Figure 3.1 below demonstrates how the philosophical underpinning of the pragmatic worldview is incorporated in the study and links with the theoretical framework, methodological approach and methods selected for the study.

Figure 3.1: Creswell and Plano Clark (2011) Four levels for developing a research study (adapted from Crotty (1998))



Chapter 4 - Theoretical factors influencing the study

At the beginning of any research study, it is important to consider the relevant theory underpinning the knowledge base of the phenomenon being researched (Sinclair 2007). This chapter outlines the behavioural theories that were considered prior to the selection of the Theory of Planned Behaviour (Ajzen 1985).

4.1 The need for a theoretical framework

The term theory explains how phenomena are interrelated with traditional theories having explanation or prediction as their purpose (Polit and Beck 2017). A theoretical framework is based on an existing theory that reflects the hypothesis of a study and is a blueprint that is often 'borrowed' by the researcher to build a research inquiry (Adom et al. 2018). The theoretical framework is the foundation from which all knowledge is constructed for the study serving as a structure and support for the rationale, problem statement, purpose, the significance and research question (Grant and Osanloo 2016). By using a theory in research, relationships can be proposed, and predictions made to suggest actions; providing a researcher a logical means of collecting data to describe, explain and predict midwifery practice (LoBiondo-Wood 2014).

A theoretical framework is crucial to a quantitative study which will have been designed to deductively test the theory, however qualitative studies can also use a framework involving the presentation of a specific theory and conceptual work regarding that theory (Rocco and Plakhtnik 2009). The approach towards using a theoretical framework can be qualitative, quantitative or mixed method

(Grant and Osanloo 2016). In a research study based on a theory, the framework is a theoretical framework; in a study with roots in a conceptual model the framework is a conceptual framework (Polit and Beck 2017). In the literature these terms seem to be used interchangeably, however Parahoo (2014) states what is more important than using the correct terminology is the consideration of whether theory has been used to underpin the study or not. Green (2014) argues given the confusion between theoretical and conceptual frameworks it could be argued they are of questionable value. However, a theoretical framework can provide a rationale for developing the research question and complement the design of the methods assisting researchers to focus on what the research is trying to achieve (LoBiondo-Wood 2014).

From reviewing the literature and identifying the gaps in the knowledge relating to the factors that influence pregnant women purchasing medication online an underpinning theory was required for the study. This would improve the limited understanding of the topic, guide the methodological approach and inform the methods for the study. During the early phases of the study design several theories that had the potential to support and inform the research and related to the topic area were explored; these are discussed below.

4.2 The Health Belief Model (HBM) (Becker 1976; 1978)

The Health Belief Model (Becker 1976; 1978) was one of the first theories developed to explain the process of change in health behaviour. Focusing on patient compliance and health prevention practice the HBM can be applied to problems of explaining, predicting and influencing health behaviour (D'Angelo

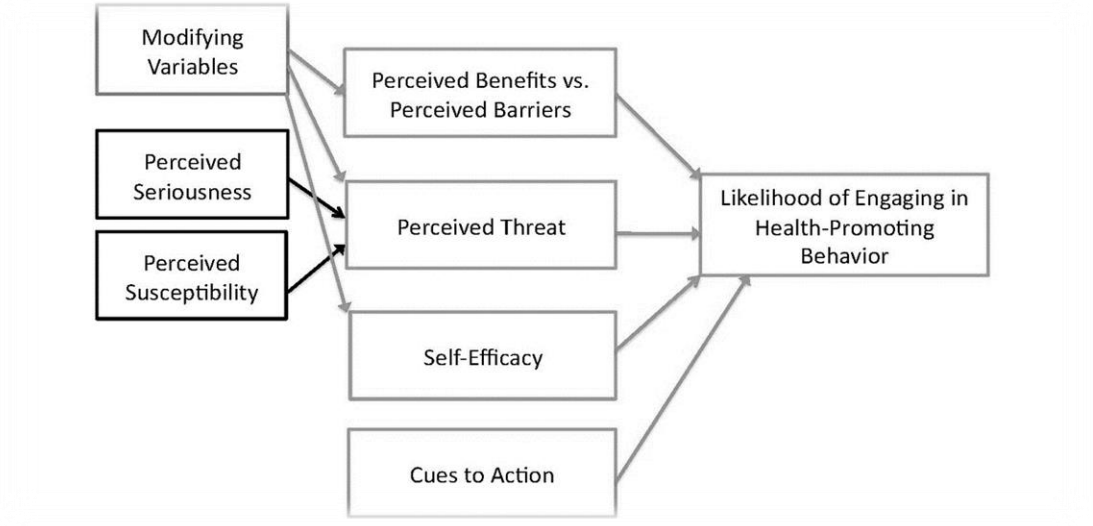
2016). As such, the HBM was explored as a potential underpinning theory for this study in relation to the prediction of why a woman purchases medication online.

The HBM consists of the dimensions of perceived susceptibility, perceived severity, perceived benefits and perceived barriers (Janz and Becker 1984). A further two constructs of cue to action and self-efficacy were added to the original model as research about the HBM evolved (La Morte 2019). The HBM assumes a person will take a health-related action if the person feels they can avoid a negative health condition. It also assumes they will take a preventative action if they have a positive expectation they avoid a negative health condition by taking action (Tarkang and Zotor 2015). This study makes the assumption that by purchasing medication online a pregnant woman is taking either a health related or preventative action. The model also assumes health seeking behaviours are influenced by a person's perception of a threat posed by a health problem and the value associated with actions aimed at reducing the threat (Polit and Beck 2017). The HBM also assumes a person makes a health-related action if they believe they can successfully make the action, requiring confidence, capacity and the necessary skills to carry out the activity in a supported environment (Tarkang and Zotor 2015).

The HBM has been recognised as one of the most widely used and tested models for explaining and predicting health related behaviour (Janz and Becker 1984). It has been used in studies to explain a broad range of health behaviour in a wide range of populations including health promotion for diet and exercise, health risk in smoking, contraceptive practices, sick role behaviours (Abraham and Sheeran 2015), health prevention for HIV (Tarkang and Zotor 2015) and communication research (Jones et al. 2015).

The HBM has several limitations in that it does not account for a person's attitudes, or beliefs that dictate acceptance of a health behaviour, nor does it account for environmental or economic factors that may affect the recommended action (La Morte 2019). In this case HBM would not consider the complexities of human computer interaction, financial implications for purchasing medication online or the aspect of behavioural control required to make an online purchase and was thus discounted as a potential theory to underpin the study.

Figure 4.1: The Health Belief Model (HBM) (Becker 1976; 1978)



4.3 Information Seeking Models

As the researcher wished to understand the factors that influence online purchasing of medication, theoretical aspects of the process of purchasing were explored. Pre-purchase information searching is an integral aspect of a consumer's decision-making process and purchasing behaviour (Akalamkam and Mitra 2017). As such several information seeking models were explored by the researcher to gain insight into this aspect of purchasing. These included Ellis Model of Information Seeking Behaviour (Ellis 1989); Kuhlthau's Information Search Process Model (Kuhlthau 1991); Marchionini's Information Seeking Process Model (Marchionini 1995) and Wilson's Model of Information Seeking Behaviour (Wilson 1981).

Although exploring information seeking theories assisted the researcher in understanding part of the purchasing process, it did not explain it in its entirety or render itself feasible for use to underpin the research study to answer the aims and objectives. Therefore, the researcher progressed to examine consumer theory.

4.4 Consumer theory

From reviewing the literature and focusing the aim and objectives of the study the researcher was primarily focusing on the pregnant woman who used the internet to purchase medication as a consumer. In order to understand online purchasing behaviour and the determinants of online purchasing behaviour,

several consumer theories were explored as a possible fit to underpin the research study.

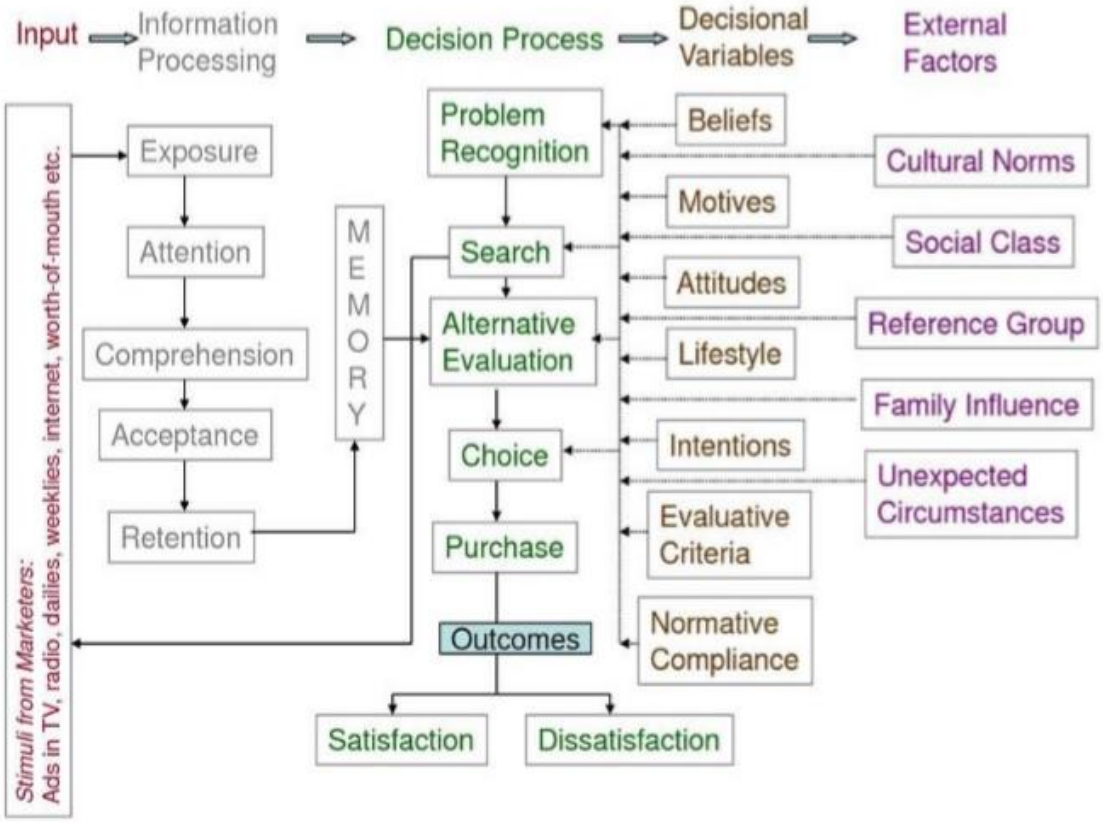
4.4.1 Grand Consumer Theories

A number of grand consumer models have been developed in previous years to explain consumer behaviour, including the Engel, Blackwell and Minaird Model (Engel, Blackwell and Minaird 1993) (Figure 4.2) and the Nicosia Model (Nicosa 1966) (Figure 4.3).

4.4.1.1 Engel, Blackwell and Minaird Model (Engel, Blackwell and Minaird 1993)

The EBM Model was originally developed in 1968 by Engel, Kollat and Blackwell and has gone through several revisions in recent years. The model displays similarities to that of the Theory of Buyer Behaviour (Howard and Sheth 1969) with a variation noted in the structure and relationship with the variables. The model structure focuses in a seven-point decision making process starting with problem recognition, followed by internal and external searches for information, the evaluation of alternatives, purchase, post purchase reflection and divestment (Bray 1993). The model incorporates multiple aspects of the purchasing process including values, lifestyle, culture and personality. However, it has been criticised for not demonstrating which factors shaped these items or addressed how different personalities can result in different decisions being made (Prasad and Jha 2014).

Figure 4.2 Engel, Blackwell and Minaird (EBM) Model



Source: Engel, Blackwell and Minaird (1995) p95.

4.4.1.2 Nicosia Model (Nicosa 1966)

The Nicosia Model (Nicosa 1966) focuses on the decision-making process for buying a new product. The model attempts to explain buying behaviour by establishing a link between the organisation/firm and its prospective customer. The model is divided into four fields (Prasad and Jha 2014):

Field 1: The consumer attitude based on the firm's messages. This is where the model concentrates on the firm's attempt to communicate with the consumer and their tendency to act in a particular way.

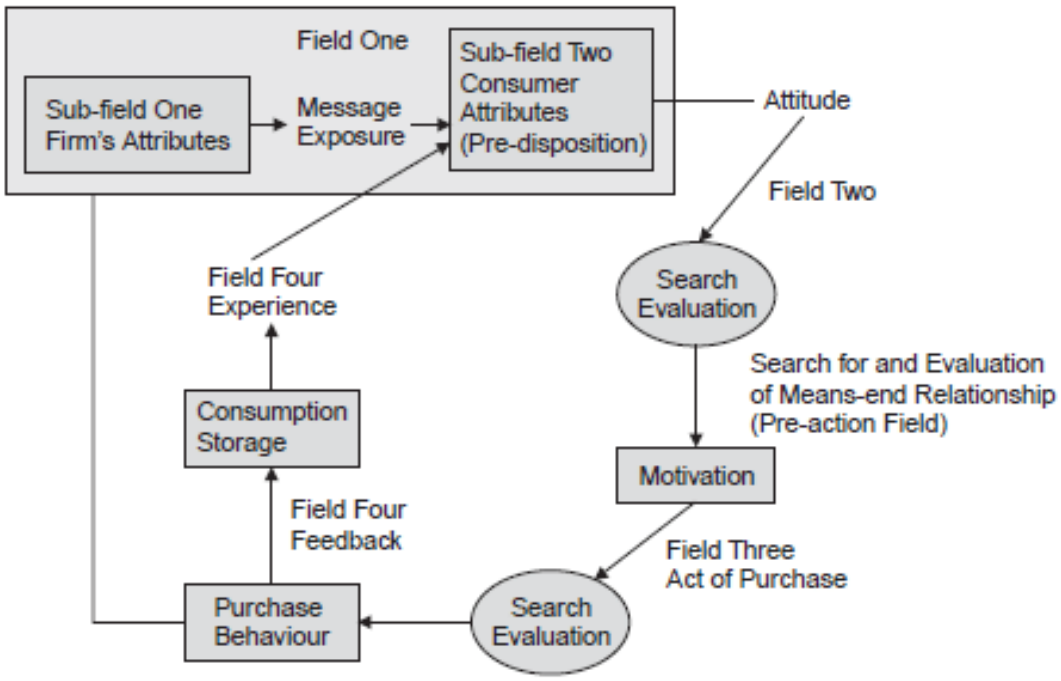
Field 2: Search and evaluation. This involves the consumer searching for alternative brands and evaluating the firm's brand in comparison to the others. In doing so the firm motivates the consumer to make a purchase in their favour. This phase is influenced by attitudes.

Field 3: The act of the purchase. The motivation created in phase two will then convince the consumer to purchase the products from the specific retailer.

Field 4: Feedback. The model also then analyses feedback from the firm and purchaser regarding the post purchase experience.

Although the model was one of the first to explain complex decision-making process for new products it has been criticised as it has not been empirically tested (Zaltman et al. 1973) and has poor variable definitions (Lunn 1974). The model also does not provide an explanation of how a consumer develops an attitude towards a product (Prasad and Jha 2014). This is particularly important in view of this study as often women have pre-defined attitudes towards consuming medication during pregnancy.

Figure 4.3 Nicosia Model (Nicosa 1966)



These classical grand models discussed have been used traditionally to explore generalised purchasing behaviour. However, with the change and increase in popularity of online consumerism these traditional theories no longer represent consumerism in the form of the modern-day phenomenon of online purchasing.

Grand theories have multiple complexities in their constructs and are also difficult to empirically test as they contain too many theories and propositions (Parahoo 2014). This level of construct complexity makes them unsuitable to use to underpin this study. Mid-range theories have been identified as theories of relevance to researchers and can be more focused than grand theories when attempting to explain phenomena of behaviour (Polit and Beck 2018). However, they involve fewer concepts making them more specific for empirical testing (Peterson and Bredlow 2012). Therefore, the researcher explored the

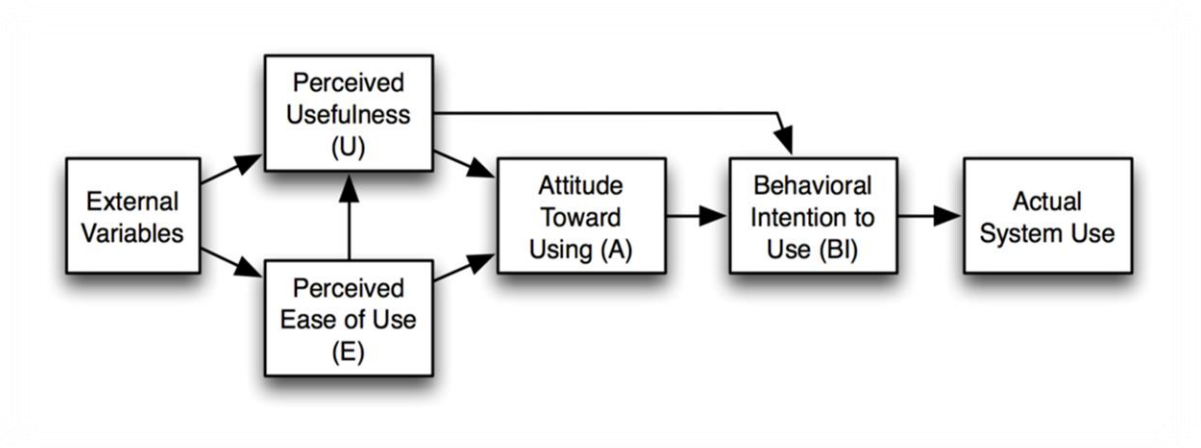
Technology Acceptance Model (Davies 1989), Theory of Planned Behaviour (Ajzen 1985) and the Theory of Reasoned Action (Fishbein and Ajzen 1975).

4.4.2 Technology Acceptance Model (Davies 1989)

The Technology Acceptance Model (TAM) developed by Davis (1989) provides a valid and reliable measure that predicts the acceptance of new technologies (Davis 1989, Davis et al.1989). Over the years the model has been refined to incorporate variables and relationships obtained from the Theory of Reasoned Action (Fishbein and Ajzen 1975).

TAM proposes that perceived ease of use and perceived usefulness predict the acceptance of information technology (Ma and Lui 2006). Perceived ease of use is the degree to which a person believes that using a technology would be free from effort or better than its substitutes (Mugo et al. 2017). Davis (1989) identifies attitude is a factor that influences how and when a person will use a technology with perceived usefulness being the degree to which a user believes a using a system would improve their performance. Figure 4.4 demonstrates TAM.

Figure 4.4: The Technology Acceptance Model (Davies et al. 1989)



TAM has been used widely and applied in research studies focusing on e-health and telemedicine (Or et al. 2011; Hu et al. 2015) in the context of consumer health informatics (Keselman et al. 2008), mobile technologies (Mugo et al. 2017) and the prediction of online purchasing behaviour (Zhang et al. 2006; Zhang et al. 2007).

TAM assumes that when a person forms an intention to act, they will have the ability to do so without limitation, which is not reflective of modern-day life or constraints (Bagozzi et al. 1992). TAM has been extended in several publications to adapt its applicability to the changing contexts of information technology (Venkatesh and Davis 2000) which has led to criticism of its overall stand-alone effectiveness (Benbasat and Barki 2007). Also, since TAM does not address intrinsic motivations, the ability for it to apply in a customer context to fulfil emotional needs may be limited (Taherdoost 2018).

For this study where TAM would be useful to predict how women accept online technology to purchase medication online, the aim of the study was to explore the factors that influenced purchasing using online technology. Therefore, this

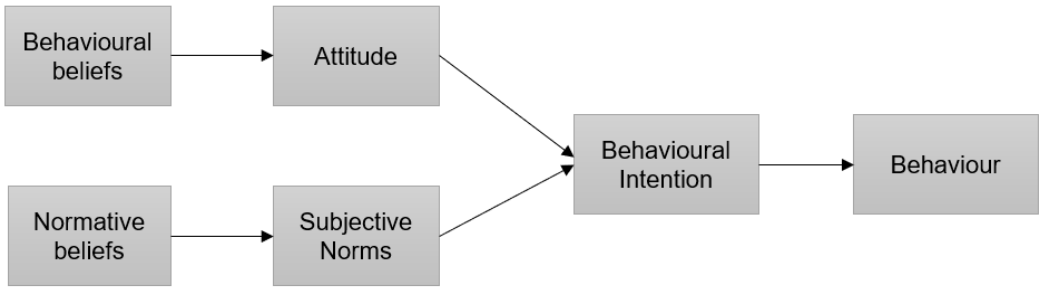
framework was not deemed a good fit for the purpose of this study and was excluded.

4.4.3 Theory of Reasoned Action (Fishbein and Ajzen 1975)

The Theory of Reasoned Action (TRA) was introduced in 1967 as a general theory of behaviour, originating from the school of social psychology and developed by Fishbein and Ajzen in 1975 (Fishbein and Ajzen 1975) from the previous study of Information Integration Theory.

TRA postulates the intention to perform a behaviour is viewed as a function of two basic factors, the person's attitude towards performing the behaviour (a person's positive or negative feeling about personally performing a behaviour) and or the person's subjective norm concerning his or her performance of the behaviour (the person's perception that his or her important others such as family, friends, or healthcare providers, think that they should or should not perform the behaviour in question) (Fishbein 2008). (Please see Figure 4.5).

Figure 4.5: Theory of Reasoned Action (Fishbein and Ajzen 1975).



The TRA also considers the determinants of attitude as function of behavioural beliefs and their outcome evaluative aspects and subjective norms as the

function of normative beliefs and the motivation to comply (Fishbein 2008). Therefore, the more a pregnant woman believes purchasing medication online will lead to positive outcomes and/or will prevent negative outcomes, the more favourable her attitude will be towards online purchasing. Similarly, the more the woman believes individual or groups such as family and friends think she should purchase medication online the more motivated the woman will be to comply with those influences and the stronger the perceived pressure (subjective norm) to carry out an online medication purchase.

According to the TRA behavioural and normative beliefs regarding a behaviour must be identified to understand the behaviour therefore, the researcher must go to members of the population under study to identify salient behavioural and normative beliefs (Fishbein 2008). To achieve this for the study the researcher must have insight of the behaviour from a population perspective and this was not possible for this research as it was online.

TRA has been used successfully to predict or explain a wide variety of health behaviours including smoking, alcohol consumption, contraception, breastfeeding, sexual behaviour (Van den Putte 1993; Ajzen et al. 2007) and to identify the determinants of internet shopping behaviour (Yu and Wu 2007).

Although the theory has potential to predict and provide an explanation of intention, TRA recognises that only intentions to engage in volitionally controlled behaviours will consistently lead to accurate behavioural predictions (Fishbein 2008). The theory also believes the sequence from

beliefs to a specific behaviour is a rational process (Sarver 1983) which does not necessarily consider a person's choice for behaviour that is not conventionally viewed as rational. In view of these limitations TRA was extended by Ajzen (1985) resulting in the Theory of Planned Behaviour with the extended component of perceived behavioural control to the framework.

Although attitude and subjective norm are highlighted as important determinants of behavioural intention, it does not facilitate the exploration of the self-efficacy element of human computer interaction involved in online purchasing, as such the Theory of Planned Behaviour which included the construct of perceived behavioural control was explored.

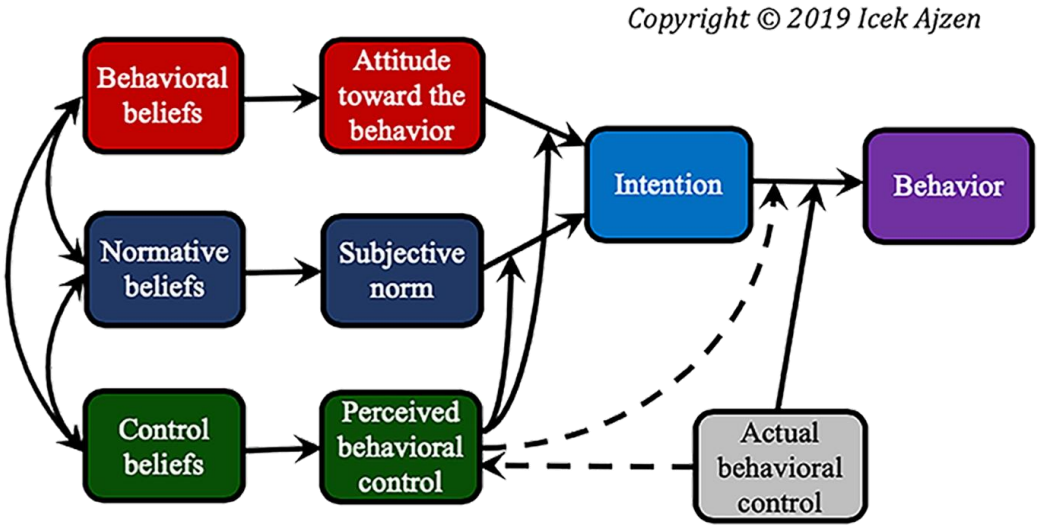
4.4.4 Theory of Planned Behaviour (Ajzen 1985).

The Theory of Planned Behaviour (TPB) is a theoretical model that emerged from the discipline of social psychology and was developed by Ajzen in 1985 (Ajzen 1985). TPB is an extension of TRA and takes into consideration conditions where an individual does not have complete volitional control over behaviour (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980). Having volitional control means the person must have resources, opportunity and support to carry out a behaviour (Ajzen 1991). The TPB makes the same assumptions as TRA, with the addition of the theory suggesting human behaviour decision making is only partly under the control of the participant, thus adding the determinant of uncertain time and opportunity called 'perceived behavioural control' (PBC), which can influence behaviour indirectly through its impact on intentions as well as directly (Wang et al.

2007). Hence the theory assumes that a person's intention, combined with PBC, will help predict behaviour with greater accuracy (Ajzen 1991).

Ajzen (1991) postulates intentions to perform behaviours can be predicted with a high level of accuracy from attitudes towards a behaviour, subjective norms and perceived behavioural control; and these intentions together with the perception of behavioural control, account for considerable variance in actual behaviour. Attitudes, subjective norms and perceived behavioural controls are demonstrated to relate to salient behavioural, normative and control beliefs regarding behaviour (Ajzen 1991). (See Figure 4.6).

Figure 4.6: Theory of Planned Behaviour (Ajzen, 1991)



According to TPB, PBC together with behavioural intention can be used directly to predict behavioural achievement (Ajzen 1991). This is rationalised by Ajzen (1991) as the effort expended to bring a course of behaviour to a successful conclusion is likely to increase with PBC, which can be used as a

substitute for a measure of actual control. This is dependent on the accuracy of people's perceptions. La Caille (2013) describes the linkage between these theoretical factors as:

Behavioural beliefs and attitudes:

A person forms belief regarding outcomes of behaviour which contribute to their attitude or evaluation of the outcome of the behaviour (e.g. purchasing medication online is convenient) with the more favourable the attitude the stronger the intention.

Normative beliefs and attitudes:

Normative beliefs refer to a person's perception regarding the expectation of others who are important to them e.g. My friends think I should purchase medication online. These beliefs contribute to the perception of social pressure and are contributing factors to a person's motivation to comply (I feel under pressure to purchase medication online as my friends do), with the more powerful the perceived norm, the stronger the intention.

Control beliefs and perceived behavioural control:

A person forms belief regarding the factors that may facilitate or be barriers to engaging in the specific behaviour (e.g. I have access to the internet and have the skills to make an online purchase). It is these beliefs that create a perception of behavioural control or how difficult or easy it is to engage with the behaviour (e.g. I will be able to make an online purchase). Ajzen (1991) highlights the concepts of self-efficacy and perceived behavioural control are

not synonymous although they are used interchangeably in the control, PBC also incorporates the external or environmental factors of time, resources and social support overall making the greater the PBC, the stronger the intention and greater likelihood of engagement with a behaviour (La Caille 2013).

Intention:

Intention refers to a person's plan of action and representation of their expressed motivation to perform the behaviour.

TPB has been used in a vast number of studies focusing on the understanding and prediction of intention of to engage in a behaviour. TPB has been previously used in the studies to understand online consumer behaviour (George 2004; Wang et al. 2007; Hansen et al. 2009). The TPB has been criticized for failing to provide emotional variables, such as perceptions of threat, mood and effect, which could possibly limit the theory's predictive power (La Caille 2013).

4.5 Rationale for the selection of the Theory of Planned Behaviour

Having reviewed the literature and several behavioural models and consumer theories and their applicability and potential to underpin the study; the Theory of Planned Behaviour (Ajzen 1991) was selected as the underpinning theoretical framework for the study.

The review of the literature demonstrated gaps in the knowledge highlighting there are limited empirical research studies that have investigated online

medication purchasing behaviour in pregnancy. The literature did not address social factors that influence medication purchasing behaviour online such as the influence that family and friends have on a woman's intention to purchase. In addition, there was no papers exploring the behavioural control aspect of online purchase intention between the mother and website.

Therefore, to carry out this research study it was important to select an underpinning theory that examines how a pregnant woman interacts with the computer and if this has influence on purchasing intention.

As the study sought to explore factors influencing the online purchase of medication during pregnancy, the TPB constructs of attitude, subjective norm and perceived behavioural control were deemed relevant and the best fit to meet the study's aim and objectives.

4.6 Summary

This chapter demonstrated the importance of having an underpinning theoretical framework for the study. The theoretical framework acts as an important frame of reference for maintaining the integrity of the study and helps determine the research design and the analysis plan (Grant and Osanloo 2016). The following chapter will discuss the overall methodological approach taken to the study and the methods selected underpinned by the TPB.

Chapter 5 - Methodology

This chapter will present an overview of the study methodology. This will include the justification for using a mixed method research approach, the research design and the methods used in the study. The chapter will also discuss the instruments used for the data collection, data analysis, ethical considerations, rigor and the rationale for the decisions made. The study's aim and objectives have been restated below for ease of reference.

5.1 Study aim and objectives

The aim of this study was to explore the multiplicity of factors that influence a pregnant woman's intention to purchase medication online.

The study objectives were:

1. To describe and analyse online medication purchasing in pregnant women, locally, nationally and internationally.
2. To explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online.
3. To use eye-tracker technology to determine modifiable features of online interfaces or websites that influence pregnant women's decision to purchase medication online.
4. To confirm data interpretation of theoretical constructs and explore tentative recommendations for research, education, policy and practice.

5.2 How the Theory of Planned Behaviour underpins the study

The study was underpinned the study was the Theory of Planned Behaviour (TPB) (Ajzen 1985) which was presented in Chapter 3. The TPB framework influenced every aspect of the study including the design, data collection and data analysis. The cross-sectional online survey was modelled on a previous questionnaire based on the TPB by Francis et al. (2004). Data analysis in this quantitative stage included testing the constructs of the TPB for purchase intention. In phase 2, the interview schedule was developed using a framework based on TPB. Themes and subthemes identified from the transcripts were mapped to the TPB. The findings from phase 1 and phase 2 were then used to design an eye tracking study in phase 3, which was also developed using the constructs of the TPB to determine purchase intention.

5.3 Mixed methods methodology

With the rise in maternal complexities during pregnancy due to more women having pre-existing co-morbidities, poor health choices and assisted fertility, heath care systems are having to adapt (Klonoff-Cohen 2017; Beeson et al. 2018). As maternal complexity increases so the need for more ‘fit for purpose’ research approaches are required. To address these complexities researchers must adapt and embrace the multi-dimensional nature of healthcare (Creswell and Plano Clark 2011). This challenge has seen a growth in recent years around mixed method studies in healthcare (Creswell 2015; Coyle et al. 2018). By mixing or integrating quantitative and qualitative data more complex issues can be addressed providing insight into a problem and a stronger understanding of the problem or question, than by a single

method study (Creswell and Creswell 2018). Human beings are complex, and their behaviours are affected by internal and external factors as well as past experiences and current opportunities.

Mixed methods research was defined by Tashakkori and Creswell (2007) in the first edition of the Journal of Mixed Methods Research as

> *as research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of enquiry.*
>
> Tashakkori and Creswell (2007) p4

To examine the factors that influence the online medication purchasing behaviour of pregnant women this study used a three phased approach, selecting a range of methods to answer the study aim and objectives, thus making a significant contribution to knowledge of the topic. The first objective was to describe and analyse patterns of online medication purchasing in pregnant women, locally, nationally and internationally, and therefore a quantitative approach was selected to achieve a large, internationally representative sample using a survey.

The second objective was to explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online. Therefore, to explore the topic in more depth a qualitative approach was selected so that women's voices could be heard and recorded. The sample was purposively selected from the international survey

with the respondents and led to online focus groups using the social media platform Facebook.

The third objective was to use eye-tracker technology to determine the modifiable features of online interfaces or websites that influence pregnant women's decision to purchase medication online. As such eye tracking technology was used on a purposive sample of women who participated in phase one of the study.

The fourth objective was to confirm the data interpretation of theoretical constructs and explore tentative recommendations for research, education, policy and practice. This objective was to demonstrate integration of the data from the three phases of data collection to provide the findings on the topic in its entirety.

5.4 Mixed method or multi method?

In view of the researcher designing a study with multiple phases to meet the research aims and objectives it was important from the onset that a clear distinction be made between mixed methods and multimethod studies. Mixed method research varies from multimethod research as it combines and integrates qualitative and quantitative characteristics across the research process from the philosophical underpinnings to the data collection, analysis and discussion (Halcomb and Hickman 2015). Multimethod studies vary in that integration is not required (Plano Clark and Ivankova 2016). Qualitative and quantitative data must be integrated if the study aim is to is to gain insights

into the same research goal objective, but not when different methods are used to explore different goals (Anguera et al. 2018). Mixed method and multimethod approaches come from different paradigmatic influences, as paradigms not only influence the theoretical backgrounds, but also how particular data could be interpreted (Dillard 2016).

Although mixed methods and multimethod studies transpired from a need to analyse complex phenomena, they are driven by separate reasons of enquiry that involve different approaches to diverse questions (Green 2015). As such the researcher carried out three sequential and integrated phases of data collection to meet the research objectives where one phase built on the next and demonstrated integration of the data sets justifying the use of a mixed method approach for the study.

5.5 Justification for using mixed methods approach

Creswell and Plano Clarke (2011) propose that by adopting a mixed method approach it is possible to answer different research questions that cannot be answered by using quantitative or qualitative approaches alone. However, the benefits of carrying out mixed methods study should also be reviewed in relation to the additional costs, time and skills required (Halcomb and Hickman 2015). This study was designed with limited budget in mind and the requirement for development of a skill set in the use of eye tracking.

Greene et al. (1989) identified five purposes for using a mixed method design including triangulation, complementarity, development, initiation and

expansion. By carrying out the study in phases, data were collected from three different methods, thereby examining the topic in its entirety and conforming to a single reality for completeness demonstrating triangulation. Complementarity was an important feature as it could use one method to elaborate, illustrate, enhance or clarify the results from another (Bryman 2006). This multistage mixed method study also demonstrated development with the study being carried out sequentially and showed expansion with phase one and phase two findings being used to inform the design of the phase three eye tracking study.

5.6 Mixed method design

Creswell and Plano Clark (2011) identify six classifications of mixed method designs that include, convergent parallel, explanatory sequential, exploratory sequential, embedded design, transformative design and multiphase design. Convergent or sometimes referred to triangulation design obtains different but complementary data on the phenomenon being studied (Polit and Beck 2017). Sequential designs include both explanatory or exploratory two-phase designs (Creswell and Plano Clark 2011). The explanatory sequential design has a quantitative phase first followed by a qualitative phase that explains the qualitative findings. The exploratory sequential design has a qualitative phase to explore the phenomenon followed by a quantitative phase focuses on measuring it (Polit and Beck 2017). The embedded design occurs when quantitative and qualitative data are collected and analysed within a traditional qualitative or quantitative design (Creswell and Plano Clark 2011). The transformative mixed methods design is where the researcher shapes the

study with a transformative theoretical framework (Creswell and Plano Clark 2011) and focuses on the multiple dimensions of power and diversity with the aim of promoting social justice particularly with healthcare (Mertens 2007). The multiphase design includes studies with multiple phases that are conducted over a period of time and linked by the objective for each phase building on each other (Creswell et al. 2011).

Fetters et al. (2013) further discusses advanced frameworks for mixed method studies that include adding to one of the three basic mixed method designs and may involve a multistage, an intervention, a case study or a participatory research framework. For this study a case study or participatory research framework would not have been suitable to meet the research aims and objectives, therefore a multistage mixed methods framework was required. Fetters et al. (2013) define a multistage mixed methods framework as one which has three or more phases with a sequential component, or two or more phases with a convergent component; hence differentiating the design from a basic mixed methods approach. As this study has three sequential phases, it differs from a basic sequential explanatory design that only involves a quantitative and qualitative element and therefore by Fetters et al. (2013) definition is a multistage mixed methods design.

Curry and Nunez-Smith (2015) identified the ‘relative timing’ as an important factor for consideration in planning in a mixed method study. In this study, the findings from phase 1 were explored in depth in phase 2 and subsequent findings from phase 1 and 2 were combined and used to develop phase 3;

therefore, this was a multistage mixed method design as described by Fetters et al. (2013). It was an appropriate approach to achieve the aims and objectives of the study.

5.7 Overall Methodological approach: Multistage mixed methods framework

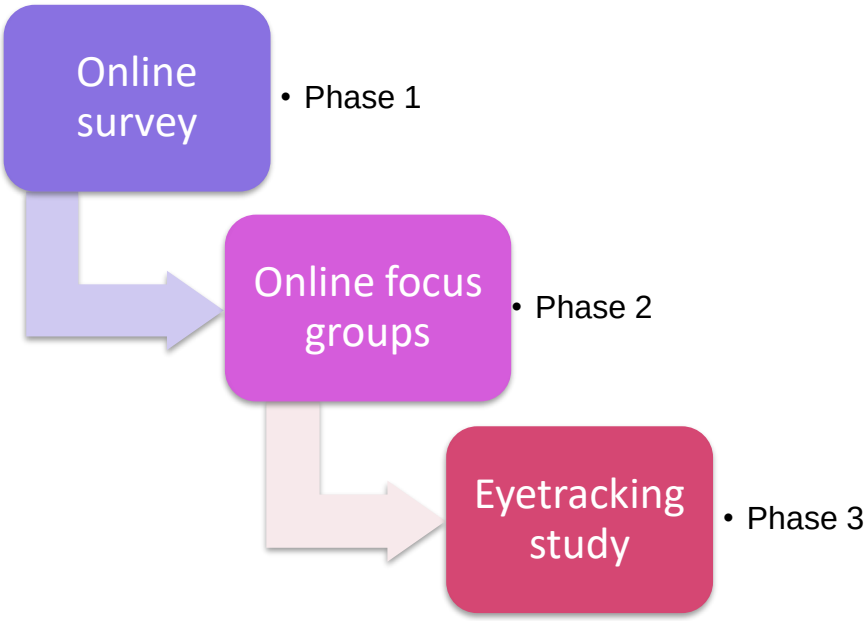
In order to achieve the aim and objectives of the study, a multistage mixed methods framework with three sequential phases was adopted (Figure 5.1). This involved collecting qualitative data after a quantitative phase in order to explain or follow up on the quantitative data in more depth. Quantitative statistics and survey results alone do not provide the human motivation behind certain preferences and behaviours and carrying out qualitative research can reveal other information not previously known or anticipated by the researchers (Bulsara 2019). The data collected from phase one and phase two was used to design an experimental eye tracking study in phase 3.

In the first quantitative phase of the study a cross sectional internet-based survey was used to collect data from women who were pregnant or been pregnant in the past 2 years to test the Theory of Planned Behaviour to explain how factors of attitude, subjective norm (SN) and perceived behavioural control (PBC) influence purchase intention. Participants who completed the online survey in phase 1 were offered the opportunity to participate in phase 2 and phase 3.

In the second qualitative phase of the study pregnant woman's online medication purchasing behaviour were tentatively explored online using Facebook as a communication platform. The exploratory follow-up built on the findings of the initial quantitative results. The theoretical principles that underpin purchasing behaviour online identified from the literature and the outcomes from phase 1 and phase 2, formulated the basis for the design of an eye tracking study in phase 3, with each stage designed to answer the research objectives.

The eye tracking study in phase 3 explored pregnant women's online medication purchasing decision making in a simulation exercise to gather micro level information regarding factors that influence online medication purchasing and aspects of web interface and human computer interaction (Figure 5.1).

Figure 5.1: Methodological approach to the study



5.8 Phase 1: Cross-sectional, internet-based survey

5.8.1 Study design

The increased global availability of the internet and popularity of social networking sites has provided new possibilities of conducting online surveys with relatively low costs and provided access to a large diverse population of participants (Forgasz et al. 2017). Women are now more accustomed to carrying out daily activities using the internet and as such have become more exceptive of completing online surveys (Dillman, et al. 2014). Several studies involving pregnant women having had successful recruitment strategies using online survey methodology (Admon et al. 2016; Hughes et al. 2018; Sinclair et al. 2018; Sinclair et al. 2019). Objective one of the study was to 'describe and analyse patterns of online medication purchasing in pregnant women, locally, nationally and internationally', as such an online cross-sectional survey was chosen for phase 1 of the study.

The survey instrument focused on the research objectives was developed using the framework for constructing a questionnaire, based on the Theory of Planned Behaviour developed by Francis et al. (2004) and had modified questions with permission, from an online purchasing of medication survey by Sinclair et al. (2012). Expert opinion, relevant literature and service user feedback was used to inform the content and co-design of the questionnaire (Appendix 2).

The number of mobile phone users in 2019 was estimated to reach over 5 billion (Statista 2018). With the increased use of smart phones, participants

were more likely complete a survey from their mobile device (Dillman et al. 2014). Therefore, the survey was formatted for viewing on a mobile device and a computer screen to increase the readability and increase the sample size. A web-based software tool for creating online surveys (QUALTRICS), was used to create an electronic link. Once the survey was created it was activated to provide an allocated URL address to allow it to be uploaded onto the University server.

5.8.2 Participants

The study utilised a non-probability sampling strategy to collect the data from part rather than the whole population of pregnant women. As such a convenience sample was used.

5.8.3 Inclusion criteria

Women who were pregnant or had been pregnant in the past 2yrs, aged 18yrs. or over, with the ability to read and understand English. Participants under the age of 18 yrs. were not included in the sample as they fell under the classification of minors requiring parental consent (Lenhart 2013). The sample was restricted to 18 yrs. or over and a statement declaration request on entry to the survey was provided.

5.8.4 Exclusion criteria

Women who had not been pregnant in the past 2yrs, who were under 18yrs., with the inability to read and understand English. The survey statement declaration asked women to only complete the survey if they were pregnant

or had been pregnant in the past 2yrs and were aged 18yrs or over. If not, they were thanked for their consideration in participating and could automatically leave the survey link by exiting the webpage.

5.8.5 Sampling Design

The researcher consulted with the statistician from Ulster University regarding power analysis for sample size. The study used an undefined population with an estimate based on the past 2 year's pregnancy rates, with a confidence level of 95% and accepting a 5% margin of error. As such, the study required a sample size of approximately n=384 to provide valid results.

5.8.6 Recruitment

As the study aimed to establish what factors influenced a pregnant woman's decision to purchase medication online the sample was obtained using the internet. The survey link was hosted on the Ulster University website, Facebook page and Twitter account (Appendix 3). The survey was retweeted on Twitter and shared on Facebook to virtually snowball the sampling frame (Pedersen and Kurz 2016). To enhance the response rate for the survey it was also necessary to advertise the link through other pregnancy websites and forums to reach a larger population of pregnant women. To achieve this the researcher used a similar strategy to promote the survey as carried out by Lagan (2010). The term 'pregnancy' was used to review pregnancy web sites and pregnancy forums using the search engine Google to identify potential websites to promote and advertise the survey. Websites were selected for inclusion if they meet the following criteria:

- Pregnancy related website
- Open to the research process
- No copyright clause

Once potential websites and forums terms and conditions were reviewed, individual moderators for the sites were contacted either through the website or using the researcher's university email account to request the promotion and advertisement of the survey (Appendix 4).

5.8.7 Pilot: Test-Retest

Prior to commencing the data collection, a pilot study was conducted during November 2017. Piloting the survey instrument was important to establish content validity and improve the questions, format and scales included (Creswell 2018). The survey had a content validity check carried out by an expert group of multi professional researchers, midwives and mothers with expertise on the topic area.

Following content validity, interrater reliability of the survey was performed by carrying out a test-retest pilot. Interrater reliability is important to examine the extent of which the collected data are correct representations of the measured variables (McHugh 2012).

The survey was administered to a purposive sample of 65 women who met the study inclusion criteria. The sample size of 65 was agreed in consultation with the University's statistician and the supervisory team. The sample was

based on sample size requirements for reliability studies by Shoukri et al. (2004) and aimed to achieve an inter-rater reliability of P=0.85. As such 35 participants were required to provide a sufficient sample size over 2 interval test-retest. However, due to the nature of online surveys and the potential for drop out (Chai-Adisaksopha et al. 2018), the team decided to aim for a higher initial sample of n=65. Statistical analyses were completed to test the reliability of the survey responses over an interval time period 1 and time 2 being 2 weeks later.

The pilot survey was initially sent out to 65 women and 45 completed surveys were returned. The second survey was administered 2 weeks following the first survey and received n=36 responses. In total n=36 responses were included in the final analysis. Demographic information and free text survey response options were not included in the reliability testing. Kappa and % agreement statistical analysis were carried out on nominal data (Cohen 1960) and Kendall Tau B statistical analysis was carried out on ordinal/scale data (Gibbons 1985) (Appendix 5). The interpretation of Cohen's Kappa was carried out using the range by Cohen (Cohen 1960) with a cut-off point decided by the supervisory team of 0.4 (Table 5.1).

Table 5.1 Cohen's interpretation of Kappa (Cohen 1960)

Value of Kappa	Level of agreement
< 0	None
0.01–0.20	None to Slight
0.21–0.40	Fair
0.41–0.60	Moderate

Kendall's Tau is a non-parametric measure of relationships between columns of ranked data. The Tau correlation coefficient returns a value of 0 to 1, where 0 is no relationship and 1 is a perfect relationship (Gibbons 1985).

The results that were significant indicated an issue with the question format. These were discussed with the supervisory team and amendments made to the original survey to make it more readable and user friendly. The majority of the issues surrounded the use of scales from -3 to +3. Visually this demonstrated more difficulty for participants and as such the scale was amended on the pilot to 1-7 to create a more user-friendly visual field.

There was also a poor statistical significance when participants answered the question regarding 'online pharmacy', whereas online supermarket and online health store seemed to have adequate response. Following discussion with the supervisory team this may be due to the population sample testing the

survey may not be overly familiar with the term and concept of ‘online pharmacy’.

Following the amendments, the survey was then re distributed to the expert panel to review. The panel consisted of representatives from midwifery, pharmacy, research, mothers. They gave feedback that the survey usability had improved following the amendments. Due to time restrictions of being part of a PhD study the pilot did not have a repeat test re-test run prior to disseminating.

5.8.8 Data Collection

Data collection commenced in January 2018 and continued for a period of 3 months until April 2018. Following this time frame the survey was closed with a message added to the survey link thanking any further interested participants for their interest but that the survey was now closed.

5.8.9 Data analysis

Quantitative data obtained from the survey responses were analysed using the SPSS package version 25. Data collection occurred over the course of 3 months from January to April 2018. Preliminary data analysis on the survey results demonstrated a high level of incomplete responses. Missing data can be a result of participants ignoring a few or all the questions, questions not being relevant to the participant’s situation, or an inability to locate a participant by the survey administrator (Cheema 2014). As such to reach a

sample size that demonstrated statistical power the survey was reopened for a period of one month in August 2018 to increase the sample.

Data screening and cleaning

All survey responses were exported from Qualtrics to SPSS files. The files were then merged into one data set and screened and cleaned to identify any errors or missing cells. The researcher followed the data screening process, checking errors and finding and correcting the errors in the data file as demonstrated by Pallant (2016). The data were cross checked for errors and completeness by an independent statistician.

Quality Assurance of the data

In total, n=714 surveys were accessed online by participants, however there were a proportion of the surveys that had incomplete responses. In keeping with quality assurance and in consultation with the University Faculty statistician the decision was made to only include data from surveys with a minimum of 80% completion (Hair et al. 2010). In doing so n=409 survey responses were eligible for inclusion in the final data set. This number meets the n=384 responses required for the sample to reach statistical power.

Missing data management

Within the final data set missing data were evident in some cells. To determine whether the data were missing completely at random (MCAR), Little's MCAR test was carried out on the data set to test the null hypothesis that 'the data were missing completely at random' (Little 1988). The Littles MCAR test

showed a significance level of 0.069, which is not statistically significant. Therefore, the null hypothesis could be accepted, and the data were missing completely at random. (Little's MCAR test: Chi-Square=4307.488, DF=4171, Sig.= .069)

Having identified missing data in some of the variables and in keeping with good practice a missing values analysis was performed to identify any patterns in the missing data (Pallant 2016). As the majority of the missing cells were at random, multiple imputation methods of completing the missing cells was appropriate.

Multiple Imputation of data to the missing cells.

Due to the large size of the data set and >2% missing data on some variable's expectation maximisation was not selected to replace the missing data. Expectation maximisation can also create bias in the sample and should be used with caution as error isn't added to the new dataset (Pallant 2016). Therefore, multiple imputation method was selected to complete the missing values as the data had been determined to be missing at random and is also a more robust method of imputing missing data for this dataset (Field 2018). Multiple imputation method specifications were set to automatic on SPSS and the subsequent model selected for the scale variables was linear regression set with 5 imputations. A mean was taken from the 5 iterations of the missing data cells to formulate a single complete data set. Any variances outside the range of possible responses with decimal places were rounded up or rounded down to create whole values.

Statistical methods used

Data analysis was carried out using SPSS. Frequency, mean, standard deviation, skewness and kurtosis factors were analysed. Regression analysis was also carried out to explore the relationship between the variables and identify the predictors that were significant to the theoretical constructs of the TPB. Categories with small numbers in the variables were collapsed into smaller numbers of categories for the analysis (Pallant 2016). This was to remove outliers in the data set and ultimately prevent bias in the results.

Once the significant predicting factors were identified for the theoretical constructs more focused inferential statistics were carried out to explore the differences between groups. Parametric testing was suitable for this data set in view of the interval scaled data used with normal distribution in scoring.

Independent samples t-test was conducted to compare the differences between means in paired samples in groups of data. ANOVA, one-way analysis of variance was used to compare the differences between means with multiple variations to explore the predicting factors on the direct and indirect measurements of attitude, subjective norm, perceived behavioural control and purchase intention. Post hoc ANOVA tests were also carried out to confirm the differences between groups following identification of a statistically significant difference in the group mean. The data in this study met the assumption of homogeneity of variances, as such Tukey honestly significant difference (HSD) post hoc test was used.

5.8.10 Ethical Considerations

Ethical approval

Phase one of the study received ethical approval from the Ulster University Research Ethics Filter Committee on 17th August 2017 (Appendix 6).

Informed implied consent

Seeking informed consent is central to the process of carrying out ethical research and respecting a participant's right to determine if they wish to contribute (Health Research Authority 2018). In this study the participant information sheet (Appendix 7) was made accessible on the opening page of the survey. Women had the option to read the participant information prior to consenting to start the survey. Women were asked to click the consent to proceed button before accessing the survey. Completion of the online survey implied voluntary consent.

Confidentiality and anonymity

During the pilot it was necessary for the researcher to know the participants email address so that the survey could be resent to evaluate the test-retest reliability of the items from the instrument. Confidentiality of participants was always maintained. IP addresses for the participants who completed the survey were held on the database until the data were checked for duplicate responses then deleted. All information held electronically was stored anonymously on a password protected computer will be kept in a locked room on Ulster University premises for 10 years and then confidentially destroyed in line with Ulster University policy:

https://internal.ulster.ac.uk/research/rg/0613%20data%20handling%20procedure%20V1.pdf

All paper documents were stored in a locked filing cabinet in the University and will be kept for 10 years before being confidentially destroyed. When quoting results and writing every effort will be made to ensure no individual party can be identified.

Protection of participants

The survey was exploratory in nature. In completing the survey there was a small possibility that a participant may have disclosed that they had purchased medications that could be potentially harmful to themselves or their baby. In this case, all participants were advised at the end of the survey if they had purchased medications to inform their midwife or General Practitioner and to check the safety of the medication they had taken during pregnancy. Links to websites that provided further information regarding medication safety in pregnancy were provided. A link to the teratology website was also provided so that pregnant women could telephone or text directly for advice on any medication if required. At the end of the survey women were invited to participate in phase 2 online focus groups and phase 3 eye tracking study. A short information paragraph about the further study was provided. Those who wish to participate were asked to give their name and contact details so the researcher could contact them.

5.9 Phase 2 Online focus groups on Facebook

5.9.1 Study design: Online focus group

With the advancement and popularity of internet technology the options for participant recruitment and data collection in healthcare have expanded dramatically (Tuttas 2015). Facebook is a global social media platform with over 2.38 billion monthly active members (Statista 2019a) with over 80 million people using the group feature each month (Guynn 2016). The popularity of social media platforms such as Facebook has recently led researchers to investigating ways of recruiting and carrying out qualitative research in secret groups to enhance their empirical research (Medley-Rath 2019; Sinclair et al. 2019).

Online focus groups are valid for research purposes as interacting with participants on the internet avoids a significant amount of travel, expense and provides a more internationally representative sample (Moore et al. 2015). Online focus groups have been identified as having equal potential as in-person focus groups for gathering high-quality information from hard to reach populations on sensitive topics and supports research by Wilkerson et al. (2014) in its use for qualitative data collection. A study by Woodyatt et al. (2012) also identifies that online discussion groups produce similar data and themes to that of in person focus groups however online focus groups were more likely to share personal experiences suggesting online focus groups have the potential to collect more detailed and personal accounts of sensitive topics.

Several authors have expressed concerns with the ability to evidence non-verbal cues during online focus groups (Pontes et al. 2018; Ferrante et al. 2016). However, Ferrante et al. (2016) and Reisner et al. (2017) would argue typed communication can communicate more by use of capital letters and emoji's ☺ to demonstrate expression.

In phase 2 online focus groups using asynchronous communication were selected to allow an in-depth examination of the experiences and perceptions of pregnant woman when purchasing medication online and to provide a greater understanding of the theoretical constructs of purchase intention in the Theory of Planned Behaviour. The data obtained in this phase built on the information obtained in phase one of the study and informed the design of the scenarios in phase 3 which facilitated the testing of the theoretical factors and practical issues to do with web interface and content design.

5.9.2 Participants

The purpose of the focus groups was to look in more depth of their thought views and experiences of online medication purchasing in pregnancy. As the survey had gathered information from an international sample the in-depth thoughts and views of a diverse international sample were also sought for the focus group sample to maintain consistency in the findings. Therefore, a purpose sample of three focus groups were selected for this phase of the study. It was decided by the supervisory team that the sample would be divided into three separate groups to meet the study objectives.

Group 1: Women who had purchased medication online during pregnancy

Group 2**:** Women who had not purchased medication online during pregnancy

Group 3: A mixed group of women who had/had not purchased medication online during pregnancy

5.9.3 Inclusion and exclusion criteria

The inclusion and exclusion criteria were consistent with criteria for phase 1.

Inclusion criteria

Women who were pregnant or had been pregnant in the past 2yrs, aged 18yrs. or over, with the ability to read and understand English.

Exclusion criteria

Women who had not been pregnant in the past 2yrs, who were under 18yrs., with the inability to read and understand English.

5.9.4 Sampling design and recruitment

Participants who completed the online survey in phase 1 were invited to participate in online focus groups for phase 2. An option to leave an email address for the researcher to make contact was available at the end of the survey in phase 1. A list of potential participants who had left their email address after completing the online survey in phase one was formulated. The list was separated into women who had or had not purchased medication online during pregnancy, so the focus group sample could be composed of

different grouped women who had similar profiles regarding medication purchasing.

A purpose sample of each grouping was then selected and an email of invitation with a Participant Information Sheet (PIS) attached was sent to each potential participant (Appendix 8-9). If the participant wanted to contact the researcher directly for more information the researcher could be contacted by email or mobile telephone from a secure mobile purchased for the sole use of the research study.

Due to the nature of asynchronous online focus groups, there is a higher drop-out rate of participants over the timeframe taken to complete the discussion (Stewart and Shamdasani 2017). Therefore, a higher number of participants is required starting the group discussion than in a traditional face to face group. Initially 12 people were sent email invites for each grouping with the expectation of recruiting 8-10 people to participate in each group.

In the following 24hrs after sending the initial invite a subsequent email was sent from the Facebook Focus Group page with a link to click should the potential participant wish to join and participate in the group. Facebook is a global social media platform and was selected for this reason as it has over 2.38 billion monthly active members (Statista 2019a), also phase 1 of the study was advertised on Facebook and a large proportion of the people recruited would have Facebook accounts.

If the potential participant had not joined the Facebook Group in the subsequent 72hrs a further email was sent with a direct link to request to join the Facebook Group or to contact the researcher had they any difficulties joining the group. If the potential participant had still not joined the group 48hrs after the second email, the researcher accepted they did no longer wish to be involved in this phase of the study.

The initial invitations to join the focus groups did not recruit the minimum participants (n=6) for each group. Therefore, a further n=5 potential participants were purposively selected and invited to join each group from the original list of potential participants who expressed an interest in participating in this phase of the study until the minimum number of participants were recruited.

Of the potential participants who were sent an email invitation n=2 bounced back. The researcher assumed from this that either the email address provided was no longer recognised or in-put incorrectly at time of documenting in survey in phase 1. One potential participant also emailed the researcher to say they did not want to participate as they were no longer using Facebook as a social media platform. One potential participant contacted researcher to provide a different email as they were going off on maternity leave and wouldn’t be accessing their work email and that was the one originally provided in phase one of the study. In total n=9 participants were recruited to focus group 1, n=8 were recruited to focus group 2 and n=6 were recruited to focus group 3 (Table 5.2).

Table 5.2: Numbers of women in each focus group

Focus Group	Number of women in group	Purchasing experience
1	9	Previously purchased medication online
2	8	Had not previously purchased medication online
3	6	Mixed group of women who had/had not purchased medication online

5.9.5 Group administration

Participants were added to the group by the researcher who controlled the group administration. The researcher invited each participant to join the focus group by clicking on the 'Invite by email' option in the top right-hand corner of the Facebook group page. This activated an email to the participant providing an invitation and link to join the closed Facebook group. If the participant had a Facebook account, they could automatically join the group at this point. If someone wished to participate who did not have a Facebook account, guidance on how to set up a personal account to join the group would be provided at this stage.

In the 'about' section of the group page details of the study and guidance for participation in the group chat was provided. The study information sheet was attached to the files section for the group page in the event any participant wanted to review.

5.9.6 Focus group topic guide

The online focus group followed a semi structured format detailed in Appendix 10. Questions in the topic guide were open ended to provide flexibility and incorporate probing questions that facilitated discussion led by the women in the groups and to ensure the aims and objectives of the study were met. The topic guide questions were framed on the constructs of the Theory of Planned Behaviour, demonstrated by Francis et al. (2004).

Question 1: Measurement of Attitude: measuring behavioural beliefs

- What do you believe are the advantages for pregnant women of purchasing medication online?
- What do you believe are the disadvantages of for pregnant women of purchasing medication online?

Prompt: Is there anything else you would associate with a woman's choice to purchase medication online?

Question 2: Measuring Subjective Norm

- Are there any individuals or groups who you think would approve of you purchasing medication online during pregnancy?
- Are there any individuals or groups who you think would disapprove of you purchasing medication online during pregnancy?

Prompt: Is there any other social influences you think would affect a pregnant woman's decision to purchase medication online during pregnancy?

Question 3: Measuring Perceived Behavioural Control

- What factors or circumstances do you think enable a pregnant woman to purchase medication from the internet?
- What factors or circumstances do you think make it difficult for a pregnant woman to purchase medication from the internet?

> **Prompt:** Are there any other issues or factors that come to mind when you think about the actual process involved in purchasing medication online during pregnancy?

Finally, thank you for your participation. If there is any other information you would like to add?

5.9.7 Online Communication

Online focus groups can be conducted synchronously or asynchronously (Williams et al. 2012). For the purpose of this study an asynchronous communication method was adopted to allow participants time and freedom to respond at their own rate and pace allowing time for reflection prior to submitting a response (Reisner et al. 2017). This is particularly important as the population involved were either pregnant or had young children and asynchronous communication would allow a period of time for participants to give responses at a time that was convenient to them (Medley-Rath 2019). This is particularly effective when participants are across different time zones and facilitates group participation from an internationally selective group.

The Facebook page was monitored 3 times a day by the researcher, morning, afternoon and evening. The researcher allowed a period of one week following completion of questions asked in the focus group to allow time for any further comments and to review the transcript of the data documented during the discussion. Following this period, the closed Facebook group was concluded, and all data were transferred for analysis.

5.9.8 Data collection

Data collection for phase 2 was carried out in May 2018.

5.9.9 Data analysis

Online focus group data were transcribed and thematically analysed using Braun and Clarke (2006) framework for analysing qualitative data (Table 5.3). Thematic analysis is a method of identifying themes and patterns of meaning across a dataset in relation to the research question (Braun and Clarke 2013). All group discussion was transcribed and checked for accuracy and formation of coding structure. The structure was then refined and categorised into codes and themes in discussion with the researcher's supervisors.

The analysis for this study was a 'theoretical' thematic analysis and guided by the Theory of Planned Behaviour. Identified themes and subthemes were mapped to the constructs of the Theory of Planned Behaviour.

Table 5.3: Phases of thematic analysis (Braun and Clarke 2006)

Phase	Description of the process
1	Familiarizing yourself with your data
2	Generating initial codes
3	Searching for themes
4	Reviewing themes
5	Defining and naming themes
6	Producing the report

Phase 1

As the focus groups were carried out online using a closed Facebook group, the data were essentially already transcribed. The data were transferred to a word document and checked for accuracy with preliminary potential codes and ideas being noted.

Phase 2

In phase 2 initial codes were generated from the data after reading the transcripts several times for the researcher to become familiar with the content. NVivo 10 was considered by the researcher to be used for the coding of the transcripts and training was carried out; however, in view of their only being three focus groups with a manageable amount of data, the researcher decided to manually code the transcripts in preference to computerised analysis. The researcher was also familiar with hand coding data from previous research experience and could relate more to the content and identify codes and concepts more effectively in table format using excel (Appendix 11).

Phase 3

Phase 3 involved the interpretative analysis of collating all the codes into potential themes and gathering all the data that was relevant to each potential theme (Braun and Clarke 2006). To facilitate theme development, codes were colour coded beside the data on an excel spread sheet that allowed easy moving and pasting of themes during the process (Appendix 11).

An inductive approach to the data analysis was used where the themes came out of the data which was analysed without trying to fit into a coding frame (Braun and Clarke 2006). This ensured pregnant women's experiences of purchasing medication online were portrayed. To address the second objective of the study, 'To explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online,' it was also necessary to explore the theoretical factors that influence purchasing, as such a deductive or theoretical thematic analysis was also carried out on the data and incorporated into the coding.

Phase 4

In this phase, all of the themes were reviewed and a thematic map of the provisional themes and subthemes was created to demonstrate the relationships between them. As the focus group questions were theory driven, themes and sub themes identified from the coding where mapped to the constructs of the Theory of Planned Behaviour. (Appendix 12)

Phase 5

In phase 5 of the thematic analysis, the themes were reviewed and refined with clear names being given for each theme to reflect the overall story and ensure there was an appropriate fit to the theoretical constructs of the Theory of Planned Behaviour. The researcher took care in identifying themes that were reflective of what was portrayed in the data.

Phase 6

The final phase involved writing up the findings to tell the story of the factors that influence pregnant women purchasing medication online. Verbatim quotes from the data where included in the final write up to support the development of the themes and subthemes and highlight a clear audit trail. The results are reported in Chapter 7.

The transcripts from the focus groups were also independently analysed by an expert in qualitative data analysis, to compare findings and to prevent bias and improve the methodological rigor of the study (See Appendix 13). Independent analysis found similar themes and subthemes to that of the researcher and supervisory team.

5.9.10 Pilot

A pilot online focus group was carried out prior to commencing the main data collection. Expert opinion and service user feedback of the online focus group format was sought prior to the pilot to ensure the questions were phased appropriately and relevant to the topic. There were no major changes to the focus group format required, and the data collection method was successful. The pilot data was not utilised in the final analysis of results.

5.9.11 Ethical considerations

Social media now plays a daily part in people's lives (O'Connor et al. 2013). Using social media as part of a recruitment strategy provides midwife researchers with an effective and efficient means to engage with a large and

diverse audience of pregnant women (Hendricks et al. 2016). With current concerns regarding the protection of online identities, researchers must ensure online safety to protect anonymity, provide confidentiality and make women feel confident to participate and share their knowledge and experiences in the research process (Woodfield 2018).

Ethical approval

Phase 2 of the study was approved by the Ulster University Research Ethics Filter Committee on the 17 August 2017 (Appendix 6).

Protection of participants

During the online focus groups if a participant disclosed, they may have taken a medication that was contraindicated during pregnancy the researcher contacted them privately to suggest they may seek further guidance and advice from their General Practitioner or Midwife. Links to websites that provided further information regarding medication safety in pregnancy were also provided should the participant require any further guidance.

If during the course of the focus group any members posted an inappropriate comment, the researcher was prepared to intervene at an early stage to diffuse the situation with phrases such as ‘I think we ‘ve covered all the ground on this one, let’s move to the next question’. In the case that a possible defamatory post was made the participant would have been informed the post would be deleted by the administrator and in a last resort removed from the

group discussion as per national guidance on using social media for healthcare research (National Institute for Health Research 2014).

Any member of Facebook can block a group or delete a membership to a group at any time they wish. Therefore, if any participant wished to withdraw from the focus group at any time they could do so.

Informed consent

Participation in the online focus group was taken as an indication and affirmation of voluntary consent.

Confidentiality and anonymity

In the event that someone wished to participate who did not have a Facebook account, guidance on how to set up a personal account was provided by the researcher. The group was a closed Facebook Group account so that only members in the group could find and see posts, it would not be accessible to the general public, therefore protecting the confidentiality of the members of group. The researcher also held the group administration role thereby controlling who could access the group.

It was also agreed that each participant in the discussion would be identified by their Facebook username. This could be their real name or a pseudo name if they choose to anonymise themselves, as such the participant had the option to retain control over their identity in the group. All identities for the members of the focus group were anonymised for the data analysis. All

information was held electronically and stored anonymously on a password protected computer kept in a locked room on Ulster University premises and will be kept there for 10 years and then confidentially destroyed in line with Ulster University policy. All paper documents will also be stored, in a locked filing cabinet in the University for 10 years and then confidentially destroyed.

https://internal.ulster.ac.uk/research/rg/0613%20data%20handling%20procedure%20V1.pdf

Great care was taken when quoting results in publications to ensure no individual party could be identified.

5.9.12 Rigor and trustworthiness of the qualitative data

Ensuring trustworthiness and rigor requires methodological soundness and adequacy in qualitative research studies. Much debate exists in the literature as to the terminology which best describes rigor and subsequent measures of quality in qualitative research (Polit and Beck 2017). Without rigor, research is worthless, becomes fiction and loses its utility (Morse et al. 2002). The concepts of validity and reliability that are often applied to quantitative research are argued by Morse et al. (2008) to have applicability to qualitative research. Lincoln and Guba (1985) argue by developing dependability, credibility, transferability, confirmability that trustworthiness is created which is a better description in terms of qualitative research. These criteria are known to represent parallels with a positivist's measures of internal validity, reliability, objectivity and external validity (Polit and Beck 2017).

It is important that this study demonstrates methodological rigor so an authentic and trustworthy reflection of pregnant women's experiences of purchasing medication online is achieved. To demonstrate trustworthiness in this study the four criteria of truth-value (credibility), applicability (transferability), consistency (dependability) and neutrality (confirmability) that were incorporated in the study and are discussed below (Lincoln and Guba 1985). It must also be noted the researcher must be adaptable to changing circumstances, demonstrate professional immediacy, sensitivity and the ability to clarify and summarize during the research process (Guba and Lincoln 1981).

Credibility

Credibility is the truthful and accurate representation of a participants lived experience and the measurement of internal consistency (Cypress 2017). Credibility was achieved by the researcher facilitating all the focus groups during data collection and this enhanced consistency by ensuring all questions were repeated and consistently stated (Singleton and Furber 2014).

Triangulation was achieved in the study by the study supervisor's peer validating the data coding, theme formation and interpretations to confirm consistency with the findings and helping to prevent bias in the analysis (Richie et al. 2013). Member checking as a critical technique for establishing credibility in qualitative research (Guba and Lincoln 1989). Transcripts of the completed focus group discussion were left on the groups for a week following

the end of the discussion. This allowed participants to review the final content of the discussion as a validity check to ensure they agreed with the content of the data (Green and Thorogood 2009). Verbatim quotes were used in the final report to provide ‘thick descriptions’ of factors that influenced women’s online medication purchasing behaviour and authenticate the study findings. An independent expert in qualitative analysis was used to independently analyse the data to confirm the findings (Appendix 13).

The researcher also took additional training in qualitative interviewing techniques to be effective and credible in carrying out the focus groups and had previous qualitative research experience carrying out semi-structured interviews for an MSc study.

Transferability

Transferability denotes the extent to which the findings from the study can be transferred or have applicability in other settings (Polit and Beck 2017). To enhance the transferability participant’s demographic details were obtained during data collection which demonstrated recruitment and representation of women from 6 different countries participating in the group. The participation of women from various countries enhances the generalizability of the study and provides descriptive data of the sample and settings so that similarities in some women from countries that were included could be made in the discussion.

The researcher also carried out ‘analytical generalisation’ by generalising the data to the Theory of Planned Behaviour to demonstrate the application of the theory to this sample and condition (Treharne and Riggs 2015).

Dependability

Dependability refers to the stability of data over time under the same conditions (Lincoln and Guba 1985). In this study the researcher has provided a clear audit trail to demonstrate dependability to any external reviewers with a discussion of the analytic decision making throughout the research process detailing methodological decisions regarding recruitment, data collection, data analysis. Polit and Beck (2017) acknowledge credibility cannot be attained in the absence of dependability. Consistent measures were taken during each focus group to use the same topic guide and questions which were well defined, piloted and underpinned by the Theory of Planned Behaviour to ensure dependability in the study. Verbatim quotes were used in the findings to demonstrate the formation of themes from the focus group data.

Confirmability

Confirmability refers to objectivity or the equivalence between independent people regarding the accuracy, relevance or meaning of the data (Polit and Beck 2017). Lincoln et al. (2011) explain this should be carried out to demonstrate the integrity of findings which should be devoid of any biases. Thomas and Magilvy (2011) comment the main strategies to demonstrate confirmability are having an audit trail and the researcher establishing reflexivity during the research process. Throughout the study a clear audit trail

has been documented and reflexivity has been demonstrated by the researcher by carrying out a personal reflexive account detailed in Chapter 4.

5.10 Phase 3 Eye tracking study

Consumer behaviour is recognised as a complicated and multidimensional process. Using eye tracking as a methodology assists researchers in understanding visual attention and offers an innovative means to capture the consumer's reaction to a display and its components as the reaction takes place (Khachatryan et al. 2013). By using eye tracking, the researcher has the ability to capture a participants habitual and subconscious behaviour naturally, thus eliminating social and desirability bias to provide a deeper understanding of the consumer's behaviour (Tobii 2015).

Eye tracking has been used as a method to understand consumer behaviour (Huddleston et al. 2015; Vu et al. 2016), online shopping behaviour (Yang 2015; Hwang and Lee 2018) and the use of healthcare products (Mou and Shin 2018). However, this novel technology has not been used in a pregnant population to explore online medication purchasing behaviour or looked at online behaviour in real time online searching. This experimental approach was selected as it can test the pregnant woman's skill in searching for a medication to purchase online and measure the subsequent effect on the intention to purchase. This data cannot be obtained from phase 1 or 2 and will add to the overall knowledge in the topic in relation to human computer interaction.

When using eye tracking, the metric data obtained only demonstrates where the participant is looking on the computer screen, it does not give the rationale for where they have looked or why (Helle 2017). Several studies have used ‘think aloud’ protocols along with computer-based eye tracking studies to validate decision making and illicit cognitive insight into behaviour (Elling et al. 2012; Genenfurtner and Seppãnen 2013). By analysing audio recordings of ‘think aloud’ descriptions further insight into the factors that influence online purchasing behaviour can be made (Holmqvist and Andersson 2017). Therefore, a think aloud protocol was used alongside the eye tracking study to meet the study aims and objectives and understand online medication purchasing behaviour.

5.10.1 Aim and objectives

The aim of this phase of the study was to use computer-based eye tracking to determine modifiable features of online interfaces or websites that influence a pregnant women’s intention to purchase medication online. The study aimed to achieve this by:

- Computing eye gaze metrics for identified areas of interest on purchasing websites that influence purchasing behaviour
- Thematically analysing ‘think aloud’ recordings that rationalise the purchase decision making process
- Measure purchase intention using a post-experiment questionnaire
- Exploring correlations between eye gaze metrics and purchase intention to integrate the datasets

5.10.2 Design

Factors that can influence a pregnant woman's intention to purchase medication online were identified from the literature and the findings of phase 1 and 2 of the study. This was used to create three scenarios for pregnant women to perform a simulated search for medication they may wish to purchase online in a controlled website environment. Eye tracking was utilized to monitor objective search strategies with the end outcome measurement being whether the pregnant woman intends to purchase medication online. Search strategies were recorded in real time rather than observation of fixed images to have a more realistic environment for searching online and improve the credibility of the results. Each scenario was developed in relation to the key themes of online purchasing that were discovered from the information obtained in phase 1 and 2 of the study and modelled on the Theory of Planned Behaviour.

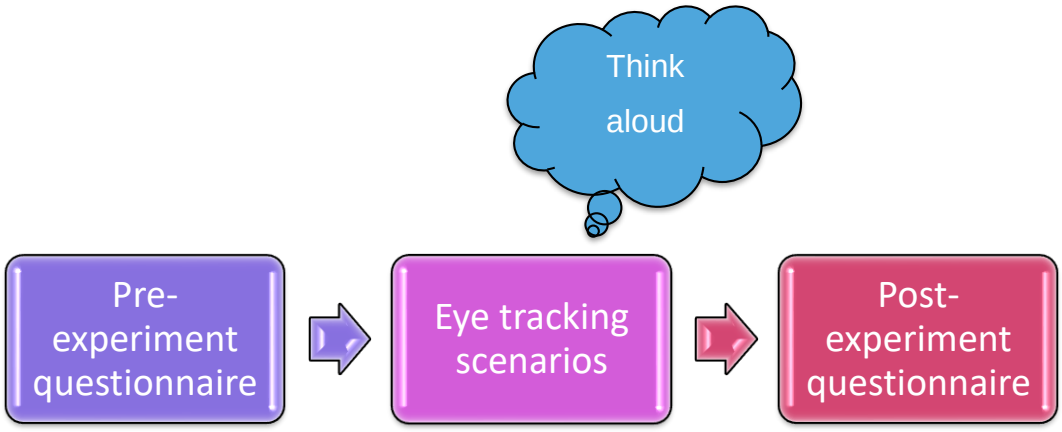
A concurrent 'think aloud' methodology was used alongside the computer-based eye tracking study so the pregnant woman could verbalize their thought process in real time when searching online. Think aloud methodology has been adopted as a computer interaction approach to elicit how users engage with machines and user interfaces (Tobii 2009).

A pre-experiment questionnaire was completed prior to the study and a post-experiment questionnaire was completed to evaluate the purchasing process online and purchase intention following each scenario (Appendix 14-15). The

decision was taken to look at three tasks based on the groups of medications most commonly identified by women in phase 1. Similar purchasing scenarios described by women to capture typical online medication seeking behaviour during discussion in phase 2 were developed. The search engine 'Google' was used to initiate the search as it is ranked world number one search engine with 1.5 billion monthly users and had general familiarity to participants (Bhangu 2019).

This allowed the researcher to obtain important evaluation data on the theoretical assumptions made, to test the exploring concepts and provide an interpretation of online medication purchasing behaviour in pregnancy that will facilitate the provision of recommendations to guide service development (See Figure 5.2).

Figure 5.2 Eye tracking Design



5.10.3 Research setting

The eye tracking study was carried out using an eye tracker in a lab environment in Ulster University Jordanstown and Medical Education Centre Craigavon Area Hospital and Daisy Hill Hospital in the Southern Health and Social Care Trust (SHSCT). These were areas that facilitated a quiet, controlled environment for optimal recording of eye tracking data. The researcher was present for all the recordings and facilitate the set up and recording of the eye tracking study.

5.10.4 Equipment - Tobii Studio X60 Eye Tracker

The Tobii Studio X60 eye tracker was used with Tobii studio software © version 3.1.6 to collect eye gaze metrics and analyse the data (Tobii Pro 2016). The eye tracker was positioned below the 24” LCD monitor with 1440px x 900px resolution which displayed the scenario instruction and google search page and was mounted at a 30° angle to align with each woman’s gaze (Tobii Pro 2016). The same eye tracking equipment was used and transported to the data collection sites and set up consistently by the researcher to the same measured dimensions. This facilitated standardisation across the data collection sites for each participant. Figure 5.3 below demonstrates the equipment used and set up at one of the data collection sites.

Figure 5.3: Eye tracking equipment

Figure 5.4 below demonstrates how the infrared light is emitted from the eye tracker to reflect off the participant's cornea to demonstrate the location of where the eyes fixate on an image.

Figure 5.4 Infrared light emitted from eye tracker

5.10.5 Calibration

Prior to commencing the eye tracking study all eye tracking equipment was checked and calibrated following manufacturer guidelines to ensure accuracy of recording for each individual participant. Each woman had an individual 5 point calibration carried out to ensure the eye tracker learnt the characteristics of the woman's eyes to accurately calculate the direction of her gaze on the surface of the screen (Tobii 2010). Following calibration each woman was asked to hold their position as steady as possible throughout the study to limit interruption of the eye tracking metric data collection.

5.10.6 Participants

A purposive sample of 34 women took part in the study. The purposive sample was taken from participants who expressed an interest in participating in the eye tracking study and left their email address as a point of contact following completion of the survey in phase 1.

5.10.7 Inclusion and exclusion criteria

The inclusion and exclusion criteria were consistent with criteria for phase 1 and 2.

5.10.8 Sampling design/recruitment

Participants of phase 1 who expressed an interest in participating in phase 3 were contacted by email and provided with a letter of invitation, information sheet and screening form that outlined the study and provided contact details

for the researcher should a they wish to gain more information (Appendix 16-18). If after reading the information pack the potential participant wanted to contact the researcher, they could make contact by University email or by a mobile phone number specific to this study. The researcher then provided a date, time and location for participation in the eye tracking study.

5.10.9 Scenarios

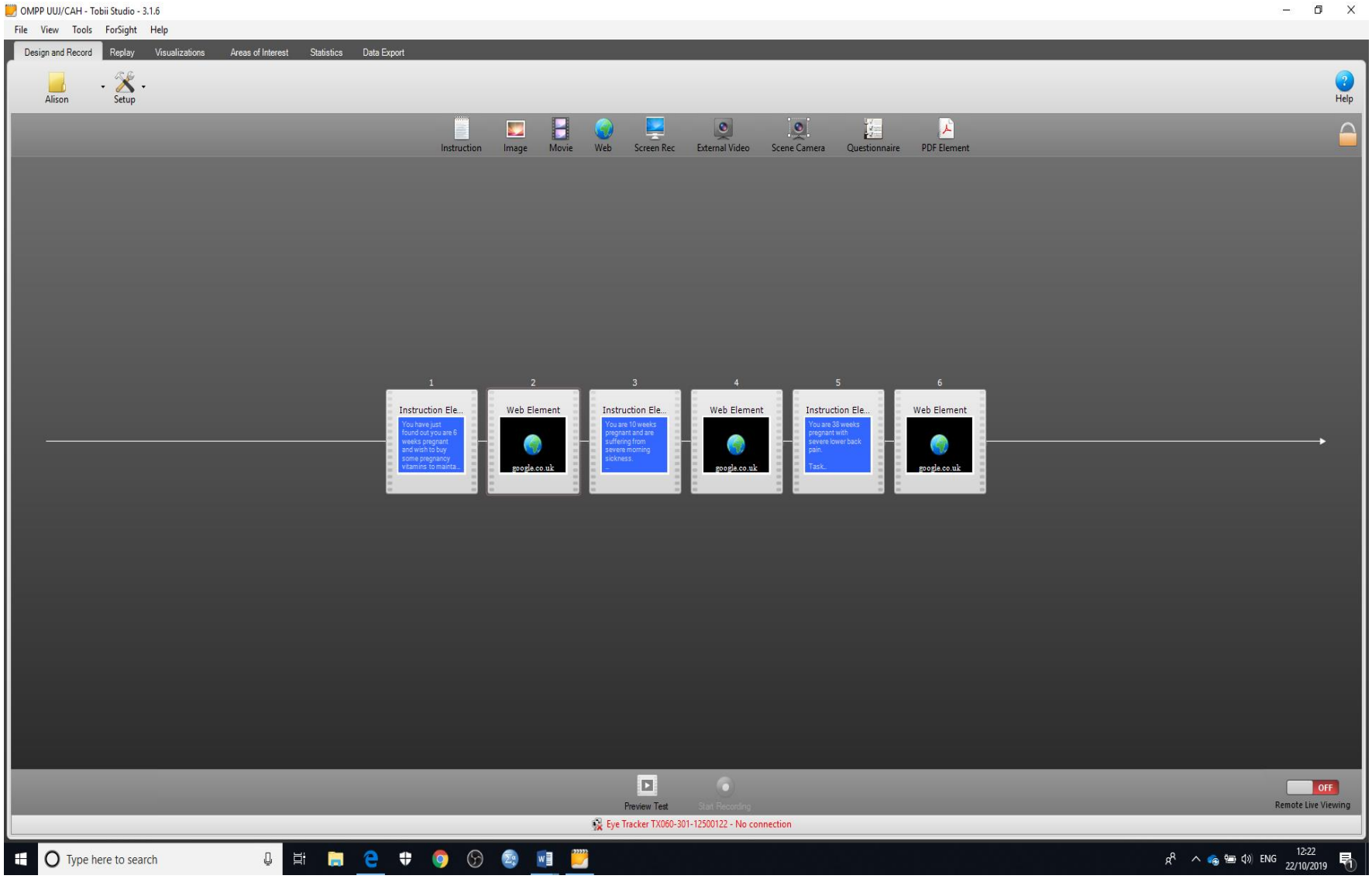
Each woman carried out 3 tasks to search for a medication they would purchase online. The medications selected in the scenarios were chosen based on the medication's women disclosed they had purchased on phase one, and from scenarios that women had mentioned during discussion in the online focus groups in phase 2. As a think aloud method was utilized during this phase of the study, women were reminded to verbalise their thought processes during the scenarios and to verbalise when they were ready for the first Google search page to appear on the computer screen (Table 5.4).

Table 5.4 Eye tracking scenarios and instruction for tasks

Scenario		Task
Scenario 1	You have just found out you are 6 weeks pregnant and wish to buy some pregnancy vitamins to maintain a healthy pregnancy	Please use 'Google' to search for a medication you may wish to purchase
Scenario 2	You are 10 weeks pregnant and are suffering from severe morning sickness'	Please use 'Google' to search for a medication you may wish to purchase
Scenario 3	You are 38 weeks pregnant with severe lower back pain	Please use 'Google' to search for a medication you may wish to purchase

Each woman's online line searching behaviour was recorded using eye tracking to observe, record and map their search strategy and online purchase decision making. Figure 5.5 demonstrates the sequence plan on the eye tracking software for the study.

Figure 5.5: Study sequence plan on eye tracking software



5.10.10 Data Collection

The study was carried out between December 2018 and April 2019. There were 4 stages of data collection within this phase of the study.

Part 1:

Part 1 included a pre-experiment questionnaire to collate demographic information and previous purchase experience (Appendix 14).

Part 2:

Eye movement metrics were recorded as each woman carried out the three scenarios including time to first fixation, fixation count, fixation duration, total fixation duration, visit duration, total visit duration and visit count for nine areas of interest (AOI) that were identified from the literature and phase 1 and 2. Each eye tracking metric was analysed for each AOI and collated in AOI groupings (Table 5.5.and Table 5.6).

Table 5.5 Eye Tracking Metric definitions: Tobii (2010)

Eye Movement Metric	Definition
Time to first fixation (T1F)	The time from the start of the media display until the test participant fixates on the AOI or AOI group for the first time (seconds).
Fixation count (FC)	Number of times the participant fixates on an AOI or an AOI group (count).
Fixation duration (FD)	Duration of each individual fixation within an AOI, or within all AOIs belonging to an AOI group (seconds).
Total fixation duration (TFD)	Duration of all fixations within an AOI, or within all AOIs belonging to an AOI group (seconds).
Visit duration (VD)	Duration of each individual visit within an AOI or an AOI group (seconds).
Total visit duration (TVD)	Duration of all visits within an AOI or an AOI group (seconds).
Visit Count (VC)	Number of visits within an AOI or an AOI group (count)

Table 5.6: Areas of Interest (AOI)

AOI	
AOI 1	Added to basket
AOI 2	Condition information
AOI 3	Delivery
AOI 4	Medication content
AOI 5	Medication information
AOI 6	Price
AOI 7	Product image
AOI 8	Searching links
AOI 9	Star ratings/Reviews

Part 3 Concurrent think aloud strategy

During the eye tracking study each participant was encouraged to give a verbal explanation of their actions whilst performing the purchasing tasks. Think aloud protocols can be carried out concurrently or retrospectively. There is much debate in the literature around the performance of these protocols. Concurrent think aloud protocols have been thought to slow down eye movements and alter the course of the experiment (Van Someren et al. 1994; Davies 1995). However, Ruckpaul et al. (2015) found there was no difference in concurrent and retrospective think aloud protocols on eye movements, and state concurrent think aloud can be essential as it provides ‘momentous

perspective'. As such a concurrent think aloud protocol was adopted for the study so thought processes would not be confused between the three scenarios.

Participants were asked to say what they were thinking, looking, doing and feeling as they carried out their search for a medication to purchase online. This provided insight into decision making behaviour whilst actively recording where their visual response was on the computer monitor. All concurrent think aloud data were audio recorded during the study to allow for transcription and data analysis.

Part 4 Post-experiment questionnaire

When women completed the eye tracking study, they were asked to complete a post-experiment questionnaire to evaluate their purchasing behaviour and decision-making regarding purchasing intention (see Appendix 15).

5.10.11 Pilot

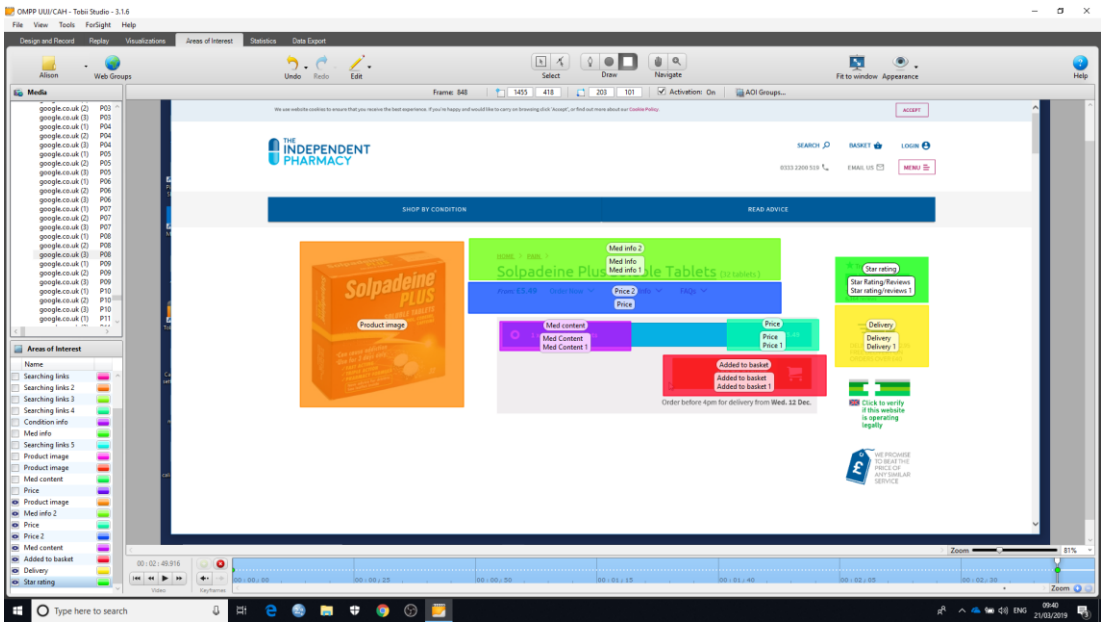
Prior to commencing the data collection, a pilot study with two women was carried out to explore the data collection approach, the eye tracking equipment and time frames for the study. Post-experiment questionnaires were initially provided for completion after each scenario. However, women tended to move position during the completion of the survey and re calibration for the eye tracking equipment was necessary. Therefore, the decision was made to complete the post-experiment questionnaires following completion of all three scenarios to limit the need for multiple recalibrations during the study.

5.10.12 Data Analysis

The data from the pre-experiment questionnaire was analysed using IBM SPSS Version 25. Descriptive statistics were carried out describe the demographic breakdown and previous purchasing behaviour of the sample group.

The eye tracking recordings were coded frame by frame using Tobii eye tracking analysis software Version 3.1.6 copyright 2007-2012 and then exported to Excel then SPSS Version 25 for statistical analysis. Coding was checked and verified by a member of the supervisory team and an independent expert in eye tracking for accuracy and consistency. The nine specific areas of interest (AOI) in the recordings were selected and coded, frame by frame (Figure 5.6).

Figure 5.6: Example of eye tracking coding frame



Think aloud data were transcribed and thematically analysed using Braun and Clarke (2013) framework for analysing qualitative data as detailed for phase 2 online focus group analysis.

Post-experiment questionnaires were analysed using SPSS Version 25. Data from the questionnaires was entered into an SPSS file and merged to create a master file with pre and post experiment questionnaire and eye tracking metric data for statistical analysis.

The dataset had no missing data, therefore missing data analysis was not necessary. Descriptive statistics including frequency, mean, standard deviation, skewness and kurtosis values were obtained and analysed. A one-way repeated measures ANOVA was conducted to identify if there was a significant difference between the scoring in the post-experiment survey across the 3 tasks.

5.10.13 Data quality in eye tracking

Data quality is essential to the validity of eye movement metric results the quality of the gaze interaction (Holmqvist et al. 2012). Quality in measuring eye tracking metrics observes spatial and temporal deviation between the actual and measured gaze direction on an individual basis (Holmqvist and Andersson 2017). There are several factors that influence data quality including varying participant eye physiology, skill of the operator, tasks which involve excessive movement, the recording environment, the geometry of the position of the eye tracker and the eye tracker design (Holmqvist et al. 2012).

To mediate for these factors a screening tool was used prior to participating in the study. Great care and vigilance was taken performing the calibrations on the eye tracking equipment and women were asked to maintain eye contact with the screen as much as possible during the scenarios. By the nature of this study design women would have to break visual attention to look down occasionally to type search terms. Although this meant the recording quality would never reach 100%, the simulated searches were more in keeping with a real-life scenario and more beneficial to the research design.

Correlation analysis was carried out between eye movement metric data and purchase intention from the questionnaire data. Correlation was also performed to test the theoretical constructs of TPB ability to predict purchase intention.

5.10.14 Ethical considerations

Ethical Approval

A second ethical approval was submitted and granted from Ulster University Research Ethics Filter Committee on 17/11/18 for phase 3 following the data collection for phase 1 and 2 of the study (Appendix 19).

Informed Consent

Both verbal and written consent was obtained from participants prior to participation in the eye tracking study. Women had the right to withdraw from the study at any time they wish to do so. Consent was obtained from the

participants prior to commencing the eye tracking study and informed consent was affirmed by participating in the study (Appendix 20).

Confidentiality and Anonymity

At recruitment the participant's names were entered on a single register with their contact details. Participants were then allocated a participant number. Participants were then only referred to by participant number, protecting participant anonymity. Vigilance was also exercised when using verbatim quotes in publications to ensure individual participants could not be identified. Consent was also gained for use of quotes in print prior to publication. All video recordings were only of the computer screen and online search strategy. Participants faces were not recorded to ensure anonymity. All recorded and documented information will be retained in a secure office in Ulster University for 10 years following the study and then destroyed.

Protection of the Participant

Using eye tracking technology is not invasive or harmful to the participant. Eye tracking systems use near-infrared illumination to create reflections on the eyes that can be tracked with high frequency, near-infrared light can be found in our natural environment in lights, candles, fires and the sun where infrared light is invisible or viewed as white light (Tobii 2017). The Tobii eye tracker has been tested and approved according to the European standard (EN 62471) for LED lights, therefore the light emission from the eye tracking technology is not known to be harmful to the human eye. A screening questionnaire by Pernice

and Nielson (2009) was completed by participants prior to commencing phase 3 to ensure they had no underlying health concerns that may affect the data collection using eye tracking equipment (Appendix 18).

Participant health related queries during study

The information collected for the study was based on hypothetical scenarios and was not anticipated that the study would inflict any health concerns on the participants. For this phase each participant was asked if they had ever purchased medication online in the pre-experiment questionnaire. This was to establish previous purchase behaviour. They were not however asked what medication they purchased. The eye tracking scenarios they were asked to perform were simulated, only looking at the process in how they interacted with the computer, therefore it was unlikely that any disclosure would made. However, there was a possibility a participant could disclose they had purchased medication online without prescription that may be detrimental to them or their baby. In such circumstances it was anticipated that reassurance would be given, concerns discussed and if necessary, further referral to the GP or Midwife would be advised. A disclosure protocol was included for the study (Appendix 21 and 22).

Cost, Reimbursement and compensation

Participation in this phase of the study was voluntary. Participants received no financial reimbursement or compensation in return for travel or participation in

the study. However light refreshments were made available for all participants who attended.

Researcher safety

The study was carried out in Ulster University Jordanstown computing laboratory and in the education rooms in Craigavon Area Hospital and Daisy Hill Hospital in the Southern Health and Social Care Trust. These are secure locations and removed potential risks for the researcher having to carry out the study in participant's homes or other unsupervised environments. The researcher informed the study supervisors when data collection took place and confirmed completion by text message.

5.10.15 Integration of mixed method datasets

When designing a mixed methods study key important factors of consideration are how the components are integrated and the timing of when each component is carried out (Creswell and Plano Clark 2011; Creswell and Creswell 2018). Integration and timing are essential elements of a mixed method study which defines the fundamental relationship between the qualitative and quantitative study components (Curry and Nunez-Smith 2015). The main approaches described in the literature to ensure integration in a mixed methods study include merging, connecting, building and embedding (Creswell and Plano Clark 2011; Fetters et al. 2013; Creswell and Creswell 2018). The sections below will discuss how the elements of the study demonstrated integration.

Merging

Merging of the datasets transpires when the quantitative and qualitative data collection and subsequent analysis are completed and the findings can be compared to ascertain complementarity, convergence and divergence in the findings (Curry and Nunez-Smith 2015). O'Cathain (2009) proposes an integrated model of dissemination of the findings where the quantitative and qualitative phases of the study are analyses separately with a chapter devoted to each phase with integration between chapters occurring in the discussion. The findings from this study will be presented in chapter 6, 7, and 8 with integration of the data demonstrated in the discussion chapter 9.

Connecting

Connected integration occurs when one type of data build on another or when one data set is used to define the sample for another component to explain the findings from the previous component (Curry and Nunez-Smith 2015). In this study connected integration was demonstrated methodologically with a sub-set of the women who completed the survey in phase one taking part in the online focus groups in phase 2 and eye tracking study in phase 3. Connecting or building as described by Fetters et al. (2013), was also demonstrated with the findings from phase 1 and phase 2 being used to develop the scenarios and survey instruments used in phase 3.

Building

Integration through building occurs when results from one procedure for data collection informs the approach to the data collection in another procedure (Fetters et al. 2013). This study demonstrates building by using the findings from the literature to design the survey in phase 1 underpinned by the TPB. Phase 2, online focus groups then built on the findings from phase 1 to inform the design of phase 3.

Embedding

Embedding happens when data collection and data analysis are linked at multiple points in a study and is of valued importance in advanced multistage designs (Fetters et al. 2013). The three phases in this multistage mixed methods study demonstrate building, connecting and merging at multiple points in the research design, data collection, and analysis. Creswell and Plano Clark (2011) identify embedding at the design level with the quantitative and qualitative elements of the study mixed with a theoretical framework to guide the overall design. This study also demonstrates embedding with all three phases being underpinned by the TPB.

5.10.15 Summary

This chapter has described the methods used and the rationale for a multiphase mixed methods approach to meet the aim and objectives of the study. The chapter sets out the application of TPB in the study and the rationale for the pragmatic approach.

The chapter describes three sequential and inter-related phases of the study underpinned by TPB and the recruitment processes, data collection, data analysis, ethical considerations and measures taken to ensure rigor and trustworthiness in the study findings. The following chapter's 6, 7 and 8 will report the findings from the study.

Chapter 6 - Results - Phase 1 Cross-sectional internet-based survey

This chapter presents the findings from phase one analysis of the cross-sectional internet-based survey underpinned by the Theory of Planned Behaviour. Data were initially collected from 23rd January to 23rd April 2018 (n=3 months). Preliminary data analysis on the survey results demonstrated a high level of incomplete responses. Therefore, in order to obtain a powered sample, the survey was re-opened for a period of one month on 6th August 2018. The survey was live online for a total of four months and 714 responses were received of which 409 were used in the final analysis.

6.1 Women who completed the survey

Most of the women were aged 25-34 yrs. (n=275, 67%), and a significant percentage were aged 35-44yrs (n=114, 28%). A very small number were in the 18-24 yrs. bracket (n=16, 4%) and as expected there was a very small response from women aged 45yrs or older (n=4, 1%). Most women who completed the survey had an undergraduate degree (n=189, 46%) or post graduate degree (n=134, 32.8%). (See Table 6.1 below).

Table 6.1: Women who completed the survey

Measures	Predictors	Frequency	Percentage
Age group	18-24yrs	16	3.9%
	25-34yrs	275	67.2%
	35-44yrs	114	27.9%
	Aged 45 or older	4	1%
Education	Primary School/Elementary School	1	0.2%
	Grammar/Secondary/High School	19	4.6%
	Technical college/Diploma	53	13%
	Undergraduate degree	189	46.2%
	Post graduate degree	134	32.8%
	Other	13	3.2%
Employment	Full-time	249	60.9%
	Part-time	83	20.3%
	Unemployed	28	6.8%
	Self employed	16	3.9%
	Student full time	6	1.5%
	Student part time	2	0.5%
	Retired	1	0.2%
	Other	24	5.9%

6.2 Women's country of residence

There was an international representation in the sample with participants from 20 countries completing the survey. Please see Table 6.2 for a breakdown of number of participants represented per country.

Table 6.2: Women's country of residence

Countries	Frequency	Percentage
Australia	15	3.7%
Belgium	5	1.2%
Canada	11	2.7%
China	8	2.0%
Denmark	4	1.0%
France	1	0.2%
Germany	1	0.2%
Hungary	1	0.2%
India	3	0.7%
Ireland	52	12.7%
Malawi	1	0.2%
Netherlands	1	0.2%
Poland	1	0.2%
Portugal	7	1.7%
Russian Federation	1	0.2%
Spain	1	0.2%
Sweden	4	1.0%
Switzerland	2	0.5%
United Kingdom of Great Britain and Northern Ireland	287	70.2%
United States of America	3	0.7%

6.3 Women's medication experience

An unexpected proportion of women paid for their prescription medication (22%) and a significant number of women (27%) took a medication for a medical condition prior to becoming pregnant. The medical conditions included are listed in Table 6.3. Women reported a wide range of conditions and there was a recognised high number of women with asthma (24%), depression (14%) and thyroid conditions (12%).

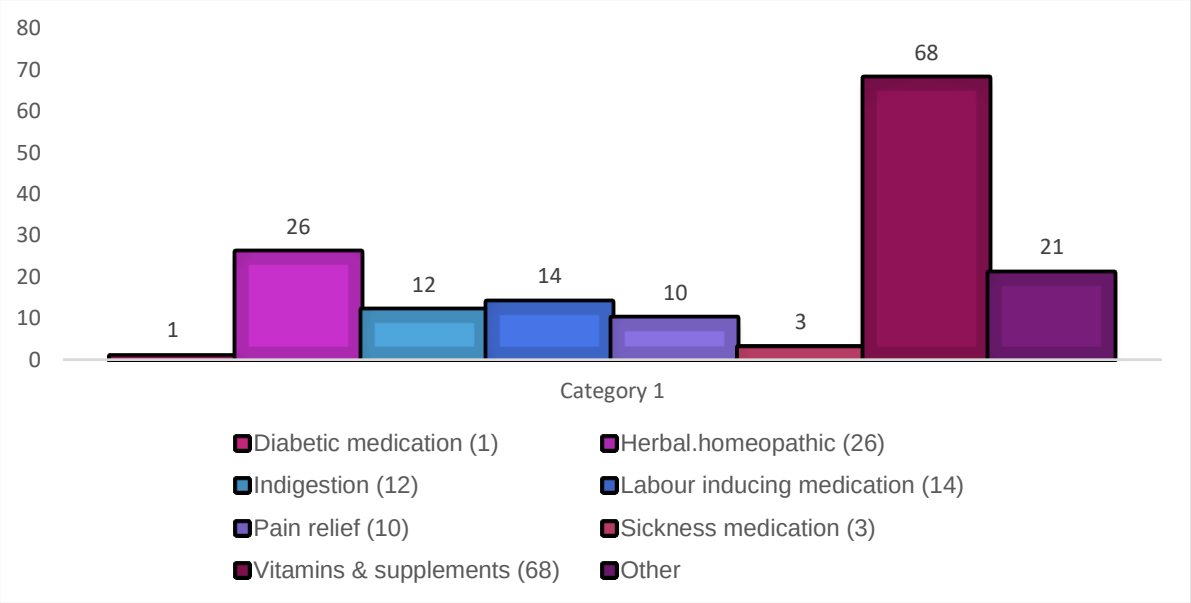
Table 6.3: Medical conditions women took medication for prior to becoming pregnant

Medical conditions	Frequency	Percentage
Acne	2	1.9%
Acid reflux	5	4.75%
Attention Deficit and Hyperactivity Disorder (ADHD)	2	1.9%
Allergies	5	4.75%
Anxiety	5	4.75%
Ankylosing spondylitis	1	0.95%
Asthma	25	23.75% **
Bipolar	2	1.9%
B12 deficiency	3	2.85%
Chronic Pain	3	2.85%
Constipation	2	1.9%
Depression	15	14.25% **
Diabetes	3	2.85%
Eczema	1	0.95%
Epilepsy	3	2.85%
Fibromyalgia	1	0.95%
Gallstones	1	0.95%
Hyperlipidaemia	1	0.95%
Hypertension	2	1.9%
IBS	3	2.85%
Low mood	1	0.95%
Migraine	3	2.85%
Multiple Sclerosis	1	0.95%
Non-specific blood clotting disorder	1	0.95%
Polycystic Ovarian Syndrome (PCOS)	1	0.95%
Thyroid conditions	13	12.35% **
Ulcerative colitis	3	2.85%
Urinary Tract Infection (UTI)	2	1.9%

6.4 Women's online medication purchasing experience

Overall, n=96 women (24%) had purchased medications online during pregnancy. The women who had previously purchased medication online did so to obtain diabetic medication, herbal/homeopathic medication, indigestion medication, labour inducing medication, pain relief, sickness medication and vitamins and supplements. (See Figure 6.1 below). The main medications women purchased were vitamins and supplements, herbal and homeopathic medications. With significant representation on purchasing for labour inducing medication, indigestion medication and pain relief.

Figure 6.1: Types of medication purchased online during pregnancy



When asked for more detail some women provided the exact medication purchased under each medication category as shown in the table 6.4 below.

Table 6.4: Specific medications purchased online by women during pregnancy

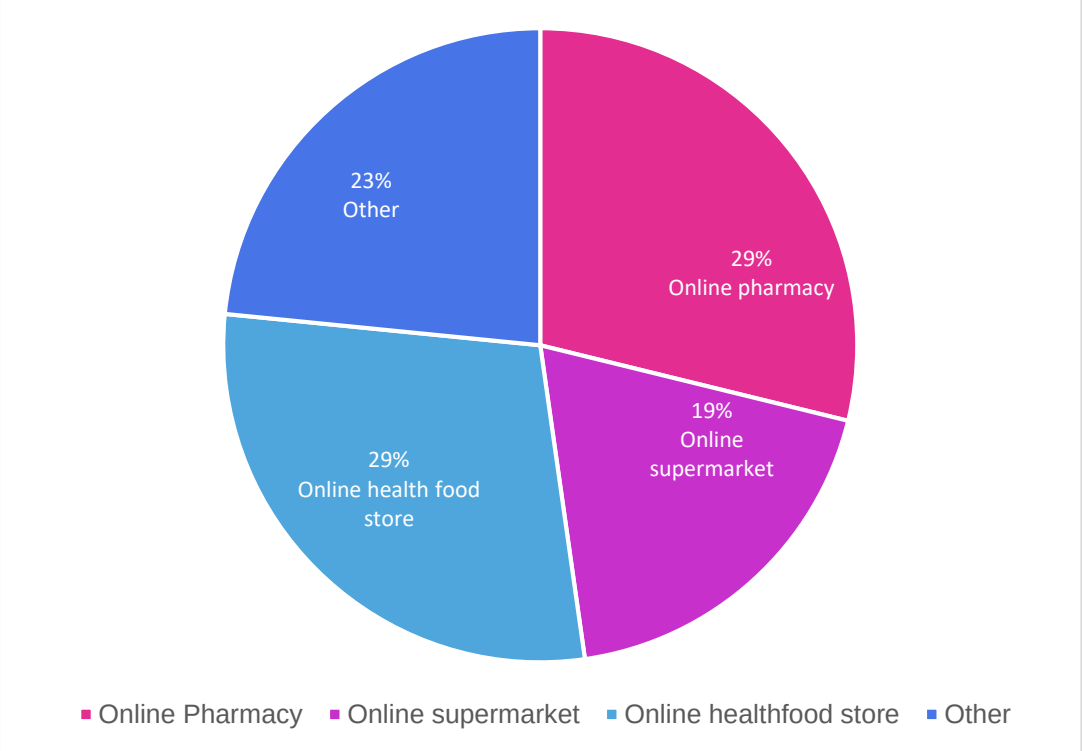
Diabetic medication	Herbal/Homeopathic	Indigestion	Labour inducing medication	Pain relief	Sickness medication	Vitamins and Supplements	Other
**Metaformin	Raspberry leaf tea Evening oil of Primrose Garlic capsules Ginseng Pentax peppermint liquid Peppermint oil Arnica Chamomile	**Ranitidine Gaviscon Rennies	Raspberry leaf capsules/tea Castor oil	Paracetamol **Lidocaine cream **Anusol Aspirin **Emla cream	**Cyclizine **Ondansetron	Pregnacare Foliate Folic Acid Calcium Magnesium Vit D Omega 3 Chromium Iodine Vit B12 Blue iron Vit D3 Bio Kult & Optibac Probiotics Floradix Cytoplan Galfer syrup Hair vitamins	**Progesterone Cream **Fluconazole **Canestan Moxibustion **Aciclovir

None of the women chose options for purchasing alcohol, antibiotics, depression/anxiety medication or recreational drugs. However, one woman had purchased a Grp B Strep testing kit online. The medications that women had purchased in the study were reviewed by an independent pharmacist (Appendix 23) who highlighted concerns that some of the medications listed would not be recommended for pregnancy or without medical prescription or guidance (See ** highlighted in red Table 6.4).

6.5 Online sources for purchasing medication online

Women purchased medication from a range of sources with most buying from an online pharmacy (29%), online health food store (29%) or a supermarket (19%). Other websites women purchased from were Amazon, Zita West fertility clinic, eBay, Laborite and brand own websites (See Figure 6.2 below).

Figure 6.2: Types of retailer medication purchased online during pregnancy



The majority of women who had purchased medication online said they received the product (n=93, 97%), and deemed it was of good quality (n=90, 94%). A large proportion said they would purchase medication online again in the future (n=83, 86%).

6.6 TPB: Direct and indirect (belief based) measures used in the survey

The survey collected data for both the direct and indirect measurements of the constructs of the TPB as these approaches assume different underlying cognitive features. By using direct and indirect methods to measure the same construct, scores are expected to be positively correlated, as such Francis et al., (2004) recommend both are included in TPB surveys.

6.6.1 Attitude (Direct Measurement)

Women's attitudes demonstrated awareness of the potential dangers of online purchasing, believing it was unsafe (n=273, 67%) and over half opting for 'harmful' response (n=229, 56%). A significant proportion of women were unsure if online purchasing cheaper (n=157, 40%), however two thirds felt it was convenient (n=272, 67%) (See Table 6.5 below).

Table 6.5: Frequency table for the direct measurement of Attitude to online purchasing, including risks

Purchasing medication online is….	1	2	3	4	5	6	7
Unsafe-Safe	161 (39.4%)	49 (12%)	63 (15.4%)	63 (15.4%)	31 (7.6%)	20 (4.9%)	22 (5.4%)
Inconvenient-Convenient	41 (10%)	18 (4.4%)	22 (5.4%)	56 (13.7%)	53 (13%)	72 (17.6%)	147 (35.9%)
Harmful-Beneficial	93 (22.7%)	54 (13.2%)	82 (20%)	96 (23.5%)	32 (7.8%)	21 (5.1%)	31 (7.6%)
Expensive- Not expensive	28 (6.8%)	31 (7.6%)	31 (7.6%)	162 (39.6%)	64 (15.6%)	49 (12%)	44 (10.8%)

6.6.2 Attitude (Indirect measurement): Measuring behavioural beliefs

The majority of women would not consider purchasing medications from the internet while pregnant or if they could not obtain medication from their local pharmacy or doctor (n= 248, 61%). Two thirds of women (n=259, 63%) agreed or strongly agreed they would not purchase medication online as they did not know the difference between a fake and legal internet pharmacy. However, almost a quarter of women strongly agreed or agreed that they would purchase medication online if it was cheaper (n=101, 25%). A small of women believed it was safer to purchase online (n= 49,12%). However, the vast majority stated they would not purchase medication from the internet because they would be concerned it may cause harm to their unborn baby (n=290, 71%) and again the majority indicated purchasing medication online made them feel uncomfortable (n=283, 69%). Privacy was not perceived to be a major concern with only 21% (n=87) stating this was important (See Table 6.6 below).

Table 6.6: Frequency table for the indirect measurement of Attitude: Measuring behavioural beliefs

Attitude (Indirect Measurement)	Strongly disagree	Disagree	Neither agree or disagree	Somewhat agree	Strongly agree
I would consider purchasing medications from the internet while pregnant	165 (40.3%)	86 (21%)	48 (11.7%)	86 (21%)	24 (5.9%)
I would purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor	145 (35.5%)	103 (25.2%)	48 (11.7%)	90 (22%)	23 (5.6%)
I would not purchase a medication from the internet because I do not know the difference between a fake and legal internet pharmacy	27 (6.6%)	65 (15.9%)	58 (14.2%)	113 (27.6%)	146 (35.7%)
I would purchase a medication from the internet if it was cheaper	137 (33.5%)	109 (26.7%)	62 (15.2%)	84 (20.5%)	17 (4.2%)
I would not purchase a medication from the internet because I would be concerned that the medication may not be of the same quality as the medication obtained from a local pharmacy	12 (2.9%)	60 (14.7%)	61 (14.9%)	126 (30.8%)	150 (36.7%)
Buying medications from the internet is safe	104 (25.4%)	137 (33.5%)	119 (29.1%)	45 (11%)	4 (1%)
I would not purchase a medication from the internet because I would be concerned it may cause harm to my unborn baby	7 (1.7%)	56 (13.7%)	56 (13.7%)	113 (27.6%)	177 (43.3%)
The thought of purchasing medications from the internet while pregnant would make me feel uncomfortable	17 (4.2%)	62 (15.2%)	47 (11.5%)	130 (31.8%)	153 (37.4%)
I would be concerned that my financial privacy might not be adequately protected if I bought medication from the internet	46 (11.2%)	142 (34.7%)	134 (32.8%)	65 (15.9%)	22 (5.4%)

6.6.3 Attitude (Indirect measurement): Measuring outcome evaluations

Women's attitudes towards purchasing demonstrated a positive response to purchasing medication that would not harm their baby (n=299, 73%) and it would be of the same quality as that obtained from their pharmacy (n=288, 70%) and safe (n=288, 70%). The overwhelming factor was the need to be able to tell the difference between fake and legal pharmacy (n=351, 86%). However, only a small number of women (n= 13, 3.2%) thought being able to purchase medications from the internet was strongly desirable with over two

thirds being uncomfortable with purchasing medications from the internet while pregnant. Women also highly rated the need for online financial privacy being protected (n=333, 81%). (See Table 6.7 below).

Table 6.7: Frequency table for the indirect measurement of Attitude: Measuring outcome evaluations

Attitude (Indirect Measurement)	Extremely undesirable	Undesirable	Neither desirable or undesirable	Somewhat desirable	Strongly desirable
Being able to purchase medications from the internet while pregnant is:	98 (24%)	97 (23.7%)	119 (29.1%)	82 (20%)	13 (3.2%)
Being able to purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor is:	95 (23.2%)	97 (23.7%)	81 (19.8%)	110 (26.9%)	26 (6.4%)
Knowing the difference between a fake and legal internet pharmacy is:	14 (3.4%)	8 (2.0%)	36 (8.8%)	102 (24.9%)	249 (60.9%)
Being able to purchase a medication cheaper from the internet is:	54 (13.2%)	51 (12.5%)	105 (25.7%)	150 (36.7%)	49 (12%)
Purchasing a medication from the internet of the same quality as that obtained from a local pharmacy is:	29 (7.1%)	15 (3.7%)	77 (18.8%)	130 (31.8%)	158 (38.6%)
Buying medications from the internet that are safe to take is:	28 (6.8%)	21 (5.1%)	73 (17.8%)	141 (34.5%)	146 (35.7%)
Being able to purchase a medication from the internet that will not harm my baby is:	28 (6.8%)	18 (4.4%)	64 (15.65)	126 (30.8%)	173 (42.3%)
Being comfortable with purchasing medications from the internet while pregnant is:	38 (9.3%)	37 (9.0%)	85 (20.8%)	138 (33.7%)	111 (27.1%)
Having my financial privacy adequately protected if I bought medication from the internet during pregnancy is:	11 (2.7%)	9 (2.2%)	56 (13.7%)	135 (33%)	198 (48.4%)

6.6.4 Subjective Norm (Direct Measurement)

Survey responses for the direct measurement of subjective norm demonstrated 60% (n=245) of women believed their family would not be happy with them purchasing medication online. Most women would not be influenced to purchase online by the behaviour of friends (n=262, 64%) and

they did not feel pressurized by friends to do so (n=377, 92%). (See Table 6.8 below).

Table 6.8: Frequency table for the direct measurement of subjective norm

Subjective Norm (Direct Measurement)	Strongly disagree	Disagree	Neither agree or disagree	Somewhat agree	Strongly agree
My family would be okay with me purchasing medication online during pregnancy	151 (36.9%)	94 (23%)	77 (18.8%)	65 (15.9%)	22 (5.4%)
Friends purchase medications online and therefore I would feel safe enough to follow their behaviour	171 (41.8%)	91 (22.2%)	95 (23.2%)	45 (11%)	7 (1.7%)
I feel under pressure to purchase medications online	333 (81.4%)	44 (10.8%)	26 (6.4%)	4 (1%)	2 (0.5%)
People who are important to me would be very unhappy if I purchase medication online during pregnancy	57 (13.9%)	72 (17.6%)	92 (22.5%)	80 (19.6%)	108 (26.4%)

6.6.5 Subjective Norm (Indirect Measurement): Measuring normative beliefs and motivation to comply

Friends and family influenced women in different ways. Women felt their friends and family would not approve of them purchasing medication online (n=248, 60%), however they were not influenced by social pressure to purchase (n=371, 87%). This demonstrates women are aware of other's perceptions but not influenced by them in online purchasing. When measuring motivation to comply in the subjective norm construct women felt strongly their friends and family approval was important (n=262, 64%), as well as what doctors and midwives think they should do (n=352, 86%). Doing what other pregnant women do was less important to women (n=232, 56%) but relevant to over half of the women. (See Table 6.9 below).

Table 6.9: Frequency table for the indirect measurement of subjective norm: Measuring normative beliefs and motivation to comply

Subjective Norm (Indirect Measurement)	1	2	3	4	5	6	7
My friends and family think I should/should not purchase medication online during pregnancy	173 (42.3%)	46 (11.2%)	29 (7.1%)	113 (27.6%)	18 (4.4%)	16 (3.9%)	14 (3.4%)
Doctors and midwives would approve/disapprove of me purchasing medication online during pregnancy	211 (51.6%)	51 (12.5%)	32 (7.8%)	74 (18.1%)	11 (2.7%)	9 (2.2%)	21 (5.1%)
I feel under social pressure to purchase medication online during pregnancy	283 (69.2%)	75 (18.3%)	13 (3.2%)	34 (8.3%)	2 (0.5%)	2 (0.5%)	0 (0%)
Friends and family approval is important to me	42 (10.3%)	31 (7.6%)	30 (7.3%)	44 (10.8%)	82 (20%)	73 (17.8%)	107 (26.2%)
What doctors and midwives think I should do matters to me	8 (2.0%)	5 (1.2%)	16 (3.9%)	28 (6.8%)	54 (13.2%)	104 (25.4%)	194 (47.4%)
Doing what other pregnant women do is important to me	127 (31.1%)	56 (13.7%)	49 (12%)	94 (23%)	53 (13%)	17 (4.2%)	13 (3.2%)

6.6.6 Perceived Behavioural Control (Direct Measurement)

Less than a third of women felt confident using the internet to purchase medication online during pregnancy (n=128, 31%). The majority of women indicated a lack of skill in online purchasing (n=259, 63%). However, those who had previously purchased online demonstrated an increased level of confidence (n=185, 45%). (See Table 6.10 below).

Table 6.10: Frequency table for the direct measurement of Perceived Behavioural Control

Perceived Behavioural Control (Direct Measurement)	Strongly disagree	Disagree	Neither agree or disagree	Somewhat agree	Strongly agree
I am confident I can use the internet to purchase medication online during pregnancy	115 (28.1%)	81(19.8%)	85 (20.8%)	92 (22.5%)	36 (8.8%)
I do not have the skills to purchase medications online	40 (9.8%)	53 (13%)	57 (13.9%)	96 (23.5%)	163(39.9%)
My previous experience of online purchasing gives me confidence	37 (9%)	53 (13%)	134 (32.8%)	124 (30.3%)	61 (14.9%)

6.6.7 Perceived Behavioural Control (Indirect Measurement): Measuring control beliefs and the influence of control beliefs

Survey responses for the indirect measurement of perceived behavioural control, measuring control beliefs found almost three quarters (n=303, 74%) of women found it unlikely women would have difficulty navigating websites to purchase medication online with 13% (n=52) of pregnant women getting frustrated trying to purchase medication online. Only a third (n=138, 34%) thought it was difficult to determine the quality of the website they were using, with 36% (n=145) unsure if the information provided on purchasing sites is difficult to understand or not.

When measuring the influence of control beliefs women were more likely to have difficulty navigating websites (n=331, 81%) when purchasing medication online and more likely to get frustrated (n=312, 76%). There was a fairly even split in the numbers of women who were likely or unlikely having difficulty determining the quality of the website they were using to purchase medication online, with over half of the women being unlikely to have difficulty understanding the information on the purchasing website (n=230, 56%). (See Table 6.11 below).

Table 6.11: Frequency table for the indirect measurement of Perceived Behavioural Control: Measuring Control Beliefs and the influence of control beliefs

PBC (Indirect measurement)	1	2	3	4	5	6	7
Pregnant women find it difficult to navigate websites to purchase medication online	202 (49.4%)	60 (14.7%)	41 (10%)	60 (14.7%)	21 (5.1%)	9 (2.2%)	16 (3.9%)
Pregnant women get frustrated trying to purchase medication online	161 (39.4%)	52 (12.7%)	43 (10.5%)	101 (24.7%)	22 (5.4%)	13 (3.2%)	17 (4.2%)
Pregnant women find difficulty determining the quality of the website they are using	73 (17.8%)	33 (8.1%)	32 (7.8%)	81 (19.8%)	53 (13%)	54 (13.2%)	83 (20.3%)
The information provided on the purchasing site is difficult to understand	68 (16.6%)	35 (8.6%)	46 (11.2%)	145 (35.5%)	51 (12.5%)	31 (7.6%)	33 (8.1%)
When purchasing medication online I am unlikely/likely to have difficulty navigating websites	1 (0.2%)	0 (0%)	2 (0.5%)	75 (18.3%)	196 (47.9%)	80 (19.6%)	55 (13.4%)
I am unlikely/likely to get frustrated purchasing medication online	1 (0.2%)	0 (0%)	2 (0.5%)	94 (23%)	165 (40.3%)	89 (21.8%)	58 (14.2%)
I am unlikely/likely to have difficulty determining the quality of the website I am using to purchase medication	81 (19.8%)	51 (12.5%)	46 (11.2%)	70 (17.1%)	38 (9.3%)	44 (10.8%)	79 (19.3%)
I am unlikely/likely to have difficulty understanding the information on the purchasing website	108 (26.4%)	77 (18.8%)	45 (11%)	95 (23.2%)	32 (7.8%)	20 (4.9%)	32 (7.8%)

6.6.8 Measurement of Purchase Intention

Two thirds of women had an issue with purchase medication online during pregnancy (n=245, 60%) and almost half of the women found online purchasing to be easy (n=202, 49%). However only 27% (n=110) would purchase online if it was cheaper. Only 22% (n=88) of women intended to purchase medication online as they thought it was safe. (See Table 6.12 below).

Table 6.12: Frequency table for purchase intention

Purchase Intention	Strongly disagree	Disagree	Neither agree or disagree	Somewhat agree	Strongly agree
I have no issue with purchasing medication online during pregnancy	144 (35.2%)	101 (24.7%)	68 (16.6%)	60 (14.7%)	36 (8.8%)
I will purchase medication online during pregnancy if it is cheaper	145 (35.5%)	88 (21.5%)	66 (16.1%)	72 (17.6%)	38 (9.3%)
I intend to purchase medication online during pregnancy as I think it is safe	161 (39.4%)	89 (21.8%)	71 (17.4%)	59 (14.4%)	29 (7.1%)
Purchasing medication online is very easy	19 (4.6%)	25 (6.1%)	163 (39.9%)	126 (30.8%)	76 (18.6%)

6.6.9 Skewness and kurtosis values of the constructs of the TPB

Descriptive statistical analysis was carried out on the sample to provide information regarding the distribution of scores on the continuous variables categorized as skewness and kurtosis. Pallant (2016) comments skewness values provide an indication of the symmetry of the distribution, where kurtosis values provide information about the 'peakedness' of the distribution.

The scores were calculated for the items in the constructs of the Theory of Planned Behaviour (See Table 6.13). The skewness values for the direct and indirect constructs of Attitude demonstrate all items were within the +/- 2 range. One of the items 'Knowing the difference between a fake and legal internet pharmacy is', had kurtosis scores which exceeded +/-2, however the skewness score was satisfactory.

The skewness and kurtosis values for the direct and indirect constructs of the TPB demonstrate items were in the range of +/-2 apart from the item 'I feel under pressure to purchase medications online'. This item had a high

skewness and kurtosis value indicating the majority of responses were scored low. These scores were at item level but combined at construct level, as such the values were noted, but no change was made to the survey. Items ‘I feel under social pressure to purchase medication online during pregnancy’ and ‘What doctors and midwives think I should do matters to me’ had scores that exceed the +/-2 range for kurtosis, however the skewness score was satisfactory (See Table 6.14).

The skewness and kurtosis values for the direct and indirect constructs of perceived behavioural control and purchase intention demonstrated values that were satisfactory and within the +/-2 range (See Table 6.15 and 6.16).

Table 6.13: Skewness and kurtosis of the Attitude (Direct and Indirect) construct of TPB

Item	Mean	Std. Deviation	Skewness	Kurtosis
Attitude-Direct Measurement				
Purchasing medication online during pregnancy is: - Unsafe: Safe	2.76	1.85	.76	-.49
Purchasing medication online during pregnancy is: - Inconvenient: Convenient	5.12	1.99	-.83	-.50
Purchasing medication online during pregnancy is: - Harmful: Beneficial	3.26	1.79	.46	-.57
Purchasing medication online during pregnancy is: - Expensive: Not expensive	4.29	1.59	-.18	-.28
Attitude-Indirect Measurement				
I would consider purchasing medications from the internet while pregnant	2.31	1.34	.54	-1.13
I would purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor	2.37	1.31	.48	-1.14
I would not purchase a medication from the internet because I do not know the difference between a fake and legal internet pharmacy	3.70	1.28	-.64	-.80
I would purchase a medication from the internet if it was cheaper	2.35	1.25	.46	-1.06
I would not purchase a medication from the internet because I would be concerned that the medication may not be of the same quality as the medication obtained from a local pharmacy	3.84	1.16	-.70	-.59
Buying medications from the internet is safe	2.29	.99	.31	-.70
I would not purchase a medication from the internet because I would be concerned it may cause harm to my unborn baby	3.97	1.13	-.80	-.51
The thought of purchasing medications from the internet while pregnant would make me feel uncomfortable	3.83	1.20	-.78	-.52
I would be concerned that my financial privacy might not be adequately protected if I bought medication from the internet	2.69	1.04	.32	-.41
*Being able to purchase medications from the internet while pregnant is…	2.55	1.15	.12	-1.01
Being able to purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor is:	2.69	1.27	.087	-1.21
Knowing the difference between a fake and legal internet pharmacy is:	4.38	.97	-1.85	**3.29
Being able to purchase a medication cheaper from the internet is:	3.22	1.21	-.47	-.71
Purchasing a medication from the internet of the same quality as that obtained from a local pharmacy is:	3.91	1.16	-1.06	.45

Buying medications from the internet that are safe to take is:	3.87	1.16	-1.01	.34
Being able to purchase a medication from the internet that will not harm my baby is:	3.97	1.17	-1.14	.55
Being comfortable with purchasing medications from the internet while pregnant is:	3.60	1.24	-.70	-.42
Having my financial privacy adequately protected if I bought medication from the internet during pregnancy is:	4.22	.95	-1.37	1.86

** Items highlighted are significant

Table 6.14: Skewness and kurtosis of the Subjective Norm (Direct and Indirect) construct of TPB

Item	Mean	Std. Deviation	Skewness	Kurtosis
Sub Norm-Direct Measurement				
My family would be okay with me purchasing medication online during pregnancy	2.30	1.26	.55	-.90
Friends purchase medications online and therefore I would feel safe enough to follow their behaviour	2.09	1.11	.611	-.74
I feel under pressure to purchase medications online	1.28	.67	**2.65	**7.34
People who are important to me would be very happy/unhappy if I purchase medication online during pregnancy	3.27	1.39	-.21	-1.20
Sub Norm-Indirect Measurement Measuring normative beliefs and motivation to comply				
My friends and family think I should/should not purchase medication online during pregnancy	2.66	1.74	.67	-.56
Doctors and midwives would approve/ disapprove of me purchasing medication online during pregnancy	2.35	1.76	1.17	.44
I feel under social pressure to purchase medication online during pregnancy	1.54	.99	1.99	**3.35
Friends and family approval is important to me	4.81	1.98	-.62	-.81
What doctors and midwives think I should do matters to me	5.94	1.39	-1.57	**2.29
Doing what other pregnant women do is important to me	2.98	1.74	.38	-.89

** Items highlighted are significant

Table 6.15: Skewness and kurtosis of the Perceived Behavioural Control (Direct and Indirect) construct of TPB

Item	Mean	Std. Deviation	Skewness	Kurtosis
PBC-Direct Measurement				
I am confident I can use the internet to purchase medication online during pregnancy	**2.64**	**1.33**	**.19**	**-1.22**
I do not have the skills to purchase medications online	**3.71**	**1.36**	**-.70**	**-.81**
My previous experience of online purchasing gives me confidence	**3.29**	**1.14**	**-.35**	**-.53**
PBC-Indirect Measurement				
Pregnant women find it difficult to navigate websites to purchase medication online	**2.34**	**1.70**	**1.15**	**.41**
Pregnant women get frustrated trying to purchase medication online	**2.70**	**1.74**	**.70**	**-.43**
Pregnant women find difficulty determining the quality of the website they are using	**4.23**	**2.11**	**-.21**	**-1.23**
The information provided on the purchasing site is difficult to understand	**3.74**	**1.74**	**.01**	**-.65**
I am likely/unlikely to have difficulty navigating websites	**5.26**	**.95**	**.19**	**.28**
I am likely/unlikely to get frustrated purchasing medication online	**5.25**	**1.01**	**.15**	**-.16**
I am likely/unlikely to have difficulty determining the quality of the website I am using to purchase	**3.93**	**2.16**	**.07**	**-1.35**
I am likely/unlikely to have difficulty understanding the information on the purchasing website	**3.13**	**1.86**	**.55**	**-.69**

Table 6.16: Skewness and kurtosis of the Purchase Intention construct of TPB

Item	Mean	Std. Deviation	Skewness	Kurtosis
Purchase Intention				
I have no issue with purchasing medication online during pregnancy	2.37	1.32	.58	-.89
I will purchase medication online during pregnancy if it is cheaper	2.44	1.37	.47	-1.10
I intend to purchase medication online during pregnancy as I think it is safe	2.28	1.31	.63	-.84
Purchasing medication online is very easy	3.53	1.01	-.38	.03

6.6.10 Measuring internal consistency of the theoretical constructs- Cronbach Alpha

The internal consistency of the direct measures of attitude, subjective norm and perceived behavioural control were assessed using the Cronbach Alpha coefficient for the survey. A Cronbach alpha level of greater than 0.6 was used to assess the reliability of the direct measurement of theoretical constructs (Ajzen 2006). As people can have positive and negative beliefs about the same behaviour, Ajzen (2006) advises an internal consistency criterion is not appropriate for the evaluation of reliability of indirect measures. This is because they are formative rather than reflective indicators of the underlying theoretical construct (Francis et al. 2004).

The Cronbach alpha scores were calculated for the direct measures of the theoretical constructs in the survey as detailed in Table 6.17 below. The values for attitude, perceived behavioural control and purchase intention had high reliabilities with Cronbach greater than 0.74. A lower value was evident for the direct measurement in the subject norm construct -0.51 indicating the items to measure the construct of subjective norm are less reliable than for the other constructs. A study by Russo et al. (2015) had similar findings with a low Cronbach alpha for the subjective norm construct using the Theory of Planned Behaviour. Schmitt (1996) has argued that reliability coefficient as low as 0.5 should not seriously weaken validity as the alpha coefficient increases with the instrument length (Millar 1995) therefore, the items in the survey should still be considered reliable to use.

Table 6.17: Cronbach Alpha values for the direct measurements of the theoretical constructs of TPB survey

TPB Construct	Cronbach Alpha
Attitude	0.76
Subjective Norm	-0.51
Perceived Behavioural Control	0.74
Purchase Intention	0.87

6.6.11 Scoring of the constructs of TPB using Francis et al. (2004) framework

In keeping with the framework used to develop the survey based on the Theory of Planned Behaviour, analysis was performed on the dataset detailed by Francis et al. (2004) to determine scores for attitude, subjective norm and perceived behavioural control that lead to the behavioural intention of purchasing medication online in pregnancy.

In some scales the wording of survey questions was reversed to limit response bias. As such the negatively worded items were reversed prior to calculating the total scores. For a breakdown of the data analysis techniques used to analyse the survey and scoring methods please refer to the table in the Appendix 24.

Scoring for behavioural beliefs: Direct construct Measurements

For the direct measures of the theoretical constructs the mean of the item scores were calculated to provide an overall construct score. The mean score for attitude was 3.86 indicating pregnant women were more likely to be in favour of purchasing medication online. The mean score for subjective norm was 2.34 indicating pregnant women were less likely to be influenced by social pressures when purchasing medication online. The mean score for perceived behavioural control was 3.21 indicating pregnant women were more likely to feel in control of purchasing medication online during pregnancy. The mean score for purchase intention was 2.65 indicating pregnant women were slightly more likely to have intention to purchase medication online.

Scoring for behavioural beliefs: Indirect construct Measurements

Indirect measures of the theoretical constructs were calculated by multiplying the individual belief components and summing the products to give an overall construct score. (See Table in Appendix 24 for the theoretical construct scores and ranges). Discussion of the findings for the constructs in this study are described in more detail below. Using this method Francis et.al. (2004) advise:

- A positive score means that the participant is in favour of the behaviour
- A negative score means that overall the participant is against the behaviour

As such interpretation of weak, moderate and strong construct values will be determined according to the range of values for each construct, with zero being a neutral point.

Attitude (Indirect Score) Range (5x+2) x9=-90 to +90

The positive score of 20.44 reflects a weak to moderate positive attitude towards purchasing medication online during pregnancy. This can be interpreted that overall, pregnant women are more likely to be in favour of purchasing medication online.

Subjective Norm (Indirect Score) Range (7x+3) x3=-63 to +63

The normative belief score of -24.13 reflects a moderate negative social pressure. This can be interpreted that overall pregnant women experiences of social pressure do not influence purchasing medication online.

PBC (Indirect Score) Range (7x+3) x4=-84 to +84)

The positive score of 6.59 reflects a weak level of positive control. This positive score means that pregnant women are more likely to feel in control of purchasing medication online during pregnancy.

The scoring for both direct and indirect measures for attitude, subjective norm and perceived behavioural control were consistent within each construct.

Skewness and kurtosis of the theoretical construct scores

The scores were calculated for the constructs of the Theory of Planned Behaviour (See Table 6.18). The skewness values for the direct and indirect constructs of Attitude and Sub Norm and the direct measurement for PBC and Purchase Intention demonstrate all constructs were in within the +/- 2 range.

The kurtosis value for the indirect measurement of PBC had kurtosis value which exceeded +/-2, however the skewness score was satisfactory.

Table 6.18: Theoretical construct scores and ranges

TPB Construct	Mean	Std. Dev	Skewness	Kurtosis	Min Values	Max Values	Range of Scores
Attitude (Direct Measurement)	3.86	1.38	0.23	-0.21	1.00	7.00	1.00-7.00
Attitude (Indirect measurement: Measuring behavioural beliefs and outcome evaluations)	20.44	21.87	-0.78	0.45	-58.00	64.00	-90 to +90
Subjective Norm (Direct measurement)	2.34	0.49	0.12	0.61	1.00	3.75	1.00-5.00
Subjective Norm (Indirect measurement: Measuring normative beliefs and motivation to comply)	-24.13	20.59	0.45	-0.32	-63.00	40.00	-63 to +63
PBC (direct measurement)	3.21	1.04	-0.26	-0.70	1.00	5.00	1.00-5.00
PBC (Indirect measurement: Measuring control beliefs and their perceived power to influence behaviour)	6.59	18.56	1.42	**3.02	-31.00	84.00	-84.00 to +84.00
Purchase Intention	2.65	1.07	0.51	-0.68	1.00	5.00	1.00-5.00

** Items highlighted are significant

6.7 Regression analysis- Analysis of variance

To further explore the relationship between the variables, stepwise multiple regression was carried out to look at the variables and identify the predictors that were significant to the theoretical constructs of the TPB in relation to purchasing medication online during pregnancy. Categories with small numbers in the variables were collapsed into smaller numbers of categories for the analysis (Pallant 2016). This was to remove outliers in the data set and ultimately prevent bias in the results.

The strongest predicting factor on all theory constructs was having previously purchased medication online during pregnancy ($R^2$0.366). Employment status and age were also highlighted as significant predictors of a direct measurement of attitude with education, having to pay for prescription medication and employment status predicting indirect measurements of attitude. Subjective norm constructs were also predicted by employment, with indirect subjective norm constructs being predicted by having pay for prescription medication. Direct measurements of PBC were also predicted by age and indirect measurements of PBC predicted by having previously taken a medication prior to becoming pregnant. Purchase intention was predicted by having previously taken a medication prior to becoming pregnant and employment status (See Table 6.19 below).

Table 6.19: Regression analysis to identify predictors to purchasing medication online during pregnancy

TPB Construct	Adjusted R^2	Distribution	Predictor	Coefficient (95% Confidence Interval)	Significance	Predictor Importance
Attitude (Direct Measurement)	0.197	Normal	Previously purchased	-1.350	0.000	0.859
			Employment	0.181	0.002	0.096
			Age	-0.288	0.033	0.045
Attitude (Indirect measurement: Measuring behavioural beliefs and outcome evaluations)	0.14	Normal	Previously Purchased	-11.209	0.000	0.335
			Education	5.272	0.000	0.310
			Pay for medication	-10.343	0.000	0.273
			Employment	2.212	0.021	2.212
Subjective Norm (Direct measurement)	0.115	Normal	Previously purchased	-0.363	0.000	0.847
			Employment	0.062	0.004	0.153
Subjective Norm (Indirect measurement: Measuring normative beliefs and motivation to comply)	0.174	Normal	Previously purchased	-19.072	0.000	0.819
			Pay for medication	-7.908	0.001	0.133
			Employment	1.851	0.036	0.048
PBC (direct measurement)	0.163	Normal	Previously purchased	-0.967	0.000	0.945
			Age	-0.218	0.036	0.055
PBC (Indirect measurement: Measuring control beliefs and their perceived power to influence behaviour)	0.062	Normal	Previously purchased	9.268	0.000	0.662
			Previously taken medication	4.731	0.030	0.162
Purchase Intention	0.366	Normal	Previously purchased	-1.477	0.000	0.896
			Pay for medication	-0.378	0.000	0.055
			Employment	0.138	0.001	0.049

6.8 Regression analysis to evaluate the TPB

A multiple regression analysis was conducted to see if attitude, subjective norm and perceived behavioural control predicts purchase intention. The multiple regression analysis aimed to answer the following questions:

1) How well do the measures of attitude, subjective norm and perceived behavioural control predict purchase intention?
2) Which is the best predictor of purchase intention?

The analysis demonstrates the constructs of attitude, subjective norm and perceive behavioural control can explain 55% of the variance in purchase intention. Of these constructs, PBC makes the largest statistically significant contribution (beta=0.422), followed by subjective norm (beta=0.287) and attitude (beta=0.254). Please see Table 6.20 below.

Table 6.20: Theoretical construct predicting factors of purchase intention

TPB Construct	Adjusted R^2	Distribution	Predictor	Coefficient (95% Confidence Interval)	Significance
Purchase Intention	**0.546**	**Normal**	**PBC** **Sub Norm** **Attitude**	**0.422** **0.287** **0.254**	**0.000** **0.000** **0.000**

6.9 Exploring the differences between groups

Once the significant predicting factors were identified for the theoretical constructs more focused inferential statistics were carried out to explore the differences between groups. Parametric testing was suitable for this data set in view of the interval scaled data used with normal distribution in scoring. Please see the table in appendix 25 for a breakdown of research questions explored using parametric statistical analysis to explore the predicting factors that were identified as statistically different in more detail.

Independent samples t-test was conducted to compare the differences between means in paired samples in groups of data (Table 6.21). ANOVA, one-way analysis of variance was used to compare the differences between means with multiple variations to explore the predicting factors on the direct and indirect measurements of attitude, subjective norm, perceived behavioural control and purchase intention. Post hoc ANOVA tests were also carried out to confirm the differences between groups following identification of a statistically significant difference in the group mean. The data in this study met the assumption of homogeneity of variances, as such Tukey honestly significant difference (HSD) post hoc test was used.

The analysis identifies there was a significant difference in the groups of women who had previously purchased medication online and the groups who had not previously purchased medication online for measurements of attitude (direct and indirect), subjective norm (direct and indirect), perceived behavioural control (direct and indirect) and purchase intention. This suggests having previously purchased medication online significantly effects purchase intention.

There was a significant difference in purchase intention, attitude (indirect) and subjective norm (indirect) in the groups of women who had to pay for prescription medication and the groups who did not pay for prescription medication. This suggests having to pay for prescription medication increases your intention to purchase medication online during pregnancy.

There was a significant difference in PBC (indirect) in the groups of women who had taken a medication for a medical condition prior to pregnancy (M=2.45; SD=15.91) and the groups who had not taken a medication for a medical condition prior to pregnancy (M=7.73; SD=19.09); t (407), p=0.018. This suggests having taken a medication for a medical condition prior to pregnancy increases your intention to purchase medication online during pregnancy.

Table 6.21: Independent t-test results that explored the differences between groups that were significant predictors of purchase intention

	Predictors	Mean	SD	t	df	Significance
Direct measures						
Attitude	Purchased Not purchased	4.90 3.54	1.49 1.17	9.31	407	0.000
Subjective Norm	Purchased Not purchased	2.51 2.15	0.45 0.46	6.78	407	0.000
PBC	Purchased Not purchased	3.96 2.98	0.84 0.99	8.75	407	0.000
Purchase intention	Purchased Not purchased Pay for prescription medication Not pay for prescription medication	3.76 2.32 2.86 2.60	0.94 0.86 0.99 1.09	14.07 2.06	407 407	0.000 0.040
Indirect measures						
Attitude	Purchased Not purchased Pay for prescription medication Not pay for prescription medication	29.33 17.71 28.47 18.17	14.86 22.95 20.24 21.81	4.67 4.02	407 407	0.000 0.000
Sub Norm	Purchased Not purchased Pay for prescription medication Not pay for prescription medication	-10.10 -28.43 -19.11 -25.54	18.10 19.38 18.83 20.87	8.234 2.635	407 407	0.000 0.009
PBC	Purchased Not purchased Previously taken medication for medical condition Not previously taken a medication for a previous condition	-0.81 8.86 2.45 7.73	12.17 19.58 15.91 19.09	-4.58 -2.37	407 407	0.000 0.018

A one-way between subject ANOVA was also conducted to compare the effects of employment on attitude (direct and indirect), subjective norm (direct and indirect) and purchase intention (Table 6.22). There was a significant effect identified between the four employment groupings on direct measurements of attitude ($F(4,404) = 2.797$, $p=0.026$), indirect measurements of attitude ($F(404, 4) = 2.49$, $p=0.04$), direct measurements of subjective norm ($F(404, 4) = 5.35$, $p=0.000$), indirect measurements of subjective norm ($F(404, 4) = 2.91$, $p=0.021$) and purchase intention ($F(404, 4) = 4.328$, $p=0.002$).

Post hoc test comparison for employment and the direct measurement of attitude using the Tukey HSD test indicated the mean score for 'other' employment options ($M=4.59$, $SD=1.41$) was significantly different to full-time ($M=3.83$, $SD=3.69$), part-time ($M=3.69$, $SD=3.69$), self-employed ($M=3.84$, $SD=1.53$).

Comparison for employment and the indirect measurement of attitude using the Tukey HSD test indicated the mean score for 'other' employment options ($M=28.61$, $SD=22.44$) and 'unemployed' ($M=22.36$, $SD=25.85$) was significantly different to full-time ($M=21.04$, $SD=21.55$), part-time ($M=16.00$, $SD=19.26$), self-employed ($M=13.94$, $SD=26.75$).

Comparison for employment and the direct measurement of subjective norm using the Tukey HSD test indicated the mean score for 'other' employment options ($M=2.55$, $SD=0.48$) was significantly different to full-time ($M=2.18$,

SD=0.48), part-time (M=2.27, SD=0.48), ‘unemployed’ (M=2.35, SD=0.37) and self-employed (M=2.13, SD=0.43).

Comparison for employment and the indirect measurement of subjective norm using the Tukey HSD test indicated the mean score for ‘other’ employment options (M=-14.61, SD=20.76) and ‘unemployed’ (M=-19.57, SD=20.07) was significantly different to full-time (M=-26.30, SD=18.84), part-time (M=-23.07, SD=20.58), and self-employed (M=-23.38, SD=24.84).

Comparison for employment and purchase intention using the Tukey HSD test indicated the mean score for ‘other’ employment options (M=3.33, SD=1.02) was significantly different to full-time (M=2.57, SD=1.01), part-time (M=2.59, SD=1.15), ‘unemployed’ (M=2.89, SD=1.01) and self-employed (M=2.44, SD=1.21).

The ‘other’ grouping included students, stay at home mums or women who said they were currently on maternity leave or carers for other family dependents. Overall these findings suggest that being unemployed, students, stay at home mums, being on maternity leave or carers for other family dependents are factors that make you more likely to purchase medication online.

A comparison for age and direct measurement for attitude and indirect measurement for perceived behavioural control indicated a mean difference

in the 25-34yrs age grouping compared to the 18-24 yrs. and 35yrs and over group. However, this was not significant.

Comparison for education and the indirect measurement of attitude using the Tukey HSD test indicated the mean score for was significantly different between post graduate degree (M=24.04, SD=18.70) and undergraduate degree (M=22.27, SD=19.81) than for having attended a Grammar/Secondary/High School (M=10.70, SD=28.34) or Technical college/Diploma (M=6.38, SD=27.89). The ‘other’ option for this category was also significantly different (M=28.92, SD=12.10) and included women who had professional qualifications such as accountancy, law and dietetics that would have required third level education. This would indicate having third level education or higher is an indirect attitude factor that increases your intention to purchase medications online during pregnancy.

Table 6.22: ANOVA post hoc test results

Measures	Predictors	Mean	SD	df	F	Significance Between groups
Attitude Direct						
Employment	Full-time Part-time Unemployed Self employed Other	3.83 3.69 3.71 3.84 4.59	1.41 1.31 1.52 1.53 1.41	Between groups 4 Within groups 404	2.80	0.026
Age group	18-24yrs 25-34yrs 35yrs and over	4.00 3.75 4.07	1.29 1.32 1.49	Between group 2 Within group 406	2.32	0.10 **
Attitude Indirect						
Education	Grammar/Secondary/High School Technical college/Diploma Undergraduate degree Post graduate degree Other	10.70 6.38 22.27 24.04 28.92	28.34 27.89 19.81 18.70 12.10	Between groups 4 Within groups 404	8.83	0.000
Employment	Full-time Part-time Unemployed Self employed Other	21.04 16.00 22.36 13.94 28.61	21.55 19.26 25.85 26.75 22.44	Between groups 4 Within groups 404	2.49	0.04
Sub Norm Direct						
Employment	Full-time Part-time Unemployed Self employed Other	2.18 2.27 2.35 2.13 2.55	0.48 0.48 0.37 0.43 0.48	Between groups 4 Within groups 404	5.35	0.000
Sub Norm Indirect						
Employment	Full-time Part-time Unemployed Self employed Other	-26.30 -23.07 -19.57 -23.38 -14.61	18.84 20.58 20.07 24.84 20.76	Between groups 4 Within groups 404	2.91	0.021
PBC Direct						
Age	18-24yrs 25-34yrs 35yrs and over	3.19 3.14 3.39	1.24 0.99 1.10	Between groups 2 Within groups 406	2.36	0.10 **
Purchase intention						
Employment	Full-time Part-time Unemployed Self employed Other	2.57 2.59 2.89 2.44 3.33	1.01 1.15 1.01 1.21 1.02	Between groups 4 Within groups 404	4.328	0.002

** No significance found between groups when more sensitive inferential statistics carried out.

6.10 Key findings for the survey

The findings from the survey have demonstrated women were more likely to be in favour of purchasing medication online and be less influenced by social pressures when making their choices. Feeling in control was important to women.

The strongest predicting factor of online purchasing during pregnancy is if a woman has previously purchased medication online, had to pay for prescription, taken a medication for a medical condition prior to pregnancy or you are unemployed, a student, stay at home mum, on maternity leave or a carer for other family dependents you more likely to purchase medication online during pregnancy. Having third level education is an indirect attitude factor that increases your intention to purchase medications online during pregnancy.

In relation to the Theory of Planned Behaviour the survey results demonstrate the constructs of attitude, subjective norm and perceive behavioural control can strongly explain 55% of the variance in purchase intention. The strongest theoretical construct predictor of purchase intention is perceived behavioural control followed by subjective norm and attitude.

Chapter 7 - Results-Phase 2 Online focus groups on Facebook

This chapter presents the findings from phase 2, online focus groups using the social media platform Facebook. The purpose of the focus groups was to gain a deeper understanding of women's online medication purchasing behaviour in pregnancy and to build on the knowledge obtained from completion of the online survey.

From the online survey a total of 132 women consented to be contacted to participate in the online focus groups. The women were divided into 2 groups; those who had purchased medication online and those who had not. Each woman was allocated a participant number and a randomly allocated to groups using random number generator software. Women were sent an email invitation with a participant information sheet (PIS) to participate in phase 2 focus groups. Initially 12 women were sent email invites for each grouping with the expectation of recruiting 8-10 people to participate in each group. However, initial invitations to join the focus groups did not recruit the minimum participants of (n=6) for each group. Therefore, a further n=5 potential participants were randomly selected and invited to join each group until the minimum number of participants were recruited. Women were added to the groups on a first come first served basis.

7.1 Demographic characteristics of the sample

The participants were recruited into 3 focus groups for phase 2 of the study.

Group 1: Women who had purchased medication online during pregnancy (n=9)

Group 2: Women who had not purchased medication online during pregnancy (n=8)

Group 3: A mixed group of women who had/had not purchased medication online during pregnancy (n=6)

This provided a range of views and experiences of pregnant women purchasing medication online and would allow a comparison of how women who do purchase may possibly vary from those who do not. The purpose of the mixed group was to enhance the data collected and enhance the discussion in the groups.

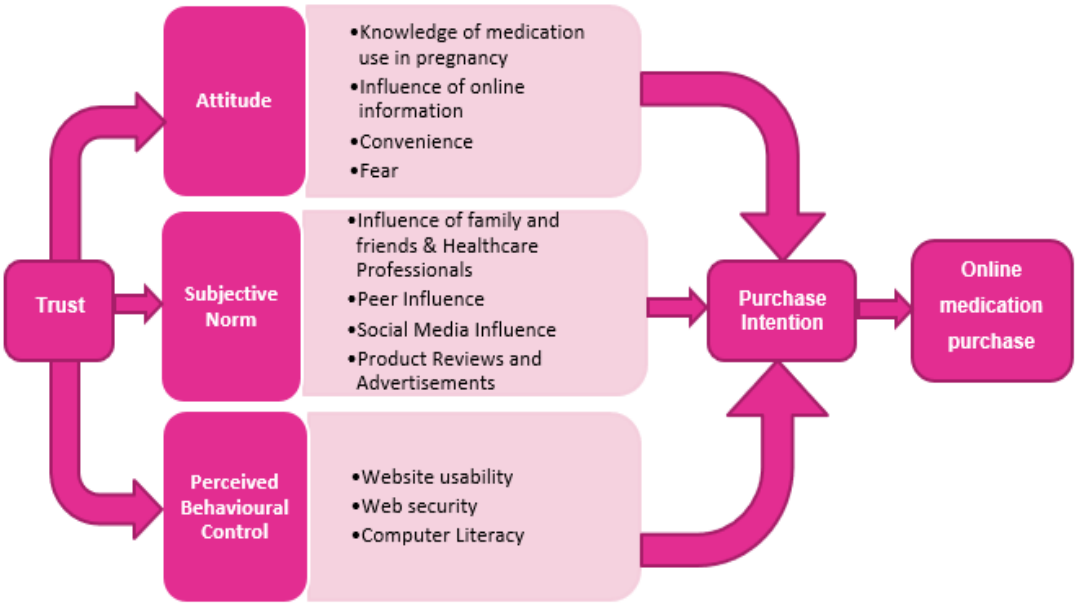
Women from six different countries participated in the study. The age ranged from 25-45yrs and the majority (n=15, 65%) were employed full-time, with almost everyone educated to degree level (n=22, 95.7%) (See Table 7.1). Less than a quarter of the women who took part (n=5, 21.7%) paid for prescription medications during pregnancy and 30.3% (n=7) of the sample took medications for a medical condition prior to becoming pregnant. Medical conditions described by women included asthma, bipolar disorder, diabetes, hyperlipidaemia, hypertension, polycystic ovarian syndrome and stomach ulcer. Ten women (43%) had previously purchased medication or herbal supplements online during pregnancy.

Table 7.1: Demographic characteristics of the sample

Measures	Predictors	Frequency	Percentage
Age group	25-34yrs	12	52.2%
	35-44yrs	11	47.8%
Education	Technical college/Diploma	1	4.3%
	Undergraduate degree	12	52.2%
	Post graduate degree	10	43.5%
Employment	Full-time	15	65.2%
	Part-time	4	17.4%
	Unemployed	1	4.3%
	Student full time	2	8.7%
	Other	1	4.3%
Country	Australia	2	8.7%
	Canada	1	4.3%
	Ireland	2	8.7%
	Portugal	1	4.3%
	Sweden	1	4.3%
	UK and Northern Ireland	16	69.6%

Themes and subthemes were identified from the data and mapped to the Theory of Planned Behaviour. These core themes and subthemes are evidenced throughout the chapter by quotations. Please see Figure 7.1.

Figure 7.1: Themes and subthemes mapped to the Theory of Planned Behaviour



7.2 Attitude

7.2.1 Knowledge of medication use in pregnancy

Women across all groups identified a lack of knowledge about medication safety in general:

> *This is my second pregnancy and I haven't had any conversations with a HCP about medications in general to be honest, let alone online purchasing.* FG1 200-202 P9

Women in the mixed focus group reported searching for information and purchasing homeopathic medications online:

> *I think there definitely is a growth in a holistic approach to many illnesses, which will lead to people researching a more natural approach to whatever and buying vitamins / supplements etc. I would be confident in ordering whatever from a chemist, such as the ones previously mentioned, online.* FG3 78-84 P3

Previous knowledge of taking medication prior to pregnancy was considered to affect purchase of medication online. Some common over the counter (OTC) medications that women buy, such as medication for candida, are no longer available for pregnant women without prescription. Women in this situation commented they would purchase online.

7.2.2 Influence of online information on medication use in pregnancy

Women indicated a lack of basic information on safe medication consumption during pregnancy and a lack of understanding of the safety of online purchasing. Women in this study identified, health/medical websites as reputable and they would use their advice to assist with decision-making, self-diagnosis and self-medication:

> *I wouldn't think to prefer an independent medical source; I would just try to find sites that look official (an organization or science-y or government)* FG2 245-247 P5

A common pattern of behaviour was described when women searched for information on common ailments and found themselves getting redirected to pharmacy websites to purchase medications:

> *Google symptoms such as "restless legs" or whatever, and being led to a reputable pharmacy which sells something to resolve or alleviate the problem.* FG3 61-62 P3

7.2.3 Convenience of purchasing medication online during pregnancy

Convenience is a key factor in purchasing behaviour:

> *Yes, convenience! Especially if you have morning sickness/other children, etc. Also, it could be perhaps a little easier to compare brands and prices while in the comfort of your own home instead of*

having to stand & look at your options while probably fairly tired.
FG2 66-70 P5

Pregnant women stated cost-effectiveness, special offers, price, price comparison, time-efficiency and the availability of more product options as being strong predictive factors influencing their behaviour:

I think it's cheaper and convenience that and u can just easily go online if u know what u want and have it delivered to your door the next day if u use Amazon Prime or something like that.
FG1 73-75 P7

Other aspects of convenience were 24hrs accessibility, optional delivery times, the ability to purchase medications as part of the weekly grocery shop and a reduction in effort required to go to a GP whilst feeling unwell:

I can never be bothered to make a doc appointment for something like meds just easier to go online and buy! I had to take aspirin in pregnancy and used to buy with my Tesco groceries online for 30p! Also I believe we should pay for meds like that which cost the nhs £1000 but we can buy for so little else where! Also when I was on 'bedrest' for 10 wks. it was very handy to get my meds delivered to my door! FG1 106-113 P7

Several women highlighted the lack of availability of timely GP appointments and the strain on GP services as contributing to purchasing medication online as a convenient solution.

Convenience, plus there is no need to make an appointment with your GP. Well it takes a couple of weeks to get an appointment in our surgery FG1 66, 71 P6

Women have also identified purchasing medications online would definitely be an option to consider if they did not receive medication from their healthcare provider:

> *If I needed prescription medications I probably would go through HCP first but if I didn't get what I needed I would be happy to buy online* FG1 287-288 P4

Women highlighted purchasing medication online gave them the freedom to choose what they needed without judgement and confidentially, without having a face to face consultation with a healthcare provider. Anonymity and control was identified as a benefit to purchasing medications with women commenting they specifically like purchasing medication in early pregnancy without having make the pregnancy public knowledge:

> *I think anonymity is a big thing, especially in the first 12 weeks when you might not have told anyone you're pregnant*
> FG1 258-259 P9

7.2.4 Fear of purchasing medication online during pregnancy

Women were concerned about the quality of the medication purchased online:

> *I would need to make sure it was from a source I was happy with; I would worry the quality might not be as good or it might not be what it actually says it is.* FG1 182-184 P9

Women also had concerns if the products were safe to take in pregnancy and whether the dosages were correct for pregnancy. The participants who hadn't purchased medication online had reservations about purchasing medications online without discussing their needs with a healthcare professional:

> *I would be v cautious about buying meds online, especially when pregnant. When pregnant, I am generally a little more cautious anyway. I think I would rather present my bump to a pharmacist just to reinforce that I am pregnant and to make sure the meds are suitable* FG3 131-132, 137-139 P3

Women in these online focus groups also suggested that often an online medical consultation service for a prescription is not free nor is it available on the NHS, despite demands on GPs being so high. Women highlighted their concerns regarding the ability for pregnant women to distinguish fake from real pharmacy websites to make a secure purchase:

> *I would know but a lot of people wouldn't have the same understanding or the ability to distinguish between "fake" and real online pharmacies and might believe anything on them.*
> FG1 177-179 P5

By self-diagnosing and self-medicating women had concerns that by by-passing healthcare professional's advice they may purchase medications contraindicated for pregnancy.

> *Maybe some women might make a conscious choice to purchase medication online if they do not think it is something they should be taking in pregnancy and maybe are worried to ask for it from a doctor or pharmacy……similarly if women bypass the doctor and pharmacy it may lead to them taking medications that are unsafe in pregnancy'* FG1 96-100, 102-104, P5

Concerns about purchasing termination of pregnancy medication online to avoid judgement or prosecution were presented:

> *Some women may be embarrassed to purchase particular medications in person and may find that doing it online is much more discrete and private. Although dangers come with this with medications such as misoprostol being available online to buy.*

These women would not be receiving the support that they should from healthcare professionals. FG3 193-197 P1

7.3 Subjective Norm

7.3.1 Influence of family, friends and healthcare professionals

Women in the focus groups who had experience of purchasing medication online predominantly felt confident to make their own purchasing decisions. Those women who had previously purchased medication online are not strongly influenced by family or friends, nor would ask their opinion. They tended to be more influenced by product reviews or star ratings:

many of my family were concerned but it didn't stop me buying them FG1 391-392 P8

Women in the focus groups who had not purchased medication online had a perception that people including family and friends would disapprove as its 'taboo' and have concerns regarding the side effects of the medications on the safety of baby:

I think if I said to my family "oh I bought these tablets online" they would be horrified! I think there is a perception of buying medications online that makes people worried. FG3 236-238 P3

Family and friends probably would advise against if the purchase would be made without doctor's approval or consent. FG3 228-229 P4

Women viewed purchasing vitamins or homeopathic remedies online as safe and acceptable, and believed that healthcare professionals would find this acceptable:

> *I think HCPs approval/disapproval would be based on what drugs you were ordering…paracetamol or pregnancare that's ok in pregnancy I think their attitude would be different if you were buying something that wasn't licensed in pregnancy.*
>
> FG1 454-455, 458-460 P9

Variation in opinions from family/friends and healthcare professionals made the decisions difficult and this was not helped by some of the reviews:

> *I've definitely had lots of confusion!! Lots of different people say lots of different things. Some encourage some things whilst others discourage it or do not think it matters. This is what confused me, differences of opinion. E.g. My doctor said Panadol is fine but others (online, friends) strongly discouraged me from using it.*
>
> FG2 111-115 P5

7.3.2 Peer Influence/Effect

Some of the women in the group felt they would be judged by their peers for purchasing medication online during pregnancy as it was perceived by some as 'not something you do'. Social norms appear to impact on women's decision making and women referred to the normalization of online purchasing as being influential:

> *I do not think I would ask others as part of me thinks it sounds stupid so therefore it's wrong others would then think I was being foolish and judge me. But as others have said, if it was more common practice among people I know, then I wouldn't be so weary of it.*
>
> FG2 279-283 P1

Peer pressure for normal and natural was a strong belief amongst some and taking medication or purchasing medication online would be frowned upon and this would reduce the likelihood of online purchasing:

> *There is a very strong social push in Australia to do and be "natural" - to not have any medical intervention pre, during and post birth.*

> *You are seen more favourably socially if you do not have any medical intervention I guess.* FG2 135-138 P5

Others thought differently:

> *Do not think I considered other's approval or not when buying online I guess it's more influenced by general purchasing behaviour.* FG1 483-484 P3

7.3.3 Social Media Influence

Pregnancy groups/forums and social media were seen as influential sources of advice for women and can affect a pregnant woman's decision to purchase:

> *Think Facebook and Twitter etc. would play a massive part if things are advertised there we tend to take note even if subconsciously!* FG1 497-498 P7

Other mums and friends on social media were thought to be influential and increased their intention to purchase medications online during pregnancy:

> *I purchased some non-prescription medicine as recommended on a Facebook group on trying to conceive when breastfeeding. I started taking Floradix on the recommendation of a colleague and regularly purchase this online.* FG1 431-436 P3

Some voiced concerns in the focus groups as to the reliability of the advice provided on social media and pregnancy forums:

> *Most pregnant and new moms are in social media groups where they have access to multiple opinions and suggestions regarding symptoms of pregnancy and newborns... in a situation of discomfort they may be induced to buy online without doctor / pharmacist opinion.* FG3 254-257 P4

7.3.4 Product Reviews and Advertisements

Product reviews and advertisements had a strong impact:

> *The online star rating is one feature I would check before buying! And reviews to check that others have been satisfied with the product when it have arrived with them* FG1 515-517 P7

> *wouldn't look twice unless there were quite a number of reviews and obviously the majority positive. I would be swayed by any negative reviews to avoid purchasing.* FG3 291-293 P1

Online products with a celebrity endorsement positively influence a woman's intention to purchase medication online, as would visual imagery of a healthy mum and healthy baby:

> *Yes I agree, recommendations and advertising plays a big role. Pregnancy is a time when I feel women will do anything to ensure the health of her baby, so if adverts or other mothers say a product is the best then the woman will want to purchase it.*
> FG1 504-507 P5

7.4 Perceived Behavioural Control

7.4.1 Website usability

Women wanted to be able to find the product they were looking with ease and the convenience of being able to make purchases in 3 clicks:

> *I can buy my contact lenses in three clicks. If there is difficult signing in, remembering passwords, looking for payment cards etc. I can be put off.* FG3 305-308 P1

Women also favoured online websites that facilitated prompt delivery time frames, low shipping costs, free delivery, ensuring medication stability during

transit with signage for delivery, displayed content and possible drug interactions to ensure it was safe to take in pregnancy before deciding to purchase.

7.4.2 Web security

Website financial security was also a major factor in a woman's decision to purchase online, with PayPal being the most commonly discussed in groups and trusted for safety:

> *if PayPal is an option I tend to trust the website. I know there is a backup if something goes wrong and also its PayPal which has my information and not the actual website.* FG1 531-534 P5

Women wanted not only financial security but also security around their personal data, with some women not wishing their details to go to third parties in order to minimize spam emails from other suppliers.

> *When I think of buying medication online, I initially think of those unsolicited emails we have all received at some time.*
> FG3 333-335 P3

Women also acknowledged difficulty in distinguishing between real and fake pharmacies sites prior to sharing and providing personal details:

> *I would know they were legit and there are so many websites claiming to be pharmacies but I think it would be hard to distinguish them.* FG1 545-546 P5

7.4.3 Computer Literacy

Throughout all of the focus groups access to the internet was not discussed by any of the women as a factor that would influence purchasing, which is in

keeping that the underlying assumption that almost everyone has internet availability. Pregnant women are of a younger population who are more internet confident, more likely to have established online purchasing behaviour and therefore more inclined to purchase medication online if required:

> *the younger population would be more accepting* 😊 *…..mostly because they are more likely to have done online purchasing before but with other products.* FG2 261-262, 267-268 P3

None of the participants in the focus groups expressed concerns about their ability to navigate websites or carry out an online purchase.

7.5 Trust

Trust was identified as an overarching theme demonstrated throughout all of the constructs relating to purchase intention in the Theory of Planned Behaviour. Women commented they would only search for information or medications on websites they trusted. Trust was linked to brand familiarity with familiar high street shops that that online retail outlets. A combination of these factors relating to trust increased a woman's intention to purchase medication online.

> *For me, it would have to be sources that are well known. For example, boots, supermarkets etc. I think for me it's about brands I know and recognize.* FG1 191-195 P9

> *I would probably only use a company that I am already familiar with e.g. boots or my local pharmacy (if they had an online option).*
>
> FG3 298-300 P3

Trust was also demonstrated in that participants highly linked positive reviews with a stronger intention to purchase and negative reviews with less inclination to purchase medication online.

7.6 Observations/Interactions from the group discussion

All participants engaged with some or all of the discussion (Table 7.2). Only one participant, did not comment on the group chat, however, they did view the questions asked, and decided not to comment. There was good group interaction with people commenting on posts and acknowledging comments people had made by ‘liking'. There is much in the literature regarding online focus groups not picking up non-verbal cues however, clicking ‘like’ is similar to acknowledging what someone has said. The use of emoji’s was also used in conversation to indicate humour and laughing and is a modern-day form of expression in the world of social media.

Unlike face to face focus groups engaging participation is difficult and due to the nature of asynchronous communication the ability to probe on interesting discussion can be limited as often with time lapse between discussion, the moment is lost and the discussion has either moved on or participants no longer wish to contribute to that thread of conversation. Acknowledging people’s comments and directly responding to their comments seemed to enhance the discussion, which also sends a notification to alert them to respond to a conversation thread they were involved.

Table 7.2 Frequency of participation and interactions in focus groups:

Focus Group	Number of group participants	Number of group interactions (Including questions, comments and likes)	Number of participants who commented in group discussion	Number of participants who read questions and comments
1	9	208	9	9
2	8	199	7	8
3	6	151	5	6

7.7 Summary- Key findings

This chapter analysis the results of three online focus groups on Facebook to explore in depth these pregnant women's online medication purchasing experience. Strong predictive factors that were found to influence purchasing behaviour included the importance of rapid retrieval of information, cost-effectiveness, special offers, price comparison, time-efficiency and availability of more product options.

Women had a definitive lack of knowledge about medication safety and were likely to be influenced by product reviews and star ratings. Online purchasing enabled women to avoid consultations with healthcare providers and helped them feel more in control. Social norms impacted on women's decision making and women referred to the normalization of online purchasing as being influential. Pregnancy groups/forums and social media were influential sources of advice and previous experience of online purchasing was an important predictor of future behaviour. All constructs of the theory had an over-arching theme of trust identified as a key factor in determining intention to purchase medication online during pregnancy.

Chapter 8 - Results-Phase 3 Eye Tracking Study

This chapter presents the findings from phase 3, the Eye Tracking Study. The aim of this phase of the study was to use eye tracking to determine modifiable features of online interfaces or websites that influence pregnant women's decision to purchase medication online. The eye tracking study consisted of an initial pre-experiment questionnaire to obtain demographic information. Each woman then carried out three tasks to search for a medication they would purchase online (Figure 8.1).

Figure 8.1 Eye tracking scenarios and instruction

Scenario		Task
Scenario 1	You have just found out you are 6 weeks pregnant and wish to buy some pregnancy vitamins to maintain a healthy pregnancy	Please use 'Google' to search for a medication you may wish to purchase
Scenario 2	You are 10 weeks pregnant and are suffering from severe morning sickness	Please use 'Google' to search for a medication you may wish to purchase
Scenario 3	You are 38 weeks pregnant with severe lower back pain	Please use 'Google' to search for a medication you may wish to purchase
Think aloud		

Each woman's online line search was recorded using eye tracking to observe their search strategy and online purchase decision making. Think aloud recordings were also obtained during the search process to justify each woman's choice and decision-making processes. Following each task, each woman carried out a Post-experiment questionnaire to measure importance

of influencing factors relating to the Theory of Planned Behaviour (Ajzen 1985) and ultimately purchase intention.

The results in this chapter will take the following format:

- Demographic characteristics of the sample
- Eye tracking metric data
- Think aloud findings
- Post-experiment questionnaire findings and integration of the datasets

8.1 Demographic characteristics of the sample

A convenience sample of women resident in Northern Ireland who expressed an interest in participating in the eye tracking study from phase 1 were contacted via email invitation. In total 34 women took part in the eye tracking study and 33 eye tracking metric recordings were valid to use in the data analysis. All women were pregnant or had a baby in the past 2yrs from completion of the online survey in phase 1. All of the women were well educated with over three quarters having a third level education or above (n= 28, 85%) and the majority were aged 25-44 yrs. (n=31, 94%). The majority of the women who participated in the study worked part-time (n= 16, 49%) or full-time (n= 14, 42%). Please see Table 8.1 below.

Table 8.1: Demographic characteristics of the sample

Measures	Predictors	Frequency	Percentage
Age group	18-24yrs	2	6.1%
	25-34yrs	15	45.5%
	35-44yrs	16	48.5%
Education	Technical college/Diploma	4	12.1%
	Undergraduate degree	15	45.5%
	Post graduate degree	13	39.4%
	Other	1	3.0%
Employment	Full-time	14	42.4%
	Part-time	16	48.5%
	Unemployed	1	3.0%
	Student full time	1	3.0%
	Student part time	1	3.0%

*All women were resident in Northern Ireland

Five women (15%) took medication for a medical condition before they became pregnant and documented the conditions were acromegaly and reflux. Almost half of the women (n=15, 46%) had purchased medication or herbal supplements online during pregnancy.

8.2 Eye Tracking Analysis

Eye tracking allows us to see a webpage from an individual's point of view and provides a wealth of information on how a user experiences a website (Djamasbi 2014). To measure were a woman looks online eye tracking records metric data that provides fixation metrics, providing insight into the woman's behaviour for selected areas of interest to the study (Poole and Ball 2006).

During this study seven eye movement metrics were recorded for nine specific areas of interest. Eye movement metric data obtained during the tasks included fixation count, fixation duration, time to 1st fixation, total fixation duration, visit count, visit duration and total visit duration for nine areas of interest (AOI's). AOI's were selected based on the findings from phase 1 and 2 and included in Table 8.2 below:

Table 8.2: Areas of Interest (AOI)

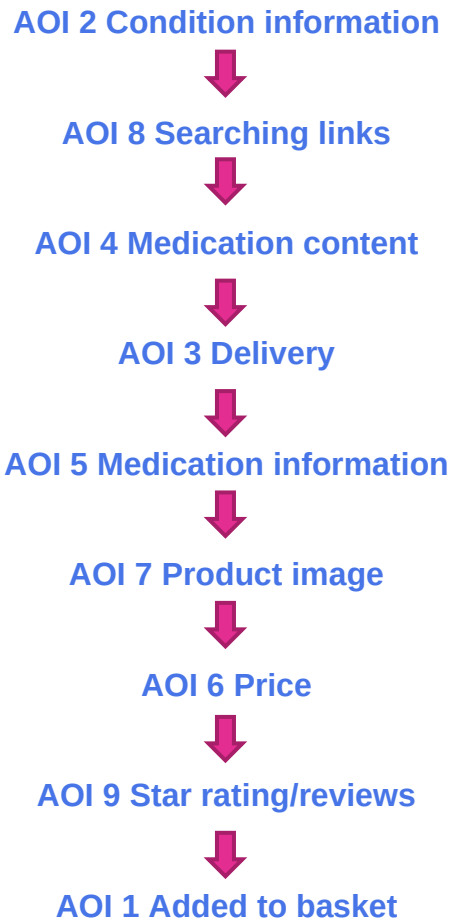
AOI	
AOI 1	Added to basket
AOI 2	Condition information
AOI 3	Delivery
AOI 4	Medication content
AOI 5	Medication information
AOI 6	Price
AOI 7	Product image
AOI 8	Searching links
AOI 9	Star ratings/Reviews

Mean metric data values obtained for each area of interest for task 1, task 2, task 3 and the combined mean metric values for all 3 tasks can be seen in Appendix 26. The results for the eye tracking metrics will be reported on at individual metric level in this chapter.

8.2.1 Time to first fixation

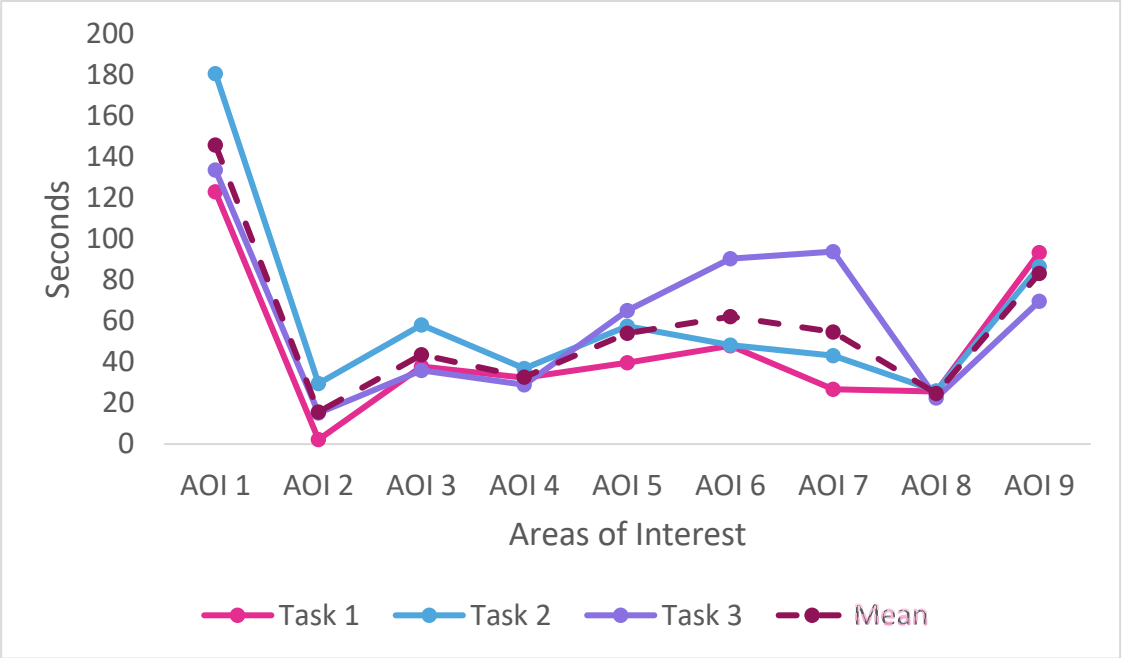
Time to first fixation is the time from the start of the media display until the test participant fixates on the AOI for the first time (seconds) (Tobii, 2010). From Figure 8.2 the trend on the graph for all three tasks follows the same sequence with a slight variation for task 3 with women taking a longer time to fixate on price and product images for purchasing pain relief medication. From this we can observe women searching for medications in the same systematic way across all tasks. The mean factor sequence across the 3 tasks demonstrates the sequential order in which women look at the AOI observed in the study when purchasing medication online as shown below.

Mean Factor sequence across 3 tasks:



However, it must be noted this is not a fluid process and women move backwards and forwards between certain AOI's when carrying out searching in real time.

Figure 8.2: Time to 1st Fixation on areas of interest (seconds)



8.2.2 Fixation duration

Fixation duration is the duration of each individual fixation within an AOI, or within all AOIs belonging to an AOI group (seconds) (Tobii, 2010). From Figure 8.3, we can see the trend differs for task 1-purchasing vitamins. The fixation duration is higher in AOI 2 (condition information) for task 2, that would indicate women look longer at condition information to purchase sickness medication. In talk aloud it was the task to purchase sickness medication women were less sure of what was safe to take.

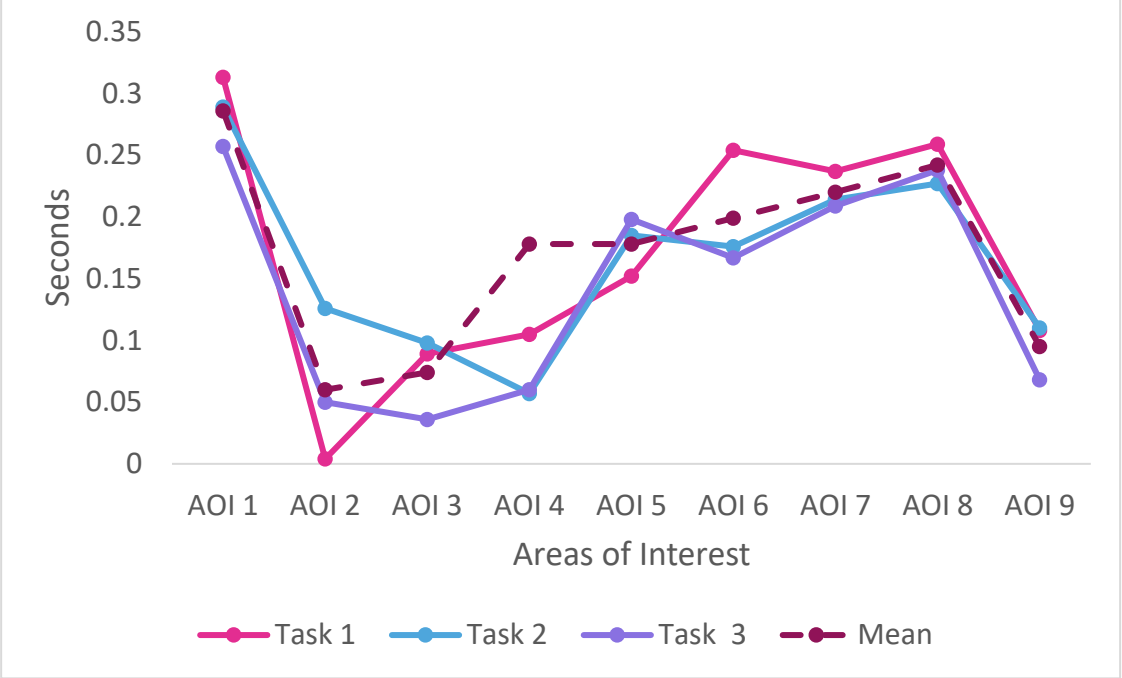
Women also had a higher fixation rate for price (AOI 6) for task 1 when purchasing vitamins. This indicates women spend more time doing price comparison when looking for pregnancy vitamins compared to sickness medication or pain relief medication.

The highest fixation durations across the tasks are for AOI 5 medication information, AOI 6 price, AOI 7 product image, AOI 8 searching links. This demonstrates there are more detailed information in this area, or it is more difficult to read, causing the woman to spend more time processing the information in these areas to make their decisions. This also makes these areas more prominent features of attention during the purchasing process.

The graph also identifies added to basket (AOI 1) has a very high fixation duration, demonstrating women spent a longer length of time concentrating on that area specifically to confirm the purchase was in the basket.

It can also be seen that women focused considerably less in AOI 2 for task 1 demonstrating women hardly looked at any condition information for purchasing pregnancy vitamins, compared to the other 2 tasks. This was rationalised during think aloud recordings as women felt purchasing vitamins was safer and as such they didn't need to search for information on what was safe to take.

Figure 8.3: Fixation duration on areas of interest (seconds)



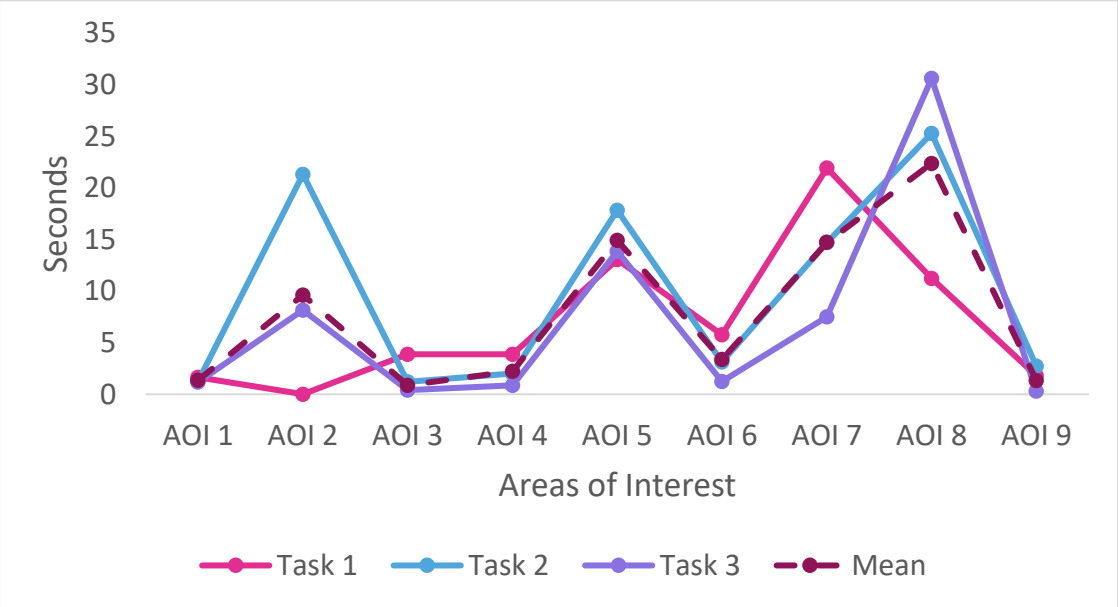
8.2.3 Total fixation duration

Total fixation duration is the duration of all fixations within all AOIs belonging to an AOI group (seconds) (Tobii, 2010). From Figure 8.4 we can see for task 2 (purchasing sickness medication) and task 3 (purchasing pain relief medication) AOI 2-condition information, AOI 5-medication information, AOI 8-searching links had the longest fixation duration. Women spent the most time considering these aspects of the websites when making their purchasing decisions.

Task 1 required women to buy vitamins online. From the total fixation duration metrics, we can see women spent nearly no time fixating on condition information, compared to when they were looking for sickness and pain relief medication.

Figure 8.4 also demonstrates price, delivery and medication content were factor's that women spent minimal length of time fixating on. In phase 1 and 2 of these factors that strongly influence online purchasing, but the actual time spent on these when purchasing is minimal in comparison to the time spent reviewing condition information, medication information and searching links, which had the longest fixation duration.

Figure 8.4: Total fixation duration on areas of interest (seconds)



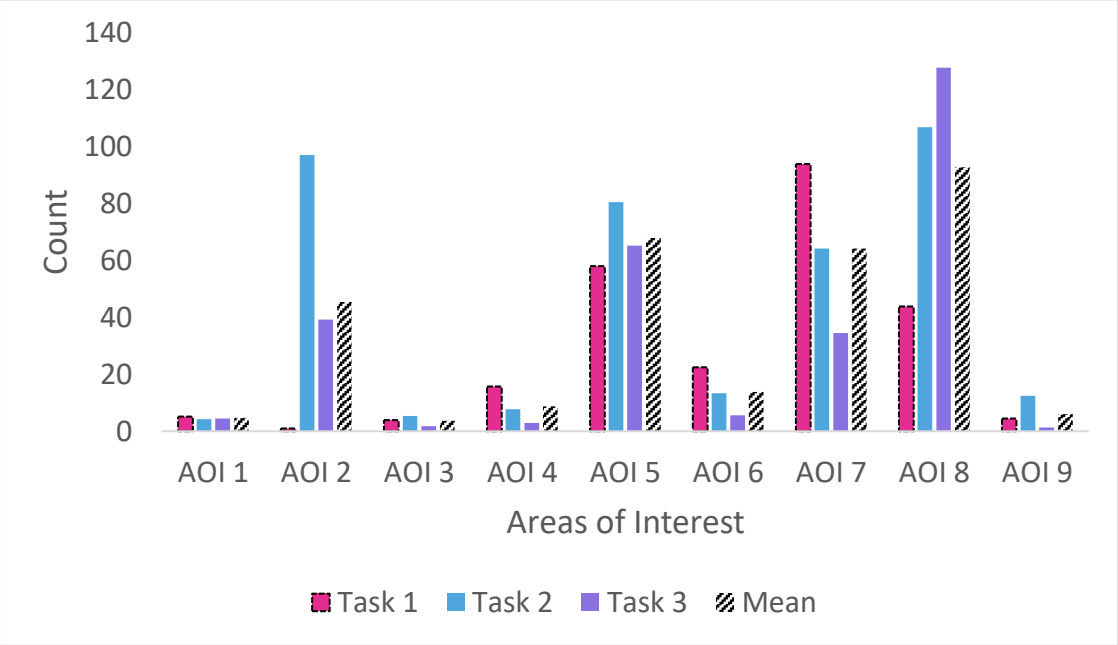
8.2.4 Fixation count

Fixation count is the number of times the participant fixates on an AOI (count) (Tobii, 2010). Figure 8.5 demonstrates the pattern across the 3 tasks is similar apart for AOI 2 (condition information) where women are looking online at considerably less information regarding the need for pregnancy vitamins than for pain relief and anti-sickness medication. Women also fixate more on AOI 7- product images for vitamins than sickness medication and pain relief.

Women's searching behaviour for medication and pain relief demonstrated more than twice as many searching links than for vitamins. Indicating they had to carry out more complex searching to find what they were looking to purchase.

The trend for AOI 4-medication content and AOI 6- price is similar across the 3 tasks with women more frequently fixating on these areas for task 1- purchasing pregnancy vitamins than for task 2 and 3.

Figure 8.5: Fixation count on areas of interest



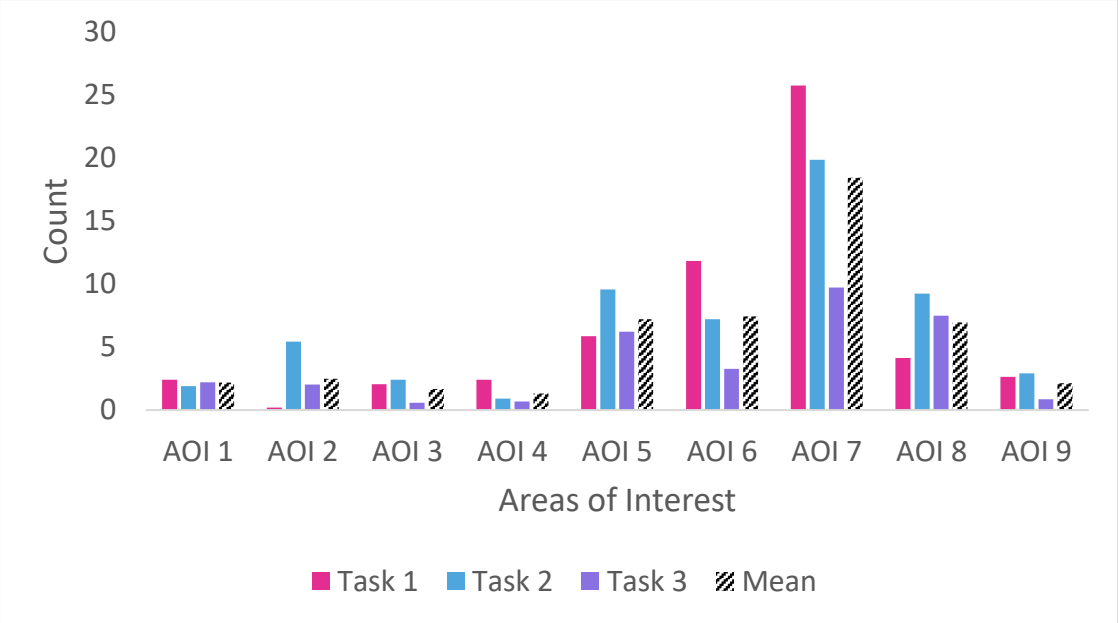
8.2.5 Visit count

Visit count is the number of visits within each AOI (Tobii, 2010). Figure 8.6 shows product images, searching links, price and medication information have the most visits within a search. A consistent finding across all eye tracking

metric results has been that women spend minimal time observing condition information when buying pregnancy vitamins, compared to purchasing sickness medication.

For price (AOI 6) and product image (AOI 7) women visit these areas nearly twice as much for task 1 compared to task 2 and 3. Women also looked at twice as many searching links (AOI 8) for task 2 and 3 than for task 1. Therefore, highlighting a more detailed and complex search strategy being carried out in task 2 and 3 prior to decision making.

Figure 8.6: Visit count on areas of interest



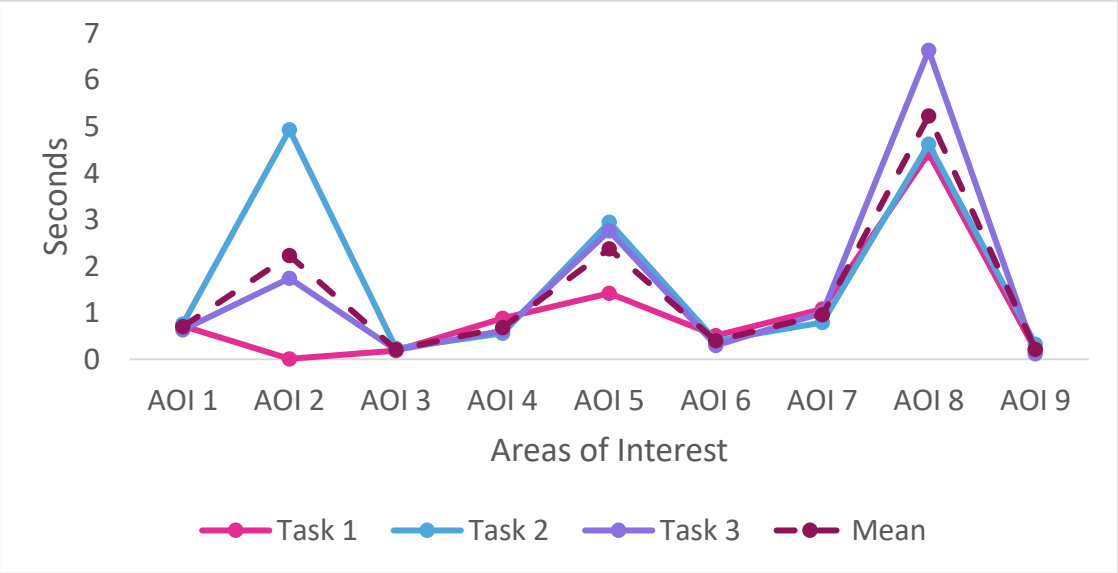
8.2.6 Visit Duration

Visit duration is the time spent on the individual website within an AOI (seconds) (Tobii, 2010). From Figure 8.7 we can see the longest visit

durations were for AOI 5- medication information and AOI 8- searching links. Women still spent twice as long looking at medication information for task 2 and 3 compared to task 1. These were the areas women focused on when they moved between both AOI's backwards and forwards to find the specific medication they required.

Condition information (AOI 2) was another important factor determining longer viewing time for tasks 2 and 3, but not for task 1. Again, highlighting women spent more time looking at condition information when sickness or pain relief medication than for purchasing vitamins.

Figure 8.7: Visit duration for areas of interest

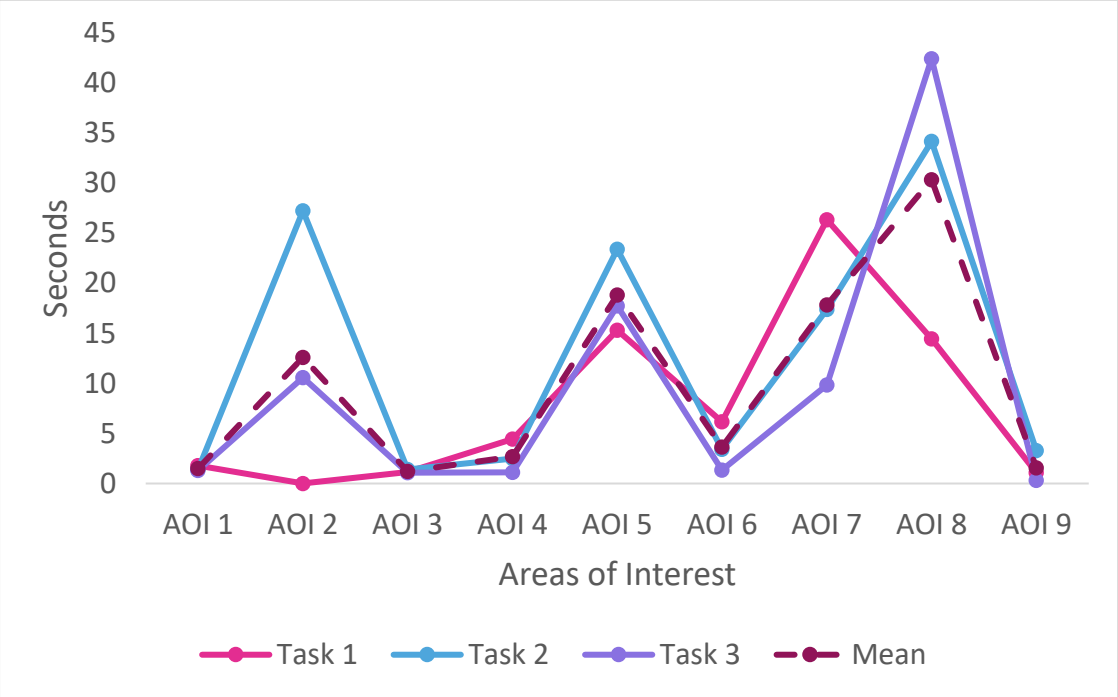


8.2.7 Total visit duration

Total visit duration is the duration of all visits within an AOI group (seconds) (Tobii, 2010). The trend in Figure 8.8 for total visit duration has similar timing

of visit duration reported above. However, slight variation is noted in product image (AOI 7) with women spending considerably longer time for task 1- for pregnancy vitamins compared to task 3 for pain medication. This graph also demonstrates women spend considerably less time on searching links (AOI 8) for task 1 compared to task 2 and 3. Women demonstrate more complexity in their searches when purchasing medication for sickness and pain relief medication than for pregnancy vitamins.

Figure 8.8: Total visit duration for area of interest



8.2.8 Purchases made by participants for each task

During each task women purchased the following medications shown in Table 8.3. In this specific aspect of the study variation in willingness to pay for products was evident. Women were prepared to pay from £3.79 to £15.29 for pregnancy vitamins. For sickness medication, women were prepared to pay

£0.60 for ginger and homeopathic remedies up to £60.00 for prescribed sickness medication. For analgesia women were prepared to pay anything from £0.60 for paracetamol from an online grocery store to £48.99 for prescription level codeine-based analgesia.

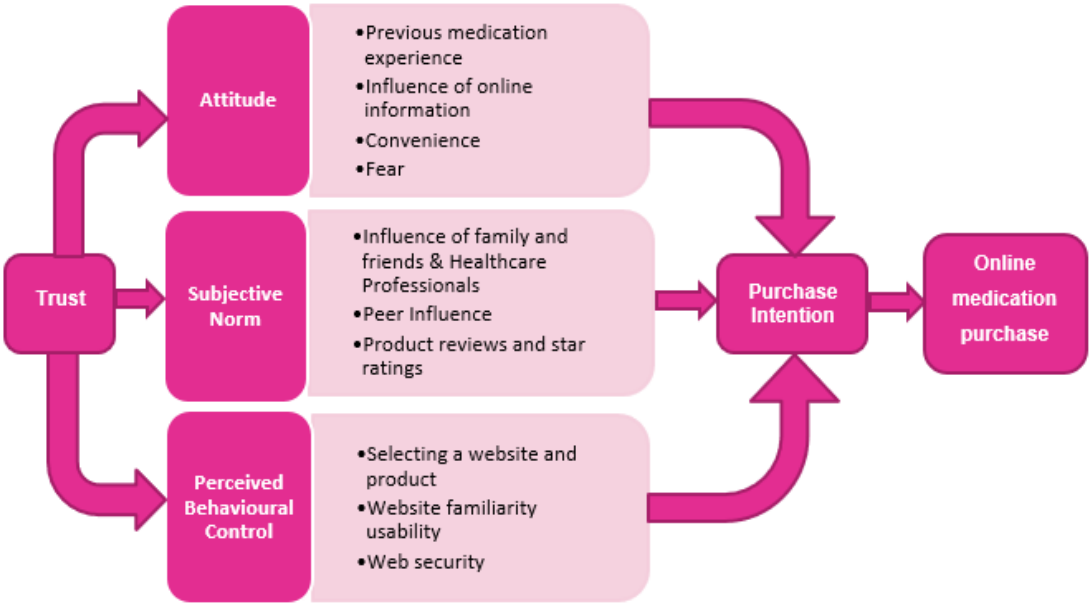
Table 8.3: Products selected for purchase during tasks

Scenarios	Product purchased	Number of women purchased	Price range
Scenario 1	Pregnacare	29	£4:00-£15.29
	Seven Seas Pregnancy vitamin	1	£3.00
	Vitamin D Well Baby	1	£4.67
	Pregnancy Vitamin	1	£9.99
	Pregnancy Folic Acid and Vitamin D	1	£3.79
Scenario 2	Ginger/Ginger based products	15	£0.60-£9.99
	Pregnacare	2	£9.35-£11.65
	Morning sickness survival kit with sickness remedies	2	£17.99
	Travel sickness bands	4	£2.19-£6.99
	Cyclizine	3	£29.99-£60.00
	Metoclopramide	1	£9.00
	Sturgeon	2	£3.47-£3.77
	Cetirizine hydrochloride	1	£3:00
	Ondansetron	2	£1.66
	Welda Cocculus	1	£6.79
Scenario 3	Paracetamol	24	£0.36-£2.99
	Pain relief patch	2	£5.99-£10.66
	Co-codamol 8/500	1	£5.29
	Co-codamol 30/500	1	£48.99
	Paracetamol & Codeine	3	£2.59-£2.99
	Pain relief spray	2	£3:00

8.3 Concurrent think aloud findings

Think aloud recordings were made during the eye tracking experiment to provide a verbal explanation of women's actions and decision-making choices whilst performing purchasing tasks. All recordings were transcribed and thematically analysed using Braun and Clarke (2006) framework for thematically analysing qualitative data. Coding was performed with themes and sub themes being extracted and mapped to the Theory of Planned Behaviour (1991). Figure 8.9 is a visual representation of the themes mapped to TPB.

Figure 8.9: Themes and subthemes mapped to the Theory of Planned Behaviour



8.3.1 Attitude

A construct of the TPB is Attitude. The analysis identified a pregnant woman's previous medication experience, the content of online information,

convenience and fear during the purchasing process influenced their intention to purchase medication online.

8.3.1.1 Previous medication experience

Women searched for medications that they were familiar with or had previous positive experiences taking. They would specifically look for familiar brands and familiar websites that sold medication and commented that familiarity made them trust the product and brand:

> *this would be the one I would buy, and I'll buy it because it was from Boots and it's one that I have seen advertised before and it's one that I have taken before so I would be happy to take it again*
> P1 24-25

> *I am going to put in Pregnacare, because I know they are the best pregnancy vitamins… I think they have a good mix, the right balance of vitamins and minerals for pregnancy and I know the brand and have used the brand when I was pregnant. So, I will look for, I will go to Boots and see if they have any offers on.* P16 8-12

Women who had previously taken prescription medication such as codeine-based products and anti-emetic medications were more proactive in searching for prescriptions medications:

> *That tablet they gave me in hospital, cyclizine…I will put that in*
> P17 38

Women who had not taken prescription medications tended to initially search for herbal and complementary medications that they suggested they would try first and build up to taking prescribed medications:

> *first thing I would want to be sure of is that it is safe for me to take this when I am pregnant. So, maybe to start, preferably I probably would take something that was non-medicated, herbal, if possible. Again, just probably best just to be on the safe side and also to avoid putting medication into my body. So, the likes of the ginger would be attractive to me as a starting point, I wouldn't go straight for medication. If that didn't work and that wasn't successful, then I would probably go to the next stage of medication, making sure that it was safe. But my first port of call would be herbal, if possible.* P24 62-64

Women also commented they would purchase herbal or complementary medications as a stop gap to treat conditions until they could arrange a consultation with a healthcare practitioner for stronger or prescribed medication:

> *Those tablets there for travel sickness might do me for now, until I can get to the GP. I will add them to my basket.* P18 65-66

8.3.1.2 Influence of online information

Women often found when searching for safety information on medication, they got non-specific advice and advised to seek medical advice:

> *Let's see. Suitable for adults and children. Not suitable for under 5. Pregnant and breastfeeding should seek medical. Ok. So, I'll buy them and I'll phone the doctor to check they are ok to take.'* P23 48-50

A large section of the sample used the NHS information website to gain advice on medications and what medications were safe to take during pregnancy for the specific conditions mentioned in the task:

> *Check the NHS website and see what they say. It is a trusted source, so it should be well researched, and their advice should be followed.* *P18 50-51*

8.3.1.3 Convenience

Women commented that convenience was high on their agenda when purchasing medication online, they specifically looked at delivery options in relation to cost and timeframe, being more prone to select a product based on free shipping and next day delivery. The convenience of being able to carry out product and price comparison was also commented on as being favourable:

> *'I'm looking to see their own brands of those Pregnacare type thing. I normally would have bought Pregnacare but the own brand ones are cheaper. They are not cheaper! Oh dear. Under there, oh they would be, similar. There's not much in it. For Pregnacare, they always do that offer 3 for 2. This is the original one. Yes, I'll stick 3 of those in my basket.* P23 18-21

Price however, although viewed by all participants wasn't a main deciding factor for women with some women preferred to purchase a more expensive product as they felt it would be of a better quality:

> *'Price wouldn't be an issue for me, with this, simply because I do not think you can put a price on your unborn baby.*
> P24 11-12

Women also explained purchasing medication online with their weekly grocery shopping for convenience:

> *'Probably, what I would do is go to Tesco's and just add it to my shopping.* P11 8

Women also commented when making choices purchasing online facilitated being able to avoid questions from healthcare providers:

I would be prone to a wee Solpadine. I'll just type it in. Go for the max because I want it to work fast, I've got a bad back. Oh, look 10% off your first order. It's not very often you can sell things like that. Independent pharmacy. £5.49 for 32. Because sometimes you go to the chemist and they ask why you are buying so many
P8 120-124

Although women found it convenient to purchase medication online, when opting to purchase a prescribed medication online they commented they would be put off by carrying out an online consultation:

'Probably in all honesty, I would go somewhere else before I would have to go through all that jazz. There is bound to be somewhere maybe, maybe you can just buy codeine on it's own and take it with paracetamol. ….Cheap co-codamol…. I will have a look at this one. UK approved pharmacy, regulated EU doctors, despatched the same day. Strength…3/500s…tablets…you can buy it.
P17 80-84

Women also frequently commented on feeling overwhelmed with the abundance of choice online and displayed frustration at time trying to find information they were looking in a very short space of time:

Oh, there is so many, so what do I do? Oh right, we want the max here, so we'll get this one. Right, where is the price? I'm looking the price here. It hasn't gave me the price. P3 16-18

8.3.1.4 Fear

Women who had no previous experience of purchasing medication online tended to discuss being afraid of purchasing medications online. This fear was often explained of concerns for the safety of their baby:

You just never know. P22 63

> *The less you take in pregnancy, the better in my eyes. Less chance of harming your baby.* P35 57-58

The fear of harming the baby was particularly evident in the early stages of pregnancy:

> *It is the fear of using medication in early pregnancy. Just taking something that might harm the pregnancy and try to avoid medications if possible.* P18 43-44

Some women also admitted to limiting their medication intake during pregnancy as they wanted to minimise the effect any medication would have on their unborn baby:

> *I do not like taking paracetamol, it's meant to be safe and then there is query…is it linked to autism in children? Suppose anything could be, so I would be a wee bit worried, unless I was at death's door, I would like to avoid it.* P22 59, 67-68

There was also concerns around purchasing anti-sickness medication linked with concerns around fetal anomalies in the aftermath of the thalidomide tragedy in the 1960's. Women with concerns over purchasing medication online expressed a preference to discuss medication requirements with a healthcare professional:

> *To be honest, I probably wouldn't buy tablets online, especially for morning sickness, given history with tablets as well and morning sickness. Just babies born with deformities. I know it was years ago, but I still would definitely not go down that route. I would speak to the GP or midwife first, before I would take anything. It would have to be very severe before I would take something.* P25 45-53

Women who also had not previously purchased displayed reluctance to purchase medication online due to concerns around the quality of the product, or whether it was fake. However, they were more accepting of purchasing vitamins or herbal supplements from a familiar brand they perceived as reputable:

> *I would be reluctant to buy anything online, is the first thing I should say, because I would be dubious as to whether or not it is genuine. But, if I saw Holland & Barrett, I would probably be deviated towards them because they are reputable, and you have heard of them. Similarly, Pregnacare is a recognised brand and it is not something I would want to scrimp on.* P20 9-15

8.3.2 Subjective Norm

A construct of the TPB is Subjective Norm. Sub themes identified from the analysis identified how a pregnant women's family friends and healthcare professionals influence, peer influence, product reviews and star ratings can influence purchase intention.

8.3.2.1 Family and friends influence

Women commented they found varying opinions offered created difficulty for them in deciding what is safe to take:

> *Just because you hear a lot of things, like you do not know what is safe to take during a pregnancy.* ' P33 29-30

The influence of friend's opinions and experiences also influenced women to search for specific medications online:

> *friends would have used it and then just when you are looking up it would be one of the first ones you would come to. There is a lot of*

input from other mums, but because it is a known brand and I would go into it. P35 30-32

My friend takes cyclizine, I really want cyclizine. P09 70

8.3.2.2 Healthcare professionals influence

Healthcare professional's opinion seemed to have a strong influence on purchasing behaviour with several women raising concerns about medication and herbal supplements if not approved by a doctor or midwife.

So, herbal remedies, I'll have a look there, other herbal remedies. Then I do not know whether I would take a herbal remedy, really, because it's not been trusted or tested. I do not know whether I would actually buy something for nausea without having to go to my GP. I think I would be afraid to take something that wasn't, do you know, sort of that the GP hasn't said this is safe to take. P1 49-53

I would speak to the GP or midwife first, before I would take anything. P25 53-54

The use of the word 'Doctor' in online information was also viewed as making the information more trustworthy.

A website that I have never been on before, but it has the word doctor in it, so that looks good. P09 78-79

A doctor's approval of a medication also made women more likely to purchase that particular product.

So I've heard of Pregnacare. It seems to be a quite good brand that is recommended by the GP. I am just going to add this one to my basket. P28 23-24

8.3.2.3 Peer influence

Women made choices of what medication to search for and purchase based on their knowledge of what was approved of and discussed by other people.

> *I probably know what I want. I probably want Pregnacare. Because it is the one that everybody talks about.* P09 11-12

> *I think just because it is quite common and everybody would do that one.* P26 21-22

Women commented they would also view how other people found a product and their opinion before making a selection.

> *So that would be another thing that I would look at, if it has been tried and tested by other people, to see what they think of it. So, that is the one that I would go for.* P15 51-52

8.3.2.4 Product reviews and star ratings

Women also took into consideration reviews and star ratings in their purchasing behaviour.

> *I am just looking to see what I can scan and see, I see free delivery and I see 9 out of 10 customers are in the satisfaction. Free UK delivery…patient information.* P09 135-137

Products that had positive reviews where more likely to be selected by women over products with poor reviews.

> *I will go back to this one that got good reviews on Trust pilot.* P09 85

'I'm just looking for, recommendations and people's ratings. P35 14

It is showing there that it has got five stars as well, so obviously it has been tried and tested by other people. P15 47-48

8.3.3 Perceived Behavioural Control

A construct of the TPB is Perceived Behavioural Control. Sub themes identified from the analysis include selecting a website and product, website familiarity and usability and safe transactions which can influence a pregnant woman's online medication purchase intention.

8.3.3.1 Selecting a website and product

Women would search specifically for websites that were online stores for high street brands they were familiar with and trusted:

'I would probably go to more like a chemist, like a Boots…because I trust it. It's like on a high street and I trust it. P1 10-12

Visual imagery and brand images were viewed frequently during the tasks. Women commented that they were drawn to certain products as they liked the name. They also commented on words in branding such as 'max strength', 'max' and 'organic', as making them more likely to view the product:

Max always sounds best because it's maximum support. P3 25

I'll go with the Pregnacare plus because it sounds better because there is a plus in it. P14 17-18

> *Organic morning sickness, I will maybe have a look at that one because being pregnant you do not want to take anything that you do not know about. So, you assume that organic, because it is all plants and stuff, is good for you.* P15 30-32

Women were drawn to areas on websites that offered incentives and promotions such as buy 2 get one free:

> *it's on offer, so yeah, I am going to buy it if it's on offer… And also, your Advantage card points, so I would use my card.* P25 25, 29

A familiar brand image with content information on the packaging was also linked with a higher rate of purchase intention without viewing other products:

> *And first up comes Pregnacare which I am familiar with because I've seen it in the shops. And I've seen lots of advertisement for it. It would be the during pregnancy one I would be looking in tablet form. I probably wouldn't actually read too much about that because I've seen so much about it and it lists 19 vitamins on the front which would just tell me to buy that.* P13 9-13

Having existing accounts with online retailers that offer quick and free delivery also increased purchase intention for those specific websites:

> *I've got Prime account, so I would go there.* P8 23

8.3.3.2 Website familiarity and usability

When searching for medications women tended to search links for a familiar brand or website:

> *I am trying to find something that comes up that is something I would have heard of or familiar to me.* P34 15

> *Amazon... I am familiar with that website. I know how it works. I know I'll get what I order. If I am not happy with it, I can send it back. They have a wide range of products. So, I'm confident they will have what I need.* P32 7-9

Women tended to search for familiar websites of recognised high street brands and familiar brands of products:

> *Ok, so I have gone into Boots website to get my Pregnacare because I know that it is a reliable source. I have used Boots many, many times and I know that there is nothing, you know, really dodgy about it. I know that it will come within three to five working days and I know that there will possibly be an offer which I will be looking up. You can see here on the screen that there are offers at the minute. There are different websites and in places where you can get pregnancy vitamins, that have their own brand. But I know that Pregnacare is a reputable brand and that it is safe to use in pregnancy. So, I am going to go with, let me see, 30 tablets or 90 tablets. I am obviously going to go with 90 tablets because it is a better offer.* P21 9-16

Women tended to want information instantly at a click of a button and tended to start a different search rather than scroll through more than the first page of information on a screen. Some women mentioned they also would avoid sponsored links or adverts on the websites:

> *I do not know but that is annoying me, I do not like, I can't get it instantly up, then I would go back, it is annoying. What are these ones? …I am going to go into this site and see if they do stronger ones.* P09 161-163

8.3.3.4 Website security

Women commented they looked at particularly for sites that offered PayPal as a source of payment and connected it to financial security:

> *You also have the option on it to use PayPal, which is the safer option with your card details. So, I am going to add to my basket and I will use PayPal to pay for it because it is safe.* P21 28-30

Women also perceived familiar websites as secure and trusted:

> *I would go to Amazon, I always go to Amazon, to be honest. I buy everything on Amazon. It is reliable and it is something, they always guarantee what they send. If it doesn't come, they reimburse you and all that kind of thing. That would be what I would tend to go with.* P4 64-66

Having previous personal data linkage with specific online retailers made women more likely to purchase from those specific websites:

> *maybe I'll go to Amazon because it'll be quicker for me to buy those. Because all my data is linked up to it.* P3 7-8

8.3.4 Trust

Trust was identified as an over-arching theme that affected women's decision making when purchasing medication online during pregnancy throughout all the theoretical constructs of the TPB.

Trust was linked with previous medication experience, the influence of social norms and when searching for websites they had previously used and had positive experiences.

> *I'm looking for a website that I've heard before or that looks like it would be more of a trusting website.* P01 71-72

8.4 Post-experiment questionnaire results

The Post-experiment questionnaire gathered information on the constructs of the Theory of Planned Behaviour (Ajzen, 1985) based on carrying out the simulated tasks. The survey also gathered information on each participant's intention of purchasing a medication online during pregnancy in a similar real-life scenario.

8.4.1 Post-experiment questionnaire results following purchasing task 1- Frequencies

Post-experiment questionnaire responses for the measurement of Attitude for this scenario found 61% (n=20) of women thought convenience of not having to go to a pharmacy was important or very important, with 24% (n=8) of women saying it was neither important or unimportant. The majority of women felt price (n=22, 67%) and quality of the medication (n=31, 94%) was important or very important. In total 30% (n=10) of women felt they were unsure if purchasing medication online was important to avoid a consultation with a healthcare provider, with 49% (n=16) thinking it was important or very important. All women in the sample thought providing safety for your baby was important or very important along with 94% (n=31) having the ability to recognise an illegitimate pharmacy as important or very important.

In relation to the subjective norm construct women were mostly unsure if their family (n=15, 46%) or friends (n=15, 46%) influenced their online purchase behaviour. However, healthcare professionals influence was important or very important (n=25, 76%). Almost half of the women thought social media

influence was of no or little importance (n=15, 46%), with over a third of the sample unsure (n=12, 36%) if social media influence was important in their online purchasing decision making. The sample was fairly split in relation to the influence product advertisement had on purchasing with 39% (n=13) saying it had little to no importance and 42% (n=14) saying it was important or very important. Customer reviews and product ratings was a stronger influencing factor 60% (n=20) of the sample saying it was important or very important.

For the construct of perceived behavioural control, how easy the website was to navigate (n=30, 85%) and the woman's ability to navigate the website (n=31, 94%) was important or very important. Having available delivery options (n=27, 82%), secure payment options (n=31, 93%), purchasing a familiar brand of product (n=31, 94%) with an accredited pharmacy logo (n=29, 88%) and using a familiar and trusted website (n=33, 100%) was important or very important. Please see Table 8.4.

Table 8.4: Post-experiment questionnaire results following purchasing task 1- Frequencies

Question: How important were the following factors to you when you were searching for the medication in this scenario?	Task 1 Frequencies (%)				
	No importance	Little importance	Neither important or unimportant	Important	Very Important
Attitude					
Convenience of not having to go to a pharmacy	-	5 (15.2%)	8 (24.2%)	13 (39.4%)	7 (21.2%)
Price	3 (9.1%)	7 (21.2%)	1 (3.0%)	12 (36.4%)	10 (30.3%)
Quality of the medication	-	-	2 (6.1%)	7 (21.2%)	24 (72.7%)
To avoid a consultation with a healthcare provider	4 (12.1)	3 (9.1%)	10 (30.3%)	10 (30.3%)	6 (18.2%)
Safety of your baby	-	-	-	4 (12.1%)	29 (87.9%)
Ability to recognise an illegitimate pharmacy	1 (3.0%)	1 (3.0%)	-	8 (24.2%)	23 (69.7%)
Subjective Norm					
Family influence	6 (18.2%)	2 (6.1%)	15 (45.5%)	7 (21.2%)	3 (9.1%)
Friends influence	4 (12.1%)	2 (6.1%)	15 (45.5%)	8 (24.2%)	4 (12.1%)
Healthcare Professionals influence	1 (3.0%)	4 (12.1%)	3 (9.1%)	14 (42.4%)	11 (33.3%)
Social media influence	9 (27.3%)	6 (18.2%)	12 (36.4%)	5 (15.2%)	1 (3.0%)
Product advertisements	4 (12.1%)	9 (27.3%)	6 (18.2%)	13 (39.4%)	1 (3.0%)
Customer reviews/product ratings	1 (3.0%)	5 (15.2%)	7 (21.2%)	10 (30.3%)	10 (30.3%)
Perceived Behavioural Control					
How easy the website was to navigate	-	1 (3.0%)	4 (12.1%)	21 (63.6%)	7 (21.2%)
Your ability to navigate the website	-	-	2 (6.1%)	25 (75.8%)	6 (18.2%)
Delivery options available	-	3 (9.1%)	3 (9.1%)	11 (33.3%)	16 (48.5%)
Secure payment options	-	-	2 (6.1%)	8 (24.2%)	23 (69.7%)
Familiar brand of product	-	-	2 (6.1%)	15 (45.5%)	16 (48.5%)
Accredited pharmacy logo	-	-	4 (12.1%)	11 (33.3%)	18 (54.5%)
A familiar trusted website	-	-	-	11 (33.3%)	22 (66.7%)

In relation to purchase intention, 79% (n=26) of women would be likely or very likely to purchase a pregnancy vitamin online in a real-life scenario (Please see Table 8.5).

Table 8.5: Purchase Intention-Task 1

Purchase intention	Task 1 Frequencies (%)				
	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very Likely
What is the likelihood you would have gone on to purchase the medication in this scenario?	3 (9.1%)	4 (12.1%)	-	7 (21.2%)	19 (57.6%)

Other key factors that women highlighted in free text boxes that would be important to them in making decisions to purchase in real life would be that they would obtain advice from a midwife or GP prior to purchasing any vitamins or medication online. They held convenience of being able to purchase some products with their online grocery shopping along with price and available offers very high. They also had the safety of their baby as paramount and would be influenced by recommendations on NHS websites.

Some women made purchase decisions in the scenario as they had previously taken the medication and it had agreed with them or because they had been given information in their previous pregnancy that the product was safe to take in pregnancy. One issue of paramount importance would always be the safety and well-being of their baby. Vitamins were commented on as always being a first choice for women as they were perceived to be beneficial and advantageous to the baby and following direction and advice from healthcare professionals. One participant also said they would unlikely buy medication

online despite buying most other products online because they liked the reassurance of seeing a pharmacist or doctor and had concerns regarding purchasing legitimate products online.

8.4.2 Post-experiment questionnaire results following purchasing task 2- Frequencies

Post-experiment questionnaire responses for the measurement of Attitude for this scenario found 52% (n=17) of women thought convenience of not having to go to a pharmacy was important or very important, with 33% (n=11) of women saying it was neither important or unimportant. Just over half of the women in the sample felt price was important or very important (n=17, 52%), with 24% (n=8) unsure if it was important or unimportant. Nearly all women in the sample felt it was important or very important that the medication be of a good quality (n=32, 97%). In total, 36% (n=12) of women felt they were unsure if purchasing medication online was important or unimportant to avoid a consultation with a healthcare provider, with 39% (n=13) thinking it was important or very important. All women in the sample felt the safety for their baby was important or very important, with 97% (n=32) recognising the ability to recognise an illegitimate pharmacy as important or very important.

In relation to the subjective norm construct, over a third of women were unsure if their family (n=12, 36%) or friends (n=13, 39%) influenced their online purchase behaviour. However, healthcare professionals influence was important or very important (85%). Social media influence (n=15, 46%) was of no or little importance, with over a third of the sample unsure (n=12, 36%) if

social media influence was important in their online purchasing decision making. The sample was fairly split in relation to the influence product advertisement had on purchasing with 33% (n=11) saying it had little to no importance and 36% (n=12) saying it was important or very important. Customer reviews and product ratings was a stronger influencing factor 64% (n=21) of the sample saying it was important or very important.

For the construct of perceived behavioural control, how easy the website was to navigate (n=28, 85%) and the woman's ability to navigate the website (n=28, 85%) was important or very important. Having available delivery options (n=26, 79%), secure payment options (n=32, 94%), purchasing a familiar brand of product (n=28, 85%) with an accredited pharmacy logo (n=26, 79%) and using a familiar and trusted website (n=30, 91%) was important or very important. Please see Table 8.6.

Table 8.6: Post-experiment questionnaire results following purchasing task 2- Frequencies

Question: How important were the following factors to you when you were searching for the medication in this scenario?	Task 2 Frequencies (%)				
	No importance	Little importance	Neither important or unimportant	Important	Very Important
Attitude					
Convenience of not having to go to a pharmacy	-	5 (15.2%)	11 (33.3%)	8 (24.2%)	9 (27.3%)
Price	3 (9.1%)	5 (15.2%)	8 (24.2%)	10 (30.3%)	7 (21.2%)
Quality of the medication	-	-	1 (3.0%)	14 (42.4%)	18 (54.5%)
To avoid a consultation with a healthcare provider	2 (6.1%)	6 (18.2%)	12 (36.4%)	7 (21.2%)	6 (18.2%)
Safety of your baby	-	-	-	3 (9.1%)	30 (90.9%)
Ability to recognise an illegitimate pharmacy	-	-	3 (9.1%)	9 (27.3%)	23 (69.7%)
Subjective Norm					
Family influence	5 (15.2%)	4 (12.1%)	12 (36.4%)	9 (27.3%)	3 (9.1%)
Friends influence	6 (18.2%)	3 (9.1%)	13 (39.4%)	7 (21.2%)	4 (12.1%)
Healthcare Professionals influence	1 (3.0%)	1 (3.0%)	3 (9.1%)	17 (51.5%)	11 (33.3%)
Social media influence	10 (30.3%)	5 (15.2%)	9 (27.3%)	8 (24.2%)	1 (3.0%)
Product advertisements	3 (9.1%)	8 (24.2%)	10 (30.3%)	10 (30.3%)	2 (6.1%)
Customer reviews/product ratings	1 (3.0%)	5 (15.2%)	6 (18.2%)	10 (30.3%)	11 (33.3%)
Perceived Behavioural Control					
How easy the website was to navigate	-	2 (6.1%)	3 (9.1%)	17 (51.5%)	11 (33.3%)
Your ability to navigate the website	-	2 (6.1%)	3 (9.1%)	19 (57.6%)	9 (27.3%)
Delivery options available	-	4 (12.1%)	3 (9.1%)	11 (33.3%)	15 (45.5%)
Secure payment options	-	-	2 (6.1%)	11 (33.3%)	20 (60.6%)
Familiar brand of product	-	-	5 (15.2%)	15 (45.5%)	13 (39.4%)
Accredited pharmacy logo	-	-	7 (21.2%)	11 (33.3%)	15 (45.5%)
A familiar trusted website	-	-	3 (9.1%)	11 (33.3%)	19 (57.6%)

In relation to purchase intention, 58% of the sample would be likely or very likely to purchase an anti-sickness medication online in a real-life scenario (Please see Table 8.7).

Table 8.7: Purchase Intention-Task 2

Purchase intention	**Task 2 Frequencies (%)**				
	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very Likely
What is the likelihood you would have gone on to purchase the medication in this scenario?	5 (15.2%)	7 (21.2%)	2 (6.1%)	14 (42.4%)	5 (15.2%)

Other key factors women commented on that would affect their decision to purchase was they found it difficult in this scenario to find online what medication was safe to take in pregnancy. Purchasing intention would also depend on how bad the sickness felt and if the woman couldn't manage symptoms with homeopathic remedies they would see the GP prior to taking anything medicated. The women who were unlikely to purchase the medication in real life commented they would be reluctant to take any medication if at all possible and that herbal/non-medicated options would always be the preferred option in order to ensure the safety of their unborn child. The brand the woman choose was also important in decision making and women involved said they would only select a name they knew and a product that they heard other women using when pregnant.

8.4.3 Post-experiment questionnaire results following purchasing task 3- Frequencies

Post-experiment questionnaire responses for the measurement of Attitude for this scenario found 55% (n=18) of women thought convenience of not having to go to a pharmacy was important or very important, with 33% (n=11) of women saying it was neither important or unimportant. Just over half of the women in the sample felt price was important or very important (n=17, 52%), with 30% (n=10) commenting it was of little or no importance. All the women in the sample felt it was important or very important that the medication be of a good quality (n=33, 100%). Women felt they were unsure if purchasing medication online was important or unimportant to avoid a consultation with a healthcare provider (n=15, 45%), with a third of women thinking it was important or very important (n=11, 33%). All women in the sample felt the safety for their baby and the ability to recognise an illegitimate pharmacy was important or very important.

In relation to the subjective norm construct women over a half of the women were unsure if their family (n=17, 52%) or friends (n=17, 52%) influenced their online purchase behaviour. However, healthcare professionals influence was important or very important (n=27, 82%). Social media influence was of little or no importance (n=17, 52%), with 27% (n=9) of the sample unsure if social media influence was important or unimportant in their online purchasing decision making. The sample was fairly split in relation to the influence product advertisement had on purchasing with 33% (n=11) saying it had little to no importance and 33% (n=11) saying it was important or very important.

Customer reviews and product ratings was a stronger influencing factor 61% (n=20) of the sample saying it was important or very important.

For the construct of perceived behavioural control, how easy the website was to navigate (n=29, 88%) and the woman's ability to navigate the website (n=28, 85%) was important or very important. Having available delivery options (n=26, 79%), secure payment options (n=33, 100%), purchasing a familiar brand of product (n=30, 91%) with an accredited pharmacy logo (n=31, 94%) and using a familiar and trusted website (n=30, 91%) was important or very important. Please see Table 8.8.

Table 8.8: Post-experiment questionnaire results following purchasing task 3- Frequencies

Question: How important were the following factors to you when you were searching for the medication in this scenario?	Task 3 Frequencies (%)				
	No importance	Little importance	Neither important or unimportant	Important	Very Important
Attitude					
Convenience of not having to go to a pharmacy	-	4 (12.1%)	11 (33.3%)	10 (30.3%)	8 (24.2%)
Price	2 (6.1%)	8 (24.2%)	6 (18.2%)	11 (33.3%)	6 (18.2%)
Quality of the medication	-	-	-	12 (36.4%)	21 (63.6%)
To avoid a consultation with a healthcare provider	2 (6.1%)	5 (15.2%)	15 (45.5%)	8 (24.2%)	3 (9.1%)
Safety of your baby	-	-	-	3 (9.1%)	30 (90.9%)
Ability to recognise an illegitimate pharmacy	-	-	-	12 (36.45)	21 (63.6%)
Subjective Norm					
Family influence	5 (15.2%)	2 (6.1%)	17 (51.5%)	6 (18.2%)	3 (9.1%)
Friends influence	6 (18.2%)	2 (6.1%)	17 (51.5%)	4 (12.1%)	4 (12.1%)
Healthcare Professionals influence	1 (3.0%)	1 (3.0%)	4 (12.1%)	15 (45.5%)	12 (36.4%)
Social media influence	10 (30.3%)	7 (21.2%)	9 (27.3%)	6 (18.2%)	1 (3.0%)
Product advertisements	5 (15.2%)	6 (18.2%)	11 (33.3%)	9 (27.3%)	2 (6.1%)
Customer reviews/product ratings	3 (9.1%)	3 (9.1%)	7 (21.2%)	10 (30.3%)	10 (30.3%)
Perceived Behavioural Control					
How easy the website was to navigate	-	-	4 (12.1%)	18 (54.5%)	11 (33.3%)
Your ability to navigate the website	-	-	5 (15.2%)	15 (45.5%)	13 (39.4%)
Delivery options available	-	1 (3.0%)	6 (18.2%)	14 (42.4%)	12 (36.4%)
Secure payment options	-	-	-	13 (39.4%)	20 (60.6%)
Familiar brand of product	-	-	3 (9.1%)	17 (51.5%)	13 (39.4%)
Accredited pharmacy logo	-	-	2 (6.1%)	15 (45.5%)	16 (48.5%)
A familiar trusted website	-	-	3 (9.1%)	12 (36.4%)	18 (54.5%)

Other factors women said they would take into consideration for this task was how important it was that they knew what pain relief was safe to take in pregnancy. Women in the group highlighted they would use advice from healthcare professionals, advice from websites and their own previous knowledge from previous pregnancies to decide what product was safe to purchase prior to purchasing. Brands recommended by healthcare professionals would strongly influence maternal choice.

In relation to purchase intention, 55% (n=18) of the sample would be likely or very likely to purchase a pain relief online in a real-life scenario (Please see Table 8.9).

Table 8.9: Purchase Intention-Task 3

Purchase intention	**Task 3 Frequencies (%)**				
	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very Likely
What is the likelihood you would have gone on to purchase the medication in this scenario?	5 (15.2%)	6 (18.2%)	4 (12.1%)	8 (24.2%)	10 (30.3%)

8.4.4 Skewness and kurtosis values of post-test questionnaire results following purchasing tasks

Descriptive statistical analysis was carried out on the sample to provide information regarding the distribution of scores on the continuous variables categorized as skewness and kurtosis. Pallant (2016) comments skewness values provide an indication of the symmetry of the distribution, where kurtosis values provide information about the 'peakedness' of the distribution. The

scores were calculated for the items in the post-experiment questionnaire (See Table 8.10 and 8.11).

‘Healthcare professionals influence’ had high kurtosis values in tasks 2 and 3 outside +/- 2 range, however the skewness score was satisfactory. ‘Safety of your baby’ item had skewness and kurtosis values outside the range of +/-2 across all 3 tasks. These scores indicate that the majority of the responses were scored high. This stands to reason as women answered 100% that the safety of their baby was important or very important to them. The ‘ability to recognise an illegitimate pharmacy’ also had high skewness and kurtosis values outside the range of +/-2 for task 1. However, skewness and kurtosis values were in the acceptable range of +/-2 for tasks 2 and 3. This would indicate there is a difference in purchasing vitamins and supplements compared to anti-sickness medication and analgesia, with the majority of participants scoring participants scoring higher for task 1. All other items within the survey were within the normal range of +/-2 for skewness and kurtosis scorings.

Table 8.10: Post-test survey results following purchasing tasks –Mean, Standard Deviation, Skewness and Kurtosis

Question: How important were the following factors to you when you were searching for the medication in this scenario?	Task 1				Task 2				Task 3			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
Attitude												
Convenience of not having to go to a pharmacy	3.67	.990	-.290	-.848	3.64	1.055	-.044	-1.208	3.67	.990	-.084	-1.005
Price	3.58	1.370	-.634	-.982	3.39	1.248	-.410	-.735	3.33	1.216	-.251	-1.010
Quality of the medication	4.67	.595	-1.648	1.840	4.52	.566	-.614	-.635	4.64	.489	-.594	-1.757
To avoid a consultation with a healthcare provider	3.33	1.242	-.479	-.504	3.27	1.153	-.054	-.647	3.15	1.004	-.124	.070

Safety of your baby	4.88	.331	*-2.433	*4.170	4.91	.292	*-2.983	*7.343	4.91	.292	*-2.983	*7.343
Ability to recognise an illegitimate pharmacy	4.55	.905	*-2.706	*8.055	4.67	.540	-1.361	1.030	4.64	.489	-.594	-1.757
Sub Norm												
Family influence	2.97	1.185	-.298	-.422	3.03	1.185	-.301	-.581	3.00	1.118	-.286	-.022
Friends influence	3.18	1.131	-.380	-.031	3.00	1.250	-.204	-.678	2.94	1.197	-.110	-.302
Healthcare Professionals influence	3.91	1.100	-1.010	.362	4.09	.914	-1.495	*3.298	4.09	.947	-1.363	*2.509
Social media influence	2.48	1.149	.105	-.895	2.55	1.252	.043	-1.311	2.42	1.200	.248	-1.058
Product advertisements	2.94	1.144	-.275	-1.144	3.00	1.090	-.154	-.683	2.91	1.156	-.201	-.734
Customer reviews/product ratings	3.70	1.159	-.513	-.691	3.76	1.173	-.607	-.643	3.64	1.270	-.715	-.374

*Identifies significant values

Question: How important were the following factors to you when you were searching for the medication in this scenario?	Task 1				Task 2				Task 3			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
PBC												
How easy the website was to navigate	4.03	.684	-.661	1.467	4.12	.820	-.958	1.017	4.21	.650	-.232	-.575
Your ability to navigate the website	4.12	.485	.353	1.307	4.06	.788	-.925	1.275	4.24	.708	-.388	-.871
Delivery options available	4.21	.960	-1.130	.442	4.12	1.023	-1.001	-.049	4.12	.820	-.596	-.227
Secure payment options	4.64	.603	-1.474	1.274	4.55	.617	-1.032	.140	4.61	.496	-.455	-1.913
Familiar brand of product	4.42	.614	-.556	-.523	4.24	.708	-.388	-.871	4.30	.637	-.349	-.581
Accredited pharmacy logo	4.42	.708	-.838	-.490	4.24	.792	-.473	-1.225	4.42	.614	-.556	-.523
A familiar trusted website	4.67	.479	-.741	-1.548	4.48	.667	-.950	-.157	4.45	.666	-.839	-.321

Table 8.11: Purchase Intention across all 3 tasks

	Task 1				Task 2				Task 3			
Purchase Intention	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
What is the likelihood you would have gone on to purchase the medication in this scenario?	4.06	1.391	-1.302	0.227	3.21	1.364	-.409	-1.218	3.36	1.475	-.368	-1.314

8.4.5 Repeated analysis of variance

A one-way repeated measures ANOVA was conducted to identify if there was a significant difference between the scoring in the post-experiment questionnaire across the 3 tasks. The means and standard deviations are presented in tables 8.11 and 8.12. There was no significant difference in the survey results for all factors apart from purchase likelihood. The results of the one-way repeated measures ANOVA showed that there was a significant effect on purchase likelihood (Wilks' Lambda=0.71, F (2,31) = 6.37, p=0.005).

Bonferroni post hoc tests showed that there was a significant effect for purchase likelihood of vitamins in task 1 (mean=4.06; SD=1.39) compared to the purchase likelihood for sickness medication in task 2 (mean=3.21; SD=1.36) and pain relief in task 3 (mean=3.36; SD=1.48).

This evidence supports the hypothesis that there is no significant difference across 3 tasks in the factors that influence online medication purchasing. It is the medication itself that is the significant influence on purchase likelihood, with women more likely to purchase pregnancy vitamins than anti-sickness or pain relief medication. These findings are consistent with phase 1.

8.4.6 Correlation analysis: The relationship between eye movements and purchase intention

To examine the relationship between eye movement metric and purchase intention regression analysis was considered. However due to the small sample size (n=33) correlation analysis was more appropriate to use on the

study data. Correlation analysis was conducted to find out if there was a relationship between the eye tracking metric data and post-experiment questions for purchase likelihood. Pearson r was used in view of the of the continuous variables used in the datasets. In determining the strength of the relationship Cohen (1988) interpretation range of values was used: Small r=0.10 to 0.29, Medium r= 0.3 to 0.49, Large r=0.50 to 1.0.

Pearson correlation demonstrates a strong negative relationship that is statistically significant between purchase intention and AOI 5-medication information for fixation duration (r=-0.456, p=0.008), total visit duration (r=-0.475, p=0.005) and fixation count (r=-0.491, p=0.004). Therefore, the less amount of time women spent looking at medication information the more likely they were to purchase medication online.

8.4.7 Correlation analysis

In view of the small sample size correlation analysis was also carried out to describe the strength and direction of relationship between the theoretical constructs relating to purchase intention. Pearson r was used in view of the of the continuous variables used in the datasets. The correlation analysis was carried out to answer the question:

Is there a relationship between attitude, subjective norm and perceived behavioural control on purchase intention?

In determining the strength of the relationship Cohen (1988) interpretation range of values was used: Small r=0.10 to 0.29, Medium r= 0.3 to 0.49, Large r=0.50 to 1.0.

The Pearson correlation demonstrates a moderate positive relationship between purchase intention and attitude which is statistically significant (r=0.40, p=0.02) and between subjective norm and perceived behavioural control (r=0.351, p=0.045). There is also a strong positive relationship between attitude and perceived behavioural control which is statistically significant (r=0.601, p=0.001). (See Table 8.12).

Table 8.12: Pearson Correlation to demonstrate the relationship between the theoretical constructs relating to purchase intention

	1	2	3	4
1.Purchase Intention	—			
2.Attitude	0.400*	—		
3.Subjective Norm	0.308	0.177	—	
4.Perceived Behavioural Control	0.241	0.601**	0.351*	—

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

8.5 Summary- Key findings

The majority of women (79%) would be likely or very likely to purchase a pregnancy vitamin online compared to 58% of women purchasing an anti-sickness medication and 55% purchasing pain relief medication**.** Therefore, women are more likely to purchase pregnancy vitamins than anti-sickness

medication or pain relief online in a real-life situation. This correlates with phase 1 findings where the highest percentage of purchased products online were vitamins or supplements. However, in the survey more women confirmed they bought pain relief online rather than anti sickness medication.

Thematic analysis of think aloud transcripts identified themes that were mapped to the TPB. Women's online choices were influenced by their previous medication experience. Women had difficulty finding specific safety information they required and expressed feeling overwhelmed with the vast number of available products online. Women were also influenced by product reviews and star ratings. Women selected specific websites that were familiar, had a recognised high street equivalent, were easy to use and provided secure transactions. Women specifically linked these elements with trustworthiness and were strong predictors of purchase intention.

Repeated analysis of variance to compare the findings from the post-experiment questionnaires identified that there was no significant difference across 3 tasks in the factors that influence online medication purchasing. It was purchase intention that demonstrated a statically significant difference across the 3 tasks therefore it is the medication itself that is the significant influence on purchase intention, with women more likely to purchase pregnancy vitamins than anti-sickness or pain relief medication.

Key findings from the integration of the eye tracking metric data and questionnaire data that measures purchase intention identify, the less time

women looked at medication information the more likely they were to purchase medication. This information provides a unique contribution to knowledge and was not identified from the data in phase 1 and phase 2.

Chapter 9 - Discussion

The overall aim of this study was to explore the multiplicity of factors that influence a pregnant woman's intention to purchase medication online. This chapter will discuss the key findings from the study in the context of current policy, practice and education relevant to the role of the midwife. Implications of the survey data that identified patterns of online medication purchasing locally, nationally and internationally will be discussed first followed by the findings from the online focus groups that explored the theoretical, technical, social, financial and practical factors influencing a pregnant woman's intention to purchase medication online. The next section will discuss how the findings from the eye tracking study identified modifiable features of online interfaces likely to influence pregnant women's decisions to purchase medication, followed by a discussion on the integration of the findings within the literature and theoretical perspectives. The final section proposes tentative recommendations for education, policy and practice based on the evidence obtained from the study and the literature.

9.1 Discussion of key findings from phase 1 cross sectional internet-based survey

One of the key findings from this study is that almost 1 in 4 pregnant women (24%) are now purchasing medications online. A previous study by Sinclair et al. (2018) identified in their data collected in 2013, that 5% of pregnant women in the UK purchase medication online. This demonstrates a significant rise in the use of the internet by pregnant women to purchase medication.

Over the past two decades, online medication purchasing has become a more accepted way to purchase medications and is evidenced in the literature as being related factors such as convenience, cost-effectiveness, anonymity and privacy (Kennedy and Wilson 2017; Tascu et al. 2017; Fittler et al. 2018). In general, UK statistics would demonstrate that online medication purchasing is becoming more prevalent with 18% of women making an online medication purchase with the 35-44 age group and overall, representing 26% of online medication purchases in 2019 (Statista 2020).

Findings from the US demonstrate a steady rise in online medication sales with approximately 20% of Americans purchasing medication online (National Cancer Institute 2013). Similar general online medication rates have been found in Denmark (19%) (Tankovska 2019). The percentage of French who have purchased medication online is slightly less at 13%, however 24% would consider doing so in the future (Statista 2019b). A lower rate has been reported for Belgium and the Netherlands; approximately 8% and10% respectively (Raynor de Best 2019a; Raynor de Best 2019b). However, China has reported an increase in demand for online pharmacy services with an expected 5.14 million Chinese expected to regularly purchase online, with a market increase of 30% every year (Matthieu 2018).

Future global online medication sales are predicted to grow to $128 billion by 2023 (Statista 2015), hence we can expect to see a further rise in online medication purchasing for pregnant women in the future.

The majority of women who purchased medication online during pregnancy in this study obtained medications that were recognised as ‘safe’ to use in pregnancy. The main types of medications women purchased online were vitamins and supplements, herbal homeopathic remedies, labour inducing medication, pain relief, medication for indigestion and sickness medication. However, it was also evident that pregnant women were also purchasing medications that were prescription only or contraindicated for pregnancy. This has implications for safety for the mother and baby, highlighting the need for strict regulatory mechanisms for online medications sales.

Women in the survey who purchased online, mainly bought pregnancy vitamins. Kennedy et al. (2016) found the high prevalence of thyroid hormone, iron, magnesium and multivitamin supplements increased the likelihood of drug to drug interactions due to concomitant intake. This is an important finding and healthcare providers should be aware women are often self-medicating with vitamins and herbal supplements and be knowledgeable regarding potential interactions with prescribed medications. The underlying assumption here is that vitamins and herbal supplements are 100% safe and this is not true. The online survey did reference medications that induced labour although, these were mostly named as herbal remedies such as raspberry leaf preparations and castor oil by women who participated in the survey. Castor oil and raspberry leaf have been associated with a higher probability of labour initiation and considered a safe non-pharmacological means of induction of labour (Neri et al. 2017; Zamawe et al. 2018).

Herbal medications have been taken by pregnant women to maintain health, avoidance of illness related to pregnancy and facilitate deliveries (World Health Organization 2014). Abdollahi and Chareti (2019) found the most frequent reasons given for using herbs during pregnancy were to promote fetal and maternal health, to relieve discomfort during pregnancy, to restore youth and to facilitate labour, abortion, reproductive health. Jerman et al. (2017) studied how women sought information about self-managed abortion online and found 41% of women were under 17 and that 11% had tried previously tried to abort their unwanted pregnancy by using a combination of herbal medications, vitamins, alcohol or drugs. Although no reference was made in any of the responses in the survey to the online purchase of abortion medication, one cannot rule out herbal medications or vitamins may have been used in combination to this effect.

Hall et al. (2011) highlighted that potentially up to 60% of pregnant women use herbal medicine during pregnancy. Kennedy et al. (2016) comment that although there is a common perception that herbal medications are safe, some may have potent pharmacological actions and are contraindicated for pregnancy. The findings from this study have demonstrated a significant number of pregnant women are purchasing herbal medications online. Future research should explore the single and combination effect of various herbal medications to provide women and midwives with evidence-based information on safe usage.

The main pain relief medications women had purchased online in the study were Paracetamol, Aspirin and topical applications of Lidocaine cream, Anusol and Emla cream. Paracetamol is a first line analgesic advised for women that is safe to take in pregnancy (NHS 2018a; Bisson et al. 2019). Previous studies have challenged its safety for use in pregnancy and long-term antenatal use identifying increased incidence of childhood asthma (Eyers et al. 2011), behavioural problems (Liew et al. 2014) and delay in gross motor skills development and communication in childhood (Brandlistuen et al. 2013). In 2015 the Food and Drug Administration (FDA) issued a safety announcement raising methodological concerns with these studies and recognised their conflicting results (FDA 2015). The use of OTC analgesia is prevalent and a recent survey of n=2017 UK participants found 40% had used over the counter painkillers in the past 12 months, with 45% and 39% having purchased over the counter medications from online retailers or online pharmacies (Statista 2019c).

Future research should potentially look at long term high dose effect of paracetamol during pregnancy and on neonatal outcomes in the future. Continued vigilance in highlighting to women that common over the counter cold and flu remedies contain paracetamol also needs continued to prevent accidental overdose during pregnancy and prevent adverse outcomes (Bisson et al. 2019).

A small percentage of women in this study also purchased anti sickness medication online such as Cyclizine and Ondansetron. Exposure to

Ondansetron taken in pregnancy has not been associated with a significantly increased risk of adverse fetal outcomes in relation to spontaneous abortion, stillbirth, major birth defect, preterm delivery or low birth weight (Pasternak et al. 2013). Ondansetron also has a low tetrogenic risk but is associated with increased risk for cardiac septum defect (Danielsson et al. 2014) and infant median cleft palate (Anderka et al. 2012). Although the teratogenic risk is low, this study highlights these women are purchasing online and as such previous studies using data from prescription registers may not be reflective of the true amount of antiemetic's women are consuming and there is potential to underestimate the risks for a developing fetus. These medications would also traditionally be prescription only and highlight concerns women are by passing medical consultation and self-medicating when they require medical management and monitoring.

Over the counter medications for the treatment of indigestion were also purchased online by pregnant women. Low value OTC medications such as paracetamol and medication for indigestion have been removed from free prescriptions in an attempt save money by the NHS (National Health Executive 2017). Removal these could potentially make pregnant women more inclined to purchase medications online as a more cost-effective option.

This study found women purchased medication from a range of sources with the most buying from online pharmacy (29%), online health food store (29%) or an online supermarket (19%). Vendors identified from the data in this study highlighted Amazon, Zita West fertility clinic, eBay, Laborite and brand own

websites as the main websites they purchased medication. A recent study has highlighted the main online retailers for UK were boots.com and Amazon where 29% and 26% of online buyers purchased OTC medicines in the past 12 months (Statista 2019c).

This study has highlighted a significant proportion of women (19%) have purchased medication online from their online supermarket or alternative supply sources such as amazon (23%), indicating women are purchasing OTC more from online retail outlets. UK spending on online supermarkets was £12.3bn in 2018 with forecast of online purchasing accounting for 10% of all grocery shopping in the next 5 years potentially increasing to 60%, equivalent to £19.8bn on 2023 (Williams 2019). With this potential for market growth, we can expect to see sales of OTC medications with a woman's online grocery shopping increase in the future. Of the women who purchased medication online the majority found the products they received to be of a good quality and a large proportion said they would purchase medication online again. By purchasing through online supermarket channels, the potential for interaction with a healthcare professional is reduced compared to a pregnant woman discussion safety of OTC medications for pregnancy. As such the importance of highlighting information on safety for medications in pregnancy must be prioritized in future website design in these retail outlets.

Women in this study were generally more likely to be in favour of purchasing medication online if it was cheaper with their experiences of social pressure not influencing their decision. Women were also more likely to feel in control

of their decision to purchase medication online. However, almost two thirds of the women had concerns around the safety of online purchasing and the quality of the product they would receive.

Another key issue highlighted by women in this study was concerns regarding the quality of the product received online. An estimated 10% of medications are suspected as being counterfeit in the supply chain (WHO 2017), with this level rising to 30% of the global medicine market (Behner et al. 2017). A significant amount of these medications enter the illegal online pharmacy trade and approximately 600 illegal online pharmacy websites are launched each month (Centre for Safe Internet Pharmacies 2016). Therefore, differentiating between a legal and fake pharmacy has become a challenge for anyone considering purchasing medication online. Regulators worldwide are working with the pharmaceutical industry in an attempt to deter the illegitimate pharmacy trade with Medicines and Healthcare products Regulatory Agency (MHRA) have seized fake medications worth £10.9 million, closing 123 illegal websites and removing 535 online adverts (MHRA 2018).

Concerns around safety should not necessarily mean pregnant women should avoid online medication purchasing (Bowman et al. 2019). A large proportion of women in the survey have highlighted their need to be able to tell the difference between a legal and fake online pharmacy and that they would consider purchasing medication online in the future. Therefore, future education for women should be targeted, to keep women alert and responsible

for their decision-making regarding access to quality and safe sourcing of medications online.

In relation to the subjective norm measurement the majority of women in this study would not be influenced or pressurised to purchase online by their friends. Women did however feel strongly that approval from doctors and midwives was important for them in selecting a medication to purchase online. This evidence highlights that women are thinking for themselves and making independent healthcare choices. Mehmood et al. (2016) identify the emerging trend of self-medication through the internet as giving patients confidence in the management of their own health and the ability to demonstrate autonomy. However, self-medication and self-diagnosis must be balanced with a woman's level of medication knowledge and be supported by midwives and healthcare professionals to avoid misdiagnosis or treatment that is inappropriate (Little et al. 2018).

In relation to perceived behavioural control, two thirds of the women in this study felt they were not confident or had the necessary skills to confidently make an online purchase, with only half of women feeling their previous experience of online purchasing gave them confidence. The general population statistics identifies almost 20% of all retail purchasing is online (Office for National Statistics 2019b), suggesting a certain level of online purchasing competence exists. However, the fact women have a lacking in confidence in this study is possibly linked to the fact women can feel over-whelmed with the vast amounts of information and options available online

(Barkin and Jani 2016), and a lack of knowledge regarding safety of medication use in pregnancy (Zaki and Albarraq 2014; Sinclair et al. 2018). Almost three quarters of women also found it difficult to navigate websites leading to frustration with the purchasing process, which is a common factor discussed in the general literature (Román and Riquelme 2014). Also, the majority of women in this study also felt it was desirable to have adequate protection of their financial privacy when making an online purchase.

This study highlights original findings in section 6.9, in that it demonstrates the strongest predicting factor of online purchase intention in pregnant women is whether they have previously purchased medication online. Predicting factors of having to pay for prescription medication, having taken a medication for a previous medical condition prior to pregnancy or having a 3rd level education also are predictors of online purchase intention in pregnancy. Employment demographics of being unemployed or a carer for other family dependants also increases a woman's intention to purchase medication online.

Trønnes et al. (2017) found having a chronic disorder was the factor with the strongest association with the use of potentially harmful medications during pregnancy including ibuprofen, metoclopramide and codeine (AOR = 3.99, 95% CI 3.54–4.49). The data from this study highlights a significant number of women who have a previous medical condition and this makes them more likely to purchase medication online. Therefore, we ought to be concerned about the potential risk to these women and their babies. Data from this study has highlighted women have purchased similar analgesia and anti-sickness

medication online during pregnancy. As such women with pre-existing medical conditions should have preconception counselling by midwives and healthcare professionals to ensure safe medication use and prevent neonatal morbidity.

Key theoretical findings from phase 1

This study tested the TPB and its ability to predict purchase intention based on the cross-sectional internet-based survey (Section 6.8). This study demonstrates the constructs of attitude, subjective norm and perceive behavioural control can strongly explain 55% of the variance in purchase intention. All theoretical constructs had a statistically significant predictive influence on purchase intention with PBC making the largest statistically significant contribution (beta=0.422), followed by subjective norm (beta=0.287) and attitude (beta=0.254). As such the TPB is a good theoretical fit to predict online medication purchase intention in a population of pregnant women.

9.2 Discussion of key findings from phase 2 online focus groups on Facebook

The second objective of the study was to explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online. To achieve this objective online focus groups were carried out on Facebook to explore in depth women's views and experiences.

In relation to the TPB construct attitude, this study demonstrated women perceived they had inadequate information about safety of medications during pregnancy and sought support from the internet. Medication safety advice is one of the most commonly searched topics on the internet for pregnant women (Sinclair et al. 2018; Hamëen-Anttila et al. 2013). Women were concerned about the evidence retrieved and cannot always tell real from fake pharmacy sites. Although the UK, US and other countries also have medication safety information that can be accessed online from UKTIS, FASS, Safe for Two, women still need advice from their midwives and doctors.

This study demonstrates pregnant women are turning to the internet to purchase medications online for convenience, cost-effectiveness, better availability of products, with similar findings documented in the literature for general online medication purchasing sales (Kennedy and Wilson, 2017; Tascu et al. 2017). The ability to avoid consultations with healthcare providers strongly appealed to some women in this study to maintain privacy, anonymity and confidentiality. However, this is a concern, as a recent study found 28.3% of women who took medication during pregnancy used medications classed as risky including ibuprofen, metoclopramide and codeine (Trönnes et.al. 2017). This with the combination of pregnant women avoiding healthcare professional consultation and essentially self-medicating by purchasing medications online, highlights a real risk for pregnant women and the safety of their unborn baby.

A large proportion of women in this study either worked full time or part time, with almost half the sample having purchased medication or vitamins online during pregnancy. This highlights modern mothers have a greater intention to purchase medication because of convenience. More worryingly several women in the focus groups commented on using the internet to obtain medication due to long waiting times to obtain appointments to see general practitioners (GP). The most recent GP Patient Survey (NHS 2018b) found 24% of the population had to wait a week or more to get a GP appointment.

Although the literature would suggest more than 90% of pregnant women take a prescribed or over the counter (OTC) medication at some stage during their pregnancy (Mitchell et al. 2011), fear about product safety and teratogenic factors remains paramount (Twigg et al. 2016; Lynch et al. 2018; Mulder et al. 2018). Fears discussed by women in the focus groups regarding online medication purchasing included whether the product they would receive would be of a good quality and the recommended dosage. Previous verification studies testing product content demonstrated considerable variation in the drug concentrations (Lagan et al. 2014; Murtagh et al. 2018). Studies have highlighted a shortfall in the packaging, labelling and patient information by the Medicines and Healthcare Products Regulatory Agency (MHRA 2016b) and thus validating the concerns raised by women in this study. Women in the study also highlighted they tried not to take medications during pregnancy for fear of harmful outcomes for their baby. Twigg et al. (2016) found similar findings in in their study with some women experiencing heartburn and UTIs and not treating the condition. Further research is required to address

women's concerns and explore risk perception around medication use in pregnancy and improve medication adherence.

More caution was displayed by women in this study for online purchase of prescription medications with women who had not previously purchased medication online being fearful. This was generally in relation to protecting the safety of their unborn baby and limiting the teratogenic risk to the fetus; a finding similar to that of general medication usage in pregnancy (Twigg et al. 2016; Lynch et al. 2018). The dangers of online medication purchasing have been highlighted and guidance provided by the Food and Drug Administration (FDA) and NHS (FDA 2018; NHS 2018c). However, women generally felt purchasing vitamins and herbal supplements was safer for them and their baby and felt their family and peers would not have any issues with obtaining them online. Abdollahi and Chareti (2019) found most pregnant women were advised to take herbal medications by their families and did not disclose what they had taken to a healthcare provider as they perceived their use to be safe. Herbal medicines have been perceived by pregnant women to be more natural and safer for use in pregnancy compared to prescribed medicines (Pallivalappila et al. 2013). Women also feel products that could be purchased OTC such as paracetamol are not considered a 'medicine' and therefore do not have as many safety concerns in comparison to prescribed medications (Bowman et al. 2019). Thus, the level of caution when purchasing vitamins, herbal medications and OTC's is less when purchasing online than for prescribed medication.

Concerns were raised by women in the focus groups that women may be using the internet to purchase abortion medication as they are not being sufficiently supported by the healthcare system. In the online focus groups, women discussed more feely they knew purchasing abortion medication online was available and expressed concerns that women's individual choices were not being supported. This qualitative form of research inquiry is definitely more suited to sensitive research topics in vulnerable populations (Creswell and Poth 2016).

Women on the Web provide a telemedicine service that provides information, healthcare support and access to abortion pills online for women with restrictive healthcare systems. A recent study found self-managed medication abortion using online telemedicine was often preferred over travel for women in countries where abortion is illegal due to its convenience and safety, however women found the experience dominated by fear and isolation due to the high associated risk of prosecution (Aiken et al. 2018). With findings from a systematic review by Endler et al. (2019a) showing medical abortion through telemedicine being highly acceptable to women, this supportive form of online medication purchasing should be supported in the future. In countries that demonstrate a contentious political environment with severe restrictions on access to medicalised abortion, the concern is that the future of abortion may be in 'unsupported, online, and in the mail' (Painter 2019).

In relation to subjective norms buying OTC medications, vitamins and herbal medications online during pregnancy was considered by women in the study

to be safe, especially if approved by healthcare professionals. However, Kennedy et al. (2016) found herbal medications recommended to pregnant women from a healthcare professional were three times more likely to be for medications contraindicated for pregnancy.

Women who had previously purchased medications online were less likely to be influenced by family and friends and more favourably disposed towards reviews and star ratings. Younger adults purchasing decisions are strongly influenced by average consumer ratings (Von Helversen 2018). However, negative reviews can exert a stronger influence than positive ones (Purnawirawan 2015). In the group of women who had not purchased medication online peer influence was identified as a factor that influences online purchasing behaviour. Women clearly indicated if online medication was more prevalent and more of their peers were doing it, they too would purchase medication online.

Social media was seen as influential and increased a woman's intention to purchase if they received advice from others that a medication had been helpful to them. Using social media to gain advice has also been found to increase prenatal attachment (Harpel 2018). However, in this study some women did demonstrate concern about the reliability of the advice on social media and pregnancy forums and preferred to see endorsement by healthcare professionals. A recent study by Van Gelder et al. (2019b) reviewed social media posts on medication safety in pregnancy and found the safety classification on strict indication drugs (93%) and medications with insufficient

knowledge on their safety during pregnancy (76%) were more likely to be incorrectly perceived by the public compared to medications with the TIS classification safe (24%). Lynch et al. (2018) identified women had a lack knowledge regarding the effect of medication on their baby and turned to social media and online blogs to assist with their decision making regarding what medications are safe to use in pregnancy.

In relation to perceived behavioural control, women expected to find what they were looking for quickly and efficiently. Specific online stores were preferred by women if they had a function to store personal details and card payments for repeated purchases or who had PayPal options. The potential for online fraud was the most important risk identified in online purchasing (Wang and Chang 2013; Pappas 2016). Women also favoured online websites that facilitated prompt delivery time frames, low shipping costs, free delivery, medication stability assurances and signage for delivery.

Women required security about the use of their personal data and here was a significant direct effect of privacy concerns on both attitude and intention. This construct is an important mediator in explaining online purchase intention with privacy concerns having been found to have a negative impact on trust but a positive impact on perceived risk (Fortes et al. 2017). The current population of pregnant women who are generation Y and Z are internet confident, more likely to have established online purchasing behaviour and therefore more inclined to purchase medication online. Generation Z expect various new devices and electronic processes to be widely available, offering consumers

greater autonomy and faster transactions with which to make more informed shopping decisions online (Priporas et al. 2017).

All aspects of the constructs of attitude, subjective norm and perceived behavioural control were relevant and important in predicting purchase intention from the focus group data. However, what was evident from the focus groups was a core theme of trust ran through all data gathered on the constructs of the TPB. Trust is a known factor to influence behaviour (Hong 2015; Thomas et al. 2018) and has a critical role in determining purchase intention (Wu 2013). Women in this study commented they would only search for information or medications on websites they trusted. Trust was also linked to women's perceived risk of online purchasing associated with the product purchased online and concerns regarding pharmaceutical quality. Li et al. (2014) highlight the concept of trust is more important for internet purchases than offline as consumers perceive more risk in online purchasing due to a person's inability to visit a physical shop and examine the product they wish to purchase. Trust is considered to be one of the most important factors that influences online purchasing (Kim et al. 2012). Trust was linked to brand familiarity with women commenting they trusted familiar high street shops that that online retail outlets, as they were familiar with their products. Women in the study commented they trusted positive online reviews with a stronger intention to purchase and negative reviews with less inclination to purchase medication online. Wang and Chang (2013) found when there is an element of risk involved in online purchasing, the amount of trust a consumer places

on sources of information, recommendations and reviews influences their purchasing decision.

9.3 Discussion of key findings from phase 3 eye tracking study

This section will discuss how the findings from the eye tracking study identified modifiable features of online interfaces likely to influence pregnant women's decision to purchase medication online. This third phase of the study demonstrates a novel methodology for exploring how pregnant women navigate websites and how they instigate and perform a web search for a medication to purchase online. It provides a unique contribution to knowledge in exploring human computer interaction and has not been used before (to the researcher's knowledge) to study a population of pregnant women.

In scenario 1 women searched for pregnancy vitamins to purchase. The vast majority selected a UK brand leader Pregnancare with only two selecting vitamin D and folic acid. Women commented during the study this was because it had been recommended by a doctor or midwife or they had previous positive experience of using it. Therefore, this study highlights healthcare professional advice can positively influence purchase intention. A recent study by O'Duill et al. (2019) in a similar population also found two thirds of women used Pregnancare as their main source of folic acid, however variations in usage were evident over the 3 pregnancy trimesters. Concerns are highlighted in a recent study by Funnell et al. (2019) with only half of women receiving adequate advice on vitamin supplementation in pregnancy and only 37% taking folic acid prior to their pregnancy.

In scenario 2 women searched to buy prescribed medication such as Ondansetron (Zofran), Metoclopramide and Cyclizine. Women in phase 1 of the study had also purchased anti sickness medication online. Concerns regarding side effects and lack of consultation with healthcare providers for ongoing monitoring and assessment for pregnant women with hyperemesis have been highlighted in section 9.1 of this chapter. These purchases were selected as one-off prescriptions from pharmacy websites that were easily accessible in a short timeframe. Over half of the women selected ginger/ginger-based products for anti-sickness in scenario 2. A meta-analysis of clinical trials carried out by Thomson et al. (2014) found using ginger for at least 4 days was associated with a 5 times greater likelihood in improvement of nausea and vomiting in early pregnancy, however its safety profile like many herbal medications is unknown.

In scenario 3 the majority of the women purchased paracetamol online, and five of the women purchased codeine-based medications. Codeine was not highlighted by any women during the phase 1 survey as being explicitly used. Women in this study were also potentially happy to pay significant amounts of money online to purchase higher dosage codeine (30mg) as they knew it was the drug they required, had previous experience of taking it, and purchased from pharmacy sites for ‘one off prescription’. OTC codeine phosphate 8-15mg combined with paracetamol, ibuprofen and aspirin is readily available for purchase online without a prescription (Nielsen et al. 2013). Codeine containing analgesics have been associated with dependence (Van Hout et

al. 2016; Van Hout et al. 2018), serious harm (Frei et al. 2010; McAvoy et al. 2011) and reports of addiction (Tobin et al. 2013; Hamer et al. 2014; Van Hout et al. 2017).

Concern from the findings in this study would be that a few of the participants tried to purchase high doses of codeine 30 mg tablets and rationalized their purchase in talk aloud as they had previous experience of taking this medication with good effect. Codeine has been used traditionally as an antenatal and postnatal form of analgesia (Bisson et al. 2019). However, the Medicines and Healthcare products Regulatory Authority (MHRA) and European Medicines Agency (EMA) issued advice in 2013, following the death of a breastfed infant in 2005 on the use of codeine in pregnancy due to morphine toxicity following maternal codeine use; and also advised against the use of codeine in breastfeeding mothers due to increased risk to the infant (Koren et al. 2006). The data from phase 3 potentially gives a clearer indication of the types of pain relief medication women are purchasing online compared to phase 1. As although women selected pain relief as an option in the survey response, the majority indicated they purchased paracetamol. Whereas purchase of more codeine-based medications online is probable.

This study focused on nine selected Areas of Interest (AOI) that were identified in phase 1 and phase 2 of the study as factors that women identified were relevant to their intended purchase behaviour. During the scenarios, eye tracking metric data for time to first fixation demonstrated women follow an almost identical sequence of behaviour when purchasing medication online

across all the tasks. Consistency in website navigation links and website structure is important to reduce the workload demand on working memory, spatial ability along with the motor and visual functions (Arch and Abou-Zhara 2008). The placement of navigational elements in website design is a crucial element in how it influences website information searching and navigation (Olmsted-Hawala and Jans 2013). This study demonstrates although women searched for products on different navigational websites their sequence of behaviour in searching for medication to purchase was almost identical. As such optimal navigation location for web navigational elements must to continue to adopt a conventional approach to enhance women's perceived behavioural control and influence online purchasing (Beattie and Morrison 2018).

Shorter time to first fixation was observed in this study for condition information can be interpreted that the AOI has better attention-getting properties (Deo 2015). Also, the shorter time to first fixation for an AOI, the greater usability and usefulness (Espigares-Jurado et al. 2020). Women in this study verbalized they looked at condition information mostly to try to locate medication safety information for the condition in each scenario to see what was safe to take prior to looking at specific products to purchase.

Fixation duration and fixation count metrics indicate women look longer looking at condition information, and also fixated on twice as many searching links to purchase sickness medication, indicating more complexity searching compared to purchasing pain relief and even less for vitamins. Longer fixation

duration has also been found to indicate a difficulty in extracting information online (Just and Carpenter 1976; Deo 2015). The duration of fixation can also indicate the time required to process the AOI that is being visualized, with longer durations being strong indicators of attracting attention (Just and Carpenter 1976; Goldberg and Kotval 1999). Women highlighted in think aloud recordings this was because they were unsure of what medications were safe to take and had to carry out more searches to find a safe medication. This was a similar concern highlighted in phase 2 of the study.

Higher fixation durations have been identified across all 3 tasks when women look at medication information, price, products images and searching links. Hsu et al. (2013) identifies higher fixations can indicate more detailed information on this area of the screen, causing women to spend more time processing information in these particular areas to make decisions.

Mikalef et al. (2018) identified that reviews are not considered equally by consumers and some demonstrate more cognitive load and observation for information on websites, implying reviews are being used as a verification tool to confirm intention rather than being a significant indictor of intention in isolation. Other studies have identified consumer reviews as important in purchase intention (Jiménez and Medoza 2013; Mauri and Minazzi 2013; Wang et al. 2015). However, by using eye tracking technology we can understand the cognitive processing associated with human computer interaction.

Product images are important visual elements on a website that can provide information and reduce the amount of cognitive efforts to market or advertise a product and influencing consumer purchasing (Goodrich 2011). Visualization and exposure of these website elements contribute to a woman's decision-making processes (Espigares-Jurado et al. 2020). Product images are the representations of reality that facilitate the woman to imagine using the product and avoid cognitive processing (Scott 1994).

Total fixation duration metrics of the AOI's for price, delivery and medication content were factors women spend minimal time fixating on during the scenarios. The literature for online medication purchasing would emphasize the ability to have cost comparison and cheaper purchasing prices are key features of online purchasing (Miyatake et al. 2016; Jain et al. 2017; SivaKumar and Gunasekaran 2017). However, this study demonstrates minimum time is spent in total fixating on these areas in relation to the purchasing process. Hence identifying it may not be as important a factor in the online purchasing process as expected. More concerning is the fact that women tended to spend a minimum amount of time looking at the content of most medications, raising concerns around their knowledge of potential drug interactions or ability to locate the information during their online searching.

Visit duration metrics demonstrate women spent twice as long looking at medication information for anti-sickness and pain relief medication compared to vitamins. Subsequently women spent a very minimal amount of time looking at condition information for pregnancy vitamins compared to pain relief and

sickness medication. Women commented they felt purchasing vitamins was safer than pain relief or anti sickness medication; a finding consistent with phase 2. Women in this study tended to fixate more on product images for purchasing vitamins. Purchase intention was higher for purchasing vitamins. Therefore, greater fixation duration for product image can increase purchase intention. Aghekyan-Simonian et al (2012) found brand image can directly and indirectly influence online purchase intention by reducing risk perception.

Total visit duration metrics had similar timings to that reported for visit duration with slight variation demonstrating women spending longer looking at product images for pregnancy vitamins. Women also demonstrated more complexity searching for sickness medication and pain relief medication than for pregnancy vitamins.

Observations from eye tracking recordings of how women looked for medications to purchase demonstrated women tended to search familiar branded high street websites. Other studies have also highlighted a consumers trust in a high street brand may positively influence their acceptance of an online version of a product (Savila et al. 2019). An interesting observation noted by the researcher identified that no one looked past the first page of search terms. If women did not easily find what they were looking for, they did not continue to search the familiar site, but deviated to a search on an alternative site. Narasimhulu et al. (2016) found women who use search engines only read the first 2-5 results, and they do not discuss the information they find with healthcare providers; but will use the information to

make healthcare decisions. Women would rather re-enter search terms than scroll onto the second page options. Li et al. (2009) found when a website is accessed for the first-time users cast an initial impression of the interface and will check whether they wish to continue browsing or leave the page. The literature evidences a user will perform an initial glance over a webpage's images and titles within the first 2-10 seconds (Fogg 2003). But will potentially leave a website within 20 seconds if they decide it is not what they wish to view (Nielsen and Pernice 2010), with others commenting on a 15 second rule, which is how long a website has to capture a person's attention (Zheng 2019). The average time spent on a healthcare website is approximately 3 minutes and 38 seconds (Brafton 2017). This would be consistent with time spent searching for pain relief and sickness medication in this study. However, it was noted a shorter time of mostly less than 2minutes for the majority of women to purchase vitamins online.

When searching for information, women tended to come away from a page if there was too much information on it and reverted back to a search option with more concise information. Feeling overwhelmed with vast amounts of online information has been previously highlighted in the findings in phase 2 and the general literature (Barkin and Jani 2016). A large number of women obtained information from the short detail of the search links. All of these findings are in keeping that women have short concentrations and skim read when searching online. Nielsen and Pernice (2010) highlight the majority of online searching is done by scan reading and confirm most people do not read full web content. It is evident from this study; women want quick and convenient

search options and will leave websites if they do not have sufficient usability. Website usability is of key importance in retaining a woman's attention and effects the potential purchase of medications online.

The think aloud findings demonstrate women's online choices were heavily influenced by their previous medication experience, with women mostly searching for medications they had previous experience of taking. Women had difficulty finding specific safety information they required and expressed feeling overwhelmed with the vast number of products available online. Women were also positively influenced by positive product reviews and star ratings. Women selected specific websites that were familiar, had a recognised high street equivalent, were easy to use and provided secure transactions. Women specifically linked these elements with trustworthiness and were strong predictors of purchase intention.

Repeated analysis of variance to compare the findings from the post-experiment questionnaires identified that there was no significant difference across the 3 scenarios in the factors that influence online medication purchasing. It was only purchase intention that demonstrated a statically significant difference across the 3 scenarios, therefore, it is the type of medication that is the significant influence on purchase intention, with women more likely to purchase pregnancy vitamins than anti-sickness or pain relief medication respectively. Women in the study felt vitamins were safer to purchase than sickness medication and pain relief. As such the construct of attitude in TPB plays a significant part in purchase intention.

A strength and unique methodological contribution of this study is how correlation analysis was used to merge eye tracking metric data and survey purchase intention outcomes. Key findings from the correlation analysis found less time pregnant women spent searching for medication information online, the more likely they were to purchase medication. This information provides a unique contribution to knowledge and was not identified from data obtained in phase 1 and 2 of the study. Bowman et al. (2019) found participants felt products that could be purchased OTC such as paracetamol were not considered as a ‘medicine’ and people did not have as many safety concerns compared to prescribed medications. Thus, the level of caution when purchasing vitamins, herbal medications and OTC’s is less when purchasing online than for prescribed medication.

This study used correlation analysis to describe the strength and the direction of the relationship between the theoretical constructs of purchase intention in the TPB. A moderate positive relationship between purchase intention and attitude which is statistically significant ($r=0.40$, $p=0.02$) and between subjective norm and perceived behavioural control ($r=0.351$, $p=0.045$). A strong positive relationship between attitude and perceived behavioural control which is statistically significant ($r=0.601$, $p=0.001$) was also demonstrated. Therefore, this study highlights areas of self-efficacy and website usability are key factors that can influence a pregnant woman’s intention to purchase medication online.

9.4 Discussion on the integration in the study and findings

Integration through design

In this study a multistage mixed methods design using both quantitative and qualitative approaches was adopted as it was best suited to demonstrate a comprehensive understanding of pregnant women's online medication purchasing behaviour.

Integration through methods

The main approaches described in the literature to ensure integration in a mixed methods study include merging, connecting, building and embedding (Creswell and Plano Clark 2011; Fetters et al. 2013; Creswell and Creswell 2018). Merging of the datasets transpires when the quantitative and qualitative data collection and subsequent analysis are completed and the findings can be compared to ascertain complementarity, convergence and divergence in the findings (Curry and Nunez-Smith 2015). The findings from this study have been presented in chapter 6, 7, and 8 with integration of the data demonstrated in the next section.

In this study connected integration was demonstrated methodologically with a sub-set of the women who completed the survey in phase one taking part in the online focus groups in phase 2 and eye tracking study in phase 3. Connecting or building as described by Fetters et al. (2013), was also demonstrated with the findings from phase 1 and phase 2 being used to develop the scenarios and survey instruments used in phase 3.

This study has also demonstrated building by using the findings from the literature review to design the survey in phase 1 which was underpinned by the TPB. Phase 2, online focus groups then built on the findings from phase 1 to inform the design of phase 3. The three phases in this multistage mixed methods study demonstrate building, connecting and merging at multiple points in the research design, data collection, and analysis. This study also demonstrates embedding with all three phases being underpinned by the TPB.

Integration of the findings

The findings in the study under the theoretical construct of attitude confirmed that in all three phases women consistently found purchasing medication online to be convenient, time effective and cheaper with their experiences of social pressure not influencing decision making. Women also confirmed in all phases of the study the main disadvantages to purchasing were fear of harming their baby, concerns regarding safety of medications and product quality from online sales. Similar findings are documented in the literature for general online medication purchasing sales (Kennedy and Wilson, 2017; Tascu et al. 2017).

The ability to avoid consultations with healthcare providers was discussed by women in phase 2 and phase 3 with women rationalising the behaviour to maintain privacy, anonymity and confidentiality. The combination of pregnant women avoiding healthcare professional consultation and essentially self-

medicating by purchasing medications online, highlights a real risk for pregnant women and the safety of their unborn baby.

Subjective Norm construct influences demonstrated women in all phases of the study identified they were not strongly affected by their family and friends opinions. This demonstrates women are aware of other's perceptions but not influenced by them in online purchasing. However, women did feel strongly that approval of medication from doctors and midwives was important when making a decision to purchase online.

Phase 2 findings built on that for phase 1. Women in phase 2 identified that they had concerns women had the option to purchase abortion medication online. Although no reference was made in any of the responses in the survey in phase 1 regarding the online purchase of abortion medication, one cannot rule out herbal medications or vitamins may have been purchased with this desired effect in mind. The fact this option was not specifically highlighted in the survey responses could be the fact abortion was still illegal in Northern and South of Ireland and several US states (Aiken 2017; HM Government 2019) at the time the survey was live. As such women were potentially afraid to disclose their experience due to fear of prosecution. Changes in legislation in the North and South of Ireland have now decriminalised abortion (HM Government 2019). This study may have demonstrated different results if replicated now.

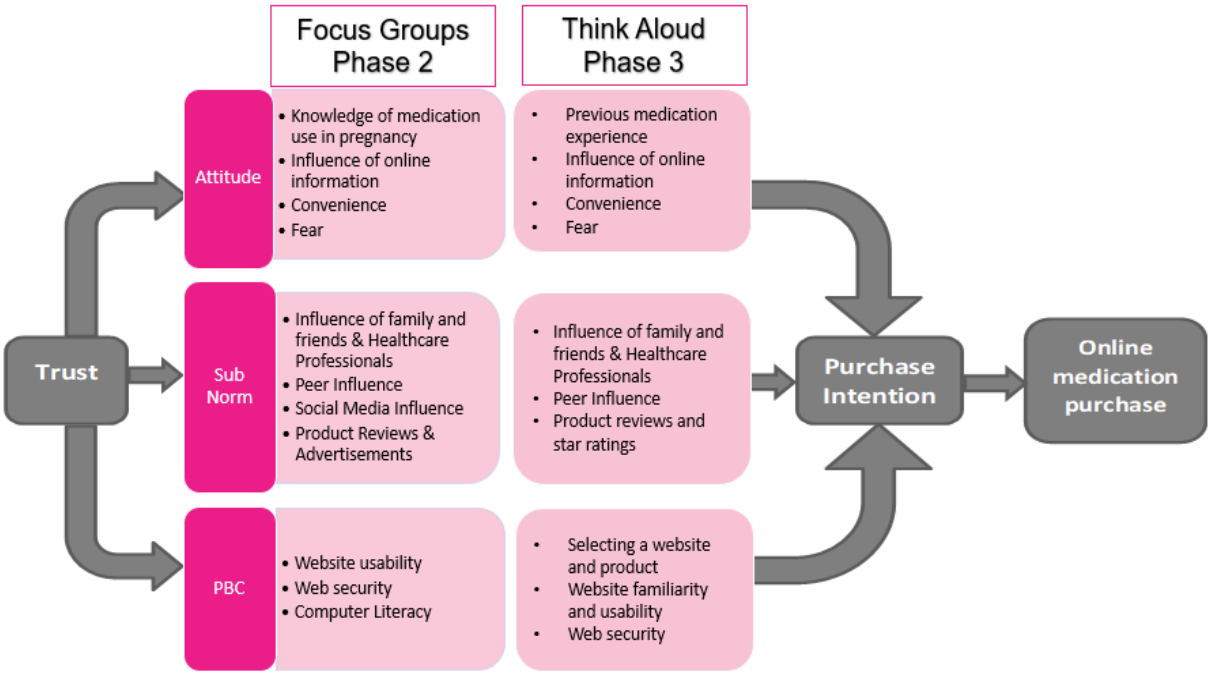
In relation to perceived behavioural control, women in all phases of this study felt they were not confident or had the necessary skills to confidently make an online medication purchase also found it difficult to navigate websites leading to frustration with the purchasing process, which is a common factor discussed in the general literature (Román and Riquelme 2014).

Women also indicated it was desirable to have adequate protection of their financial privacy when making an online purchase in all three phases. The potential for online fraud is the most important risk identified in online purchasing in the literature (Wang and Chang 2013; Pappas 2016). Women highlighted concerns regarding the potential use of their personal data and that had a significant direct effect of privacy concerns on both attitude and intention in phase 2 and phase 3. Perceived Behavioural Control is an important mediator in explaining online purchase intention with privacy concerns having been found to have a negative impact on trust but a positive impact on perceived risk (Fortes et al. 2017).

In phase three the think aloud findings had a strong comparative to that of the findings of the phase 2 focus groups making a strong contribution to theory development on future studies and recognising the impact trust has on purchase intention on this population. Phase 3 think aloud findings only varied slightly from the focus group findings in that women demonstrated their selection of medication to purchase was heavily dependent on their previous medication taking experience. Social media impact was also not discussed by women in phase 3, however this was most probably due the fact the study

was a web search simulation that did not incorporate any social media context. Women in phase 3 also tended to purchase from sites they were familiar with or had previous experience using. See figure 9.1.

Figure 9.1 Comparison and theoretical links of phase 2 focus group and phase 3 think aloud findings



Trust is a known factor to influence behaviour (Hong 2015; Thomas et al. 2018) and has a critical role in determining purchase intention (Wu 2013). Women in this study commented they would only search for information or medications on websites they trusted. Trust was also linked to women's perceived risk of online purchasing associated with the product purchased online and concerns regarding pharmaceutical quality. Trust was linked to brand familiarity with women commenting they trusted familiar high street shops that had online retail outlets, as they were familiar with their products.

Women in the study commented they trusted positive online reviews with a stronger intention to purchase and negative reviews with less inclination to purchase medication online.

Some variations were evident with regard to online purchasing and some women stated cost was most important whilst others felt quality was more important and this was justified with comments such as: ‘you can’t put a price on your unborn baby’ (Section 8.3.1.3).

Phase 3 findings have strengthened the findings from phase 1 and 2 in that the post experiment survey demonstrate women consistently have the same opinion regarding online purchasing, however their purchase intention changes with different medications. Women in phase 3 have demonstrated they are more cautious when purchasing anti-sickness medication and pain relief medication rather than pregnancy vitamins. This is a consistent finding with phase one that demonstrated pregnant women purchased more pregnancy vitamins than any other medication. However, in the survey in phase 1, more women confirmed they bought pain relief medication online rather than anti sickness medication.

The literature would suggest vitamins and herbal medicines have been perceived by pregnant women to be more natural and safer for use in pregnancy compared to prescribed medicines (Pallivalappila et al. 2013). Women also feel products that could be purchased OTC such as paracetamol

are not considered a ‘medicine’ and therefore do not have as many safety concerns in comparison to prescribed medications (Bowman et al. 2019).

Concern from the findings in this study would be that a few of the participants in phase 3 tried to purchase high doses of codeine 30 mg tablets and rationalized their purchase in talk aloud as they had previous experience of taking this medication with good effect. The data from phase 3 potentially gives a clearer indication of the types of pain relief medication women are purchasing online compared to phase 1. The majority of women confirmed purchasing paracetamol for pain relief in the online survey but based on the focus group data it is likely that codeine-based medications were also purchased.

A strength and unique methodological contribution of this study is how correlation analysis was used to integrate the eye tracking metric data and post experiment survey purchase intention outcomes in phase 3. Key findings from the correlation analysis found less time pregnant women spent searching for medication information online, the more likely they were to purchase medication. This information provides a unique contribution to knowledge and was not identified from data obtained in phase 1 and 2 of the study.

Phase 1 of this study tested the TPB and its ability to predict purchase intention based on the cross-sectional internet-based survey (Section 6.8). This demonstrated the constructs of attitude, subjective norm and perceive behavioural control can strongly explain 55% of the variance in purchase

intention. All theoretical constructs had a statistically significant predictive influence on purchase intention with PBC making the largest statistically significant contribution. In phase 3 correlation analysis was used to describe the strength and the direction of the relationship between the theoretical constructs of purchase intention in the TPB. A strong positive relationship was identified in phase 3 between attitude and perceived behavioural control Therefore, this study highlights areas of self-efficacy and website usability under the construct of perceived behavioural control are key factors that can influence a pregnant woman's intention to purchase medication online. As such the TPB is a good theoretical fit to predict online medication purchase intention in a population of pregnant women.

9.5 Recommendations for education, policy and practice to address online medication purchasing in pregnancy

Objective 4 was to confirm data interpretation of the theoretical constructs and explore the tentative recommendations for education, policy and practice. The following recommendations are proposed with action points:

9.5.1 Recommendations for education

1. Education for safe online purchasing is a public health 'shared responsibility' that requires co-production of guidance materials and targeted educational messages for the public and health professionals

Action Plan

The researcher is currently working with the Public Health Agency in updating the Regional Pregnancy Book and proposes to include a new section on: "Safe online purchasing of medications during pregnancy". This will be developed and co-produced by women and health professionals.

The researcher is also working with the Public Health Agency in developing Preconception Care public awareness documents and pathways for women with prior medical conditions to include guidance on medication use in pregnancy. Formal input from pregnant women with chronic health conditions and specialist health professionals providing care will be sought to co-develop and co-produce appropriate guidance.

Justification for the recommendation

This study highlights there is a growing trend of almost 1 in 4 pregnant women using the internet to purchase medications online. Some women do not recognize the potential harm in purchasing OTC analgesics and false assumptions about safety prevail. With almost half of pregnancies still not planned, early risk exposure to women and subsequently the fetus and baby taking illicit medication or purchasing online requires public health awareness

and education for women at a preconception stage. Future education for women and midwives needs to consider safety in purchasing medication online, but also continue to highlight the tetrogenic risks of some medication, so women can reduce their risk exposure. Women who have chronic health conditions such as cardiac disease, diabetes, epilepsy or asthma should receive preconception counselling prior to pregnancy planning so preventative health measures can be taken for contraception or guidance on medication adjustments for pregnancy to reduce the risk.

9.5.2 Recommendations for policy

1. Policy and legislation should be developed to make search engines and social media companies liable for publishing or promoting illegal online pharmacies and fake online medications to protect the public.

Action

Government, policy and legislation officials should be informed of the facts regarding online medication purchasing highlighting the potential for harm for pregnant women. The lack of guidance and safety measures and the responsibility of social media and corporate companies such as GOOGLE or BING have to play in protecting the public from online harm should be highlighted and enforced at legislative level.

Justification for the recommendation

This study has demonstrated the rapidly growing area of online medication purchasing in pregnancy. Yet despite the global recognised availability of illicit

and counterfeit drugs in the online pharmaceutical medications in the supply chain, very little accountability is demonstrated by search engines or social media outlets who promote or advertise illegal online pharmacies. Future legislation should consider holding search engines and social media outlets to account for facilitating illegal online activity.

2. Future planning for healthcare should develop services to facilitate equitable online access for women requiring abortion services

Action

Consultation on the new legal framework for abortion services in Northern Ireland following the decriminalization of abortion has been carried out. The researcher currently has a commissioning role for services for maternity care within the Public Health Agency and will contribute to the production of an equitable service model for women requiring abortion services in Northern Ireland including the consideration of telemedicine.

Justification for the recommendation

Future services should be developed to facilitate equitable access to services for women. Women who choose to avail of medical abortion at home should have access to telemedicine and support services so that they make the safest choice possible. Nurses, midwives and healthcare providers should be available to support women, so women do not have to purchase abortion medication online from unreliable sources with no healthcare provider input.

9.5.3 Recommendations for practice

1. Future healthcare consultations, online prescriptions and over the counter sales advice should be explored from a virtual communication capacity.

Action

Department of Health and workforce commissioners should explore future workforce planning from a virtual communication capacity including virtual chat rooms, skype and safe and secure online mechanisms for consultation and distribution of medications.

Justification

This study has highlighted pregnant women's difficulties in accessing face to face medical appointments resulting in women turning to online medication purchasing as an option to get what they require. Future services should explore more accessible and virtual options for healthcare consultations to maximize the work force potential and ability for women to engage easily with healthcare professionals. We are currently in a health service with workforce capacity issues particularly for midwifery and new ways of working and carrying out virtual consultations should be explored so women and staff can be supported in maternity services.

2. Enhanced communication between midwives, healthcare providers and women regarding medication safety should be developed from preconception to post pregnancy.

Action

Public health resources should be invested in developing critically appraised medication safety information for pregnant women (e.g. leaflets, podcasts, video clips, social media broadcasts, official blogs). These public and professional information sources need to be co-developed by mothers, academics, pharmacists, doctors and midwives. The information needs to be in electronic formats for ease of access and be updated regularly.

Justification

Midwives and healthcare providers must initiate communication with pregnant women to encourage women to openly discuss the risks of taking, stopping, or altering the dosage of a medication while trying to become pregnant or during their pregnancy. Women should be encouraged to initiate conversations with their healthcare provider regarding OTC, herbal, vitamin and prescribed medication to obtain a true reflection of what women are consuming and their means of purchase. In doing so healthcare providers will be able to recognise any potential drug interactions that may affect the safety of the mother and baby.

Further education is required for women on how to access to unbiased information on the safety of medications, vitamins and herbal supplements online so that women can make safe choices on their purchases and midwives can signpost on how to access and provide advice on safe online medication purchasing.

Future development of electronic patient records should have functionality to provide public health messages for women that can be easily accessible from personal electronic devices and provide information on safe medications and online purchasing safely. Future planning for healthcare should develop services to facilitate accessible links to recognised online pharmacy and medication information for women during pregnancy to provide convenient, safe, streamline effective healthcare in the future in keeping with the Department of Health eHealth and Care Strategy (Department of Health 2016).

9.6 Summary

This chapter has discussed the findings from this multistage mixed methods study in relation to the general literature and made recommendations for education, policy and practice. The following chapter will present the study's strengths and limitations along with identifying areas for further research. This chapter will also discuss how the findings make an original contribution to the body of knowledge, dissemination of the results and concluding comments.

Chapter 10 - Conclusion

This chapter presents the strengths and limitations of the study and identifies areas for post-doctoral research. The original contribution to the body of knowledge emanating from the study is identified and a plan for dissemination of the results is presented.

10.1 Strengths and Limitations of the study

10.1.1 Strengths

This study used a robust, multistage, mixed methods design to explore online medication purchasing behaviour in pregnancy. It is one of the first studies to focus solely on general online medication purchasing in pregnancy (to the researcher's knowledge) using the Theory of Planned Behaviour (Ajzen 1985).

The use of a modernised snowball sample with the cross-sectional internet-based survey provided a successful recruitment strategy for phase 1 reaching statistical power and thus leading to a secure recruitment outcome for phase 2 and 3. The sequential nature of the research approaches enabled data linkage, data analysis and data interpretation (findings from phase 1 and phase 2 used to design scenarios for online medication purchasing in phase 3). The design and the integrated use of the TPB strengthened the mixed methods approach and enabled a comprehensive integration of the data sets.

The novel application of eye tracking technology provided a unique method of measuring online purchasing at micro-level and provides an analysis of human computer interaction. The use of the TPB in this approach has

provided unique data that facilitates a deeper understanding of pregnant women's medication purchasing behaviour in pregnancy.

10.1.2 Limitations

The cross-sectional internet-based survey in phase 1 had a sample from 20 countries, however, it was only available in English and did not include women from low income countries. These are limitations of the study that need to be acknowledged.

The survey followed the framework for TPB by Francis et al. (2004), as such questions on the theoretical constructs were asked both directly and indirectly. This made the survey long and quite repetitive and although over 700 people accessed the survey, only 409 women completed questions sufficiently to be represented in the results. Liu and Wronski (2018) found a negative relationship between survey completion rates, survey length and question difficulty.

The survey in phase 1 was also retrospective, therefore, required memory recall which has been highlighted by Van Gelder et al. (2018) as being less accurate than other methods of data collection from medication prescribing registries. However, prescription data bases do not provide information on alterative medicines and OTC medicines purchased by pregnant women, therefore this methodology was best suited for the sample. It must also be highlighted the survey criteria were broad to obtain a general impression of

types of medication women purchased, therefore it would be difficult to make specific inferences for particular types of medications from the findings.

Recruitment for the whole study was from women who participated in phase 1, therefore the sample used could potentially contain a more motivated sample, than that for a general population. Also, a high percentage of the sample in all phases of the study had a 3rd level education qualification or higher; as such further research should investigate women from less educated backgrounds to obtain a more generalisable result.

Conducting research online influences who can join the study as participants require a familiarity and level of competence with online communication (Medley-Rath 2019). Women also need access to the internet and technology to facilitate participation which can restrict some women participating in the study (Moore et al. 2015). However, as this study sought to recruit women who wished to express their experience of online purchasing of medication, it could be assumed they already had a level of competence and access to computer technology.

As the women in the eye tracking study were searching for medication in real time, they lost eye contact with the computer screen periodically to type search terms, as such no recording obtained had 100% recording quality. Holmqvist et al. (2012) comments data quality can be influenced by participants, operators, the task, eye strength, recording environment, geometry or the eye tracking design, all of which could have affected the

results in this study. However, it is a normal habitual behaviour to type search terms when purchasing and makes the study as close to real life as can be expected.

The eye tracking study in phase 3 also only explored purchase intention for 3 types of medications and there was no validation of actual online purchasing, therefore limiting the findings.

10.2 Original contributions to knowledge

This study makes a number of contributions to knowledge in the area of online purchasing of medication in pregnancy.

10.2.1 First study to synthesise published data on online medication purchasing in a published literature review

This study was the first to carry out and publish a structured review of the literature on online medication purchasing in pregnancy. Subsequent to the initial published review, the updated review (January 2018-December 2019) has identified a large increase in the volume of published papers in relation to the acquisition of misoprostol/mifepristone or abortion pills online, highlighting the need for further research into specific areas of medication purchasing in pregnancy.

10.2.2 Study identifies the predicting factors of a pregnant woman's intention to purchase medication online during pregnancy

This study demonstrates that the strongest predicting factor of online purchasing intention in pregnant women is a history of previous purchase of medication online. The requirement to pay for prescription medication, having a medical issue requiring longer term medication and being highly educated are predictors of online purchase intention in pregnancy. Employment demographics of being unemployed or a carer for other family dependents also increases a woman's intention to purchase medication online.

10.2.2. This study was the first to use the novel method of eye tracking

This study was the first to use the novel method of eye tracking in a pregnant population to measure online purchasing at micro-level and provide an analyse human computer interaction when online purchasing. This research study aimed to obtain a deep understanding of the behavioural factors that influenced pregnant women to purchase medication online. By using eye tracking, the researcher was able to determine what a pregnant woman was viewing online in real time on screen and measure for how long and what sequence. As such the researcher was able to elicit more accurate conclusions regarding purchasing medication online and their reasons for choice, justified by think aloud protocols.

Obtaining eye tracking metric data and merging it with post-experiment questionnaire data enabled the researcher to draw conclusions that would not have been feasible from any other means of data collection and analysis. The study has provided new information and a unique statistically significant finding, that the less medication information pregnant women view online when considering a purchase, the more likely they are to purchase medication online (Section 8.4.6).

10.2.3 To date this is the only study to utilize the TPB to identify factors that influence intention to purchase medication online

This was the only study (to the researcher's knowledge) that utilized the TPB to identify the factors that influence online medication purchasing in

pregnancy. A multiple regression analysis was carried out on phase 1 data that demonstrated the constructs of attitude, subjective norm and perceived behavioural control could strongly predict 55% of the variance in purchase intention. As such the theory is a good fit for predicting online medication purchasing in a pregnant population. Further analysis on online focus groups also identified a common thread of trust that ran through all constructs highlighting the significance of this in relation to purchase intention. This was also evident from the think aloud data in phase 3. Correlation analysis was also carried in the eye tracking study in phase 3 that demonstrated a strong positive relationship between attitude and perceived behavioural control and a moderate positive relationship between purchase intention and attitude.

This research has contributed to theoretical knowledge development as the application of the TPB in this context is novel and has proven valuable. We know trust is an overarching factor that has a major influence on all constructs of the TPB and in this specific study, it has been shown to have a major impact on pregnant women's online medication purchasing behaviour with predictive validity. However, in light of the limitations of this study, it is important to undertake further research that includes a more representative sample and women from low and middle income countries and those who do not speak English.

10.3 Future research

Future research should focus on the development of critically appraised information on safe medication use in pregnancy and safe online medication

purchasing. Regular updates for women and healthcare professionals are an educational necessity. However, funding is required to produce regular updates and research is needed to explore the medication topics and the approaches to development and dissemination of the evidence. Future research focusing on dissemination methods for getting evidence into practice should focus on the exploration, uptake and preference for a range of educational communication options (e.g. text alerts, mobile apps, social media, hard paper copy, TV media). This is essential to ensure women and healthcare providers have the most successful forms of access to information to increase the levels of evidence-based knowledge.

The recent update of the literature has highlighted an increase in the area of access to abortion medication from telemedicine websites. The survey results from this study did not highlight any woman purchasing abortion medication online, however the focus groups evidenced women were aware of the option and expressed concerns other women were potentially not getting enough support. As such future studies should explore women's reasons for self-medicating and purchasing abortion medication online, to see what can be done to make it safer or provide better services so that women are better supported in their care and decision making.

A large number of women who participated in this study indicated they had taken medication for a pre-existing medical condition prior to pregnancy which was identified as a predicting factor of online purchase intention. Future studies should explore the potential long-term impacts of medication used that

may not be on prescription databases in this cohort and measure the outcomes for neonatal mortality and morbidity.

The use of eye tracking technology to explore women's online behaviour and interaction with computer interfaces could also be explored further to enhance online programmes for education for both healthcare staff and pregnant women to improve usability and measure efficacy of online options in the future. More research on eye tracking using a pregnant population will also enhance the general applicability and external validity of this research study.

10.4 Dissemination of results

The findings from this study have been presented at local and national conferences including:

- 10/09/19 Final (3rd) postgraduate seminar presentation, Ulster University Jordanstown.
  Presentation: Online medication purchasing in pregnancy

- 02/05/19 Inaugural Doctoral Collaboration Conference UU & QUB
  Canada Room, Queens University, Belfast
  Presentation: Online medication purchasing behaviour in pregnancy.

- 05/05/18 Festival of PhD Research Ulster University.
  Presentation: Online medication purchasing behaviour in pregnancy: A structured review of the literature.

- 4/10/18-05/10/18 Annual RCM Conference Manchester

  Poster Presentation: Little, A., Sinclair, M., Zheng, H., Gillen, P (2018) Using social media for safe and effective recruitment of pregnant women in survey research.

- 31/10/17-01/11/17 Annual RCM Conference Manchester

  Poster Presentation: Little, A., Sinclair, M., Zheng, H., Gillen, P (2017) Safeguarding pregnant women who purchase medication online.

- 12/09/17 Confirmation seminar, Ulster University Jordanstown.

  Presentation: Online medication purchasing behaviour in pregnancy.

- 10/01/17 100-day postgraduate seminar presentation, Ulster University Jordanstown.

  Presentation: Online medication purchasing behaviour in pregnancy.

Further plans have been confirmed to present internationally at the Triennial ICM Midwifery Conference in Bali in June 2020.

The structured review of the literature (chapter 2) has been published in Evidence Based Midwifery in 2018 (Little et al. 2018). Further plans to write up the research findings for publication are in process.

A scholarship was awarded to attend COSTbirth Innovation in Action Research Training School in Lucerne Switzerland in February 2018, funded from the European Cooperation in Science and Technology (COST) Action IS1405 Building Intrapartum Research Through Health (“Birth”).

Funding was also obtained from INHR Ulster University to deliver a Doctoral College Research Led Initiative: Workshop titled ‘Your literature review: sorting fact from fiction’ February 2018.

The researcher has also been awarded the Broadening Horizons Travel Bursary from Ulster University to assist with costs of travelling to Bali to attend and present at the Triennial ICM conference.

A copy of the researchers training and achievements during the PhD is available in Appendix 27.

10.5 Conclusions

Overall, this study has highlighted that increasingly more pregnant women are turning to the internet with 1 in 4 pregnant women purchasing medications online. In this study women considered convenience, importance of rapid retrieval of information, cost-effectiveness, special offers, price comparison, time-efficiency, availability of more product options, anonymity and the ability to avoid consultations with healthcare providers increased online purchase intention.

Women had a definitive lack of knowledge about medication safety and were likely to be influenced by product reviews and star ratings. Women who identified concerns regarding the safety implications for their baby made them less likely or be more cautious when online purchasing during pregnancy. Women also had a false sense of security regarding the safety of certain OTC medications such as paracetamol and herbal supplements.

Friends and family influenced women in different ways. Women felt their friends and family would not approve of them purchasing medication online, however they were not influenced by social pressure to purchase. This demonstrates women are aware of other's perceptions but not influenced by them in online purchasing. Women's purchase intention was strongly influenced by a doctor's recommendation and product reviews and star ratings.

The Theory of Planned Behaviour applied in this study and tested using the eye tracking Technology demonstrates new insight into the online behaviours of pregnant women searching for medications online with new knowledge demonstrated. The less time a pregnant woman searches for medication information online the more likely they are to purchase a medication online. Women select specific websites that are familiar, have a recognised high street equivalent, are easy to use and provided secure transactions. Women specifically linked these elements with trustworthiness and were strong predictors of purchase intention.

For future care provision, midwives and healthcare professionals need to be aware that pregnant women are purchasing medications online to ensure their knowledge is evidence-informed and they offer pregnant women appropriate advice. The current medication profile on pregnant women with chronic conditions is not fit for purpose and a targeted effort to identify and provide preconception care needs requires investment to raise awareness of medication safety and prevention of infant morbidity. Public health agencies need to work in partnership with professionals and parents to develop workable policies and guidelines that will have impact. Government backing for assuring effective online monitoring of websites and the critical appraisal of medications for use by pregnant women is essential in keeping women and their unborn babies safe in the future.

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Appendix 1: Published literature review

Little A, Sinclair M, Zheng H, Gillen P. (2018) Online medication purchasing behaviour in pregnancy: a structured review of the literature. *Evidence Based Midwifery* **16**(1): 13-20

Online medication purchasing behaviour in pregnancy: a structured review of the literature

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Abstract

Background: When deciding to purchase medication online a pregnant woman has to negotiate a complex health system that involves concerns regarding risk, safety and responsibility for the baby along with her own needs. Research is required to determine what modifiable factors influence a pregnant women's behaviour with regard to the purchasing of medications online.
Research question: What modifiable factors influence a pregnant woman's intention to purchase medication online?
Methods: A structured review of the literature was completed using the 12-step approach described by Kable et al (2012). PRISMA guidelines were followed to ensure credibility and transparency in the review. A systematic search of the literature was carried out on eight databases including: MEDLINE (OVID), CINAHL Plus, PsycINFO, Web of Science, Scopus, Google Scholar, EtHOS and PROSPERO. Inclusion criteria were primary quantitative, qualitative, mixed method studies or literature reviews, having been published in peer review journals between January 2007 to January 2018 in English. The population was pregnant women, and the outcomes of interest were the modifiable factors that influence intention to purchase medication online. Quality appraisal of the retrieved papers was assessed using the Joanna Briggs Checklists for Analytical Cross Sectional Studies, Qualitative Studies and Diagnostic Test Accuracy.
Findings: The search of the databases retrieved 4150 papers. Only four papers were eligible for inclusion in the review. Themes of medication safety, online purchasing of medication and the mother's relationship with healthcare professionals were identified. Sub themes included attitudes towards taking medication, safety of the unborn baby, risks of online medication purchasing, advertising factors, customer reviews, changing dynamic of the doctor/patient relationship, and ability to bypass medical consultation.
Conclusion: There is a definitive lack of empirical studies in this field and further qualitative and quantitative research is needed.
Implications for practice: Midwives and healthcare professionals need to be aware that pregnant women are purchasing medications online.

Key words: pregnancy, medication, safety, online purchasing, internet, evidence-based midwifery

Background

Over recent years there has been changing dynamics in the pregnant population. Women are becoming pregnant at an older age (Kenny et al, 2013) and there is poorer general health at the start of pregnancy associated with lifestyle factors such as smoking, alcohol consumption, recreational drugs, obesity, reduced physical activity and a recognised increase in IVF pregnancies (Klonoff-Cohen, 2017). These factors along with pre-existing medical conditions increase the need for some women to continue taking medication during pregnancy, with more than 90% of pregnant women taking a prescribed or over-the-counter (OTC) medication at some stage during their pregnancy (Mitchell et al, 2011).

For many medications, there is a lack of evidence regarding specific recommendations for use by pregnant women (Thorpe et al, 2013; EUROmediCAT, 2011). When taking a medication, a pregnant woman has to negotiate complex health-based decision-making that includes concerns involving risk, safety and responsibility for the baby along with her own needs (Meurk et al, 2014). A lack of evidence regarding the safety of medications for use in pregnancy creates a challenge for healthcare professionals and pregnant women. Ultimately this may impact on women's ability to make informed decisions (Hansen et al, 2016).

In recent years the internet has developed widespread attention as a source of health-related information for women during pregnancy (Sinclair et al, 2018; Gao et al, 2013; Song et al, 2013; Lagan et al, 2010) and a purchasing channel for medication (Sinclair et al, 2018; Holtgräfe and Zentes, 2012). Sinclair et al (2014) identify women are self-medicating and buying paracetamol, opiate based drugs such as codeine and anti-inflammatory medication for lower back pain. There is also a body of evidence that women are using herbal medication during pregnancy (Kennedy et al, 2016; Kennedy et al, 2013). For the pregnant woman the internet has now provided the option to purchase OTC medications, herbal/homeopathic medications and prescription-only medicines online (Fittler et al, 2013). The literature regarding the increasing prevalence of e-pharmacies in use would suggest the online medication industry is a growing economy (The Centre for Safe Internet Pharmacies, 2016).

With the growing importance of the internet as a source of information and provision of options to purchase medications online, research is required to address the gap in the knowledge

and to determine what modifiable factors influence a pregnant woman's behaviour with regard to the purchasing of medications online. Being able to signpost women and healthcare professionals to access valid and reliable online information about medication usage, and online purchasing in pregnancy is our shared responsibility (Sinclair, 2014). Understanding what, how and why women purchase medication online is important to shape future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service provision.

Aim

The aim of this structured review was to critically analyse and synthesise previous research studies in a transparent and reproducible way in order to increase knowledge of online medication purchasing behaviour in pregnancy.

Research question

We used the approach recommended by Khan et al (2003), Patient, Exposure and Outcome (PEO) to focus the research review question:

"What modifiable factors influence a pregnant woman's intention to purchase medication online?"

Objectives:

- To describe and analyse patterns of online medication purchasing by pregnant women, locally, nationally and internationally.
- To explore the theoretical, technical, social, financial and practical factors likely to influence a pregnant woman's intention to purchase medication online.

Method

The 12-step guideline by Kable et al (2012) was used to provide a structured and replicable literature review. This structured approach was used to document the search strategy prior to the critical analysis and synthesis of the data retrieved (Table 1). This structure was also chosen as it provided a framework that was easily translatable for writing for publication. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were also followed during the review to ensure credibility and transparency in the review process (Shamseer et al, 2015).

The databases MEDLINE (Ovid), CINAHL Plus, PyschInfo, Web of Science and Scopus were searched in April 2017 and the search was updated in January 2018 to locate published research regarding online medication purchasing behaviour in pregnancy. MEDLINE (Ovid) was identified as one of the key databases for the topic of interest in this review and the search strategy was initially trialled on this in order to test that the MeSH and keyword terms retrieved relevant papers.

Searches of the grey literature were carried out using Google Scholar for any other published or unpublished material such as conference presentations. Searches for theses were under taken by searching Ethos, which provides a list of theses stored by the British Library. Manual searches for references were undertaken by searching for relevant citations of selected articles. PROSPERO was searched for any ongoing or recently completed systematic reviews. Alerts were set up on the first author's personal account for each database in order to receive notifications of new publications during the period of the review.

Table 1. A 12-step guideline for authors (Kable et al, 2012)

1.	Provide a purpose statement
2.	Document the databases or search engines used in your search strategy
3.	Specify the limits applied
4.	List the inclusion criteria and exclusion criteria
5.	List the search terms used
6.	Document the search process
7.	Assess retrieved articles for relevance
8.	Document a summary table of included articles
9.	Provide a statement specifying the number of retrieved articles
10.	Conduct quality appraisal of retrieved literature
11.	Critical review of the literature
12.	Check the reference list for accuracy

(Kable et al, 2012)

The following inclusion/exclusion criteria were applied to the search:

Inclusion criteria

- Studies involving pregnant women purchasing medication online.
- Papers from peer reviewed journals published from January 2007 to January 2018.
- Primary quantitative, qualitative, mixed method studies and literature reviews.
- Articles written in English.
- Studies involving only human subjects.

Exclusion criteria

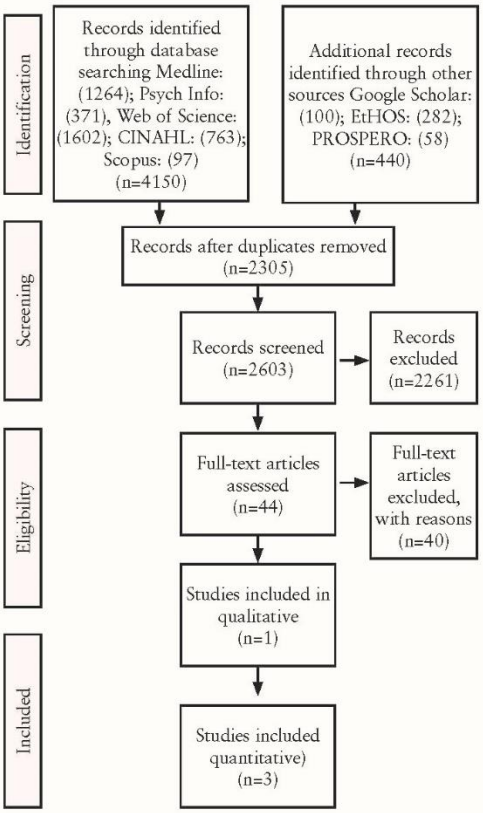
- Studies that do not focus specifically on pregnant women purchasing medication online.
- Studies focusing on online purchasing of contraception.
- Non peer reviewed studies.
- Studies not written in English.

The research question was broken down into the component parts to identify the appropriate search terms.

The search strategy was created with the assistance of the university librarian who had expertise in systematic review searching specialising in life and health sciences. The search terms were tested to verify their effectiveness in locating papers consistent with the inclusion and exclusion criteria for the review, prior to applying to all searches. After the MEDLINE strategy was finalised, it was adapted to the syntax and subject headings of the other databases. Literature search results were transferred to the Refworks reference management software package to facilitate collaboration with reviewers during the study selection process.

The PRISMA flow diagram (Figure 1) demonstrates the strategy used for the selection of the papers included in the review. The Refworks reference management software package was used to remove all duplicate references. All remaining relevant papers were screened by title. Those not meeting the criteria were removed. Where there was uncertainty regarding

Figure 1. Search strategy for article selection PRISMA Flow Diagram



the relevance of the study by title, the abstract was read to determine if the study met the inclusion criteria. In cases where it was unclear from the abstract if the article had relevance to the review, the full paper was obtained from the databases, open access or inter-library loan system and inclusion/exclusion criteria applied.

Quality appraisal of the retrieved articles was assessed using the Checklist for Analytical Cross Sectional Studies (The Joanna Briggs Institute, 2016a), the Checklist for Qualitative Studies (The Joanna Briggs Institute, 2016b) and the Checklist for Diagnostic Test Accuracy Studies (The Joanna Briggs Institute, 2016c). In the EUROmediCAT (2011) study, methodological limitations were identified with only two focus groups having been carried out. It is therefore debatable if data saturation would have been achieved from the findings. However, the study was considered too valuable to exclude and was included to explore all the current body of knowledge of the topic.

The study by Sinclair et al (2018) included in the review identified 5% of the population were using the internet to purchase medication online, though the data were collected in 2013 so an update is required for today's population of pregnant women. There was also no breakdown of what actual medications pregnant women specifically purchase from the internet. None of the studies extracted from the literature address the social factors that influence medication purchasing behaviour online such as the influence that family and friends have on a pregnant woman's intention to purchase medication online. There are also no studies that look at purchase intention in relation to the human/computer interaction of the mother and website. It is relevant to discover if factors such as website navigation and interpretation of information provided on the site influences a woman's purchase intention.

Results

In total 4590 hits were obtained from the search strategy. After screening 44 full text papers were accessed for eligibility and four papers met the inclusion criteria to be included in the review. Three of the papers retrieved from the literature search all related to the EUROmediCAT (2011) four phase, multi-method scoping study conducted between March 2011 and December 2013 (Table 2).

The findings from the included papers were explored using thematic analysis, and the overarching themes were identified to elicit what modifiable factors influence a pregnant woman's intention to purchase medication (Braun and Clarke, 2006). Theme maps were also used to form a visual tool to map out the facets of the developing analysis and to identify themes, subthemes, and interactions between themes and subthemes. The main themes and sub themes that emerged were:

- Medication safety
- Attitude towards online medication purchasing
- Mothers relationship with healthcare professionals.

Medication safety

Attitude towards taking medication in pregnancy

Attitude towards taking medication in pregnancy is a key determinant of whether a pregnant woman will decide to purchase medication online. Sinclair et al (2018) identified that 87% would only take a medication if it was absolutely necessary to maintain their health status. Furthermore, in their study 40% of the sample (n=82) had a prior history of a chronic health condition and 39% where taking at least one medication when they became pregnant.

Concerns for their unborn child

Sinclair et al (2018) identified that regardless of age, 90% of women would reconsider taking medication if they were to become pregnant due to the potential risk to their unborn child. This is in stark contrast to the study by Murtagh et al (2017) that demonstrated there is a cohort of pregnant women at the other end of the spectrum who can avail of the option to purchase medication online with the intention to end their pregnancy.

Attitude towards purchasing medications online

Perceived benefits of online medication purchasing

Table 2. Summary of the papers selected for inclusion in the review

	Author (year) country	Study design	Sample size and sites	Design/data collection methods	Comments/key findings	Quality appraisal
1	Lagan Et al (2014) Assessing the availability of the teratogenic drug isotretinoin outside the pregnancy prevention programme: a survey of e-pharmacies	Cross sectional survey Online purchase of isotretinoin	n=50 e-pharmacies	Quantitative Phase 1: Cross-sectional survey identifying e-pharmacies Phase 2: Purchasing isotretinoin from subset of phase 1 to access PPP policy adherence, purchasing procedures and check samples for chemical authenticity	Tetrogenic compounds isotretinoin is accessible to purchase online while pregnant without prescription. n=43 (86%) e-pharmacies did not have authentication logo Isotretinoin could be purchase from 42 sites without valid prescription Information missing on birth defects n=25 Information on not taking isotretinoin in pregnancy missing in n=24 Information missing on not taking isotretinoin if planning pregnancy missing n=33 Of eight attempted purchases n=7 arrived. All were verified as isotretinoin	Checklist for analytical cross sectional studies (The Joanna Briggs Institute, 2016a)
2	EUROmediCAT (2011) W7 Implications of the internet in relation to medication access and safety information.	Four-phase multi-method approach	Phase 4: Two focus groups of women (n=11 and n=15)	Phase 4: Online focus groups	Phase 4: Findings substantiated the data from the literature about accessibility, affordability, convenience and the need to check medication safety information	Checklist for qualitative studies (The Joanna Briggs Institute, 2016b)
3	Sinclair et al (2018) An assessment of pregnant women's knowledge and use of the internet for medication safety information and purchase.	Cross-sectional survey	n=284	Quantitative: Online survey	5% of women reported buying medication online 46% of women with higher levels of education consider buying medication online as safe	Checklist for analytical cross sectional studies (The Joanna Briggs Institute, 2016a)
4	Murtagh et al (2017) Exploring the feasibility of obtaining mifepristone and misoprostol from the internet.	Online purchase and chemical assay of mifepristone and misoprostol	n=18 websites identified to purchase mifepristone and misoprostol online	Quantitative: n=20 mifepristone-misoprostol combination products and n=2 misoprostol products purchased online	Online abortion medication can be purchased online in the US without prescription Mifepristone tablets purchased had within 8% of the labelled amount of active agent (200mg mifepristone tablet contained between 184.3mg and 204.1mg) Misoprostol 200mcg tablets contained between 34.1mcg and 201.4mcg of active ingredient]	Checklist for diagnostic test accuracy studies (The Joanna Briggs Institute, 2016c)

Sinclair et al (2018) identified that 5% of the pregnant population purchased medications online. A qualitative study by EUROmediCAT (2011) found that women perceived the benefits of online medication purchasing as being cheaper than other retailers, convenient, and accessible without prescription or unavailable in the UK. Sinclair et al (2018) identified that women with a higher educational attainment were more likely to consider purchasing medication from online pharmacies to be safe (42% vs. 26% p<.001) and would purchase medication online from an e-pharmacy while pregnant if they could not buy the medication from a local pharmacy or doctor (54% vs 46% p=.008) or if it was

cheaper (41% vs 23% p=.004) compared with women with lower educational attainment. In addition, they reported that 71% of pregnant women who purchased medication had been asked 'sometimes' or 'never' by the online pharmacy for a prescription and only 57% had been asked 'sometimes' if they were pregnant. The remaining 29% were not able to remember if they had been asked. Forty-three percent of women in this study were never asked to complete a medical questionnaire. None of the online pharmacy websites in the study by Murtagh et al (2017) asked for a prescription.

Perceived risk of purchasing online

A pregnant woman's perceived risk plays a major role in the intention to purchase medication online. Sinclair et al (2018) identified that regardless of demographic status, 85% of women would not purchase medications online if they were pregnant due to fear surrounding legitimacy of the e-pharmacy, safety, quality, dosage and whether or not they would receive the product. Of the women who purchased medication online, 50% always received their order, while the rest only received them occasionally or never. This study also reported 46% of women with higher levels of educational attainment thought that buying medications online from e-pharmacies as safe and acceptable. However, only 5% of the population had done so during pregnancy.

The study by Lagan et al (2014) provided evidence that women of child-bearing age, who were potentially in early pregnancy, had the opportunity to purchase online the teratogenic drug isotretinoin for severe acne without any form of risk assessment, pregnancy prevention advice, or warning of the potential teratogenic effects associated with the consumption of the drug. This particular drug is a known teratogen and it should not have been available for online purchase without a prescription as the recipient, if female, must be on double contraception and have medical counselling.

In relation to verifying illegitimacy of an online pharmacy, Sinclair et al (2018) found 200 (70%) women had never seen a symbol or warning message indicating a medication may be harmful to a baby 'if taken in pregnancy' or 'do not take in pregnancy'. Lagan et al (2014) assessed eight e-pharmacy sites that displayed a pharmacy accreditation seal and one of these was not authentic. Also, if the site displayed an 'authentic' accreditation seal, it did not necessarily follow that governance procedures were in place to minimise the risk of harm for consumers who purchase medication online. Regardless of age and educational attainment 75% of women stated they would be unable to differentiate between a legitimate and illegitimate online pharmacy.

EUROmediCAT (2011) identified that pregnant women have concerns regarding the quality of the product they order, what country it is from and whether the product they receive is safe. Lagan et al (2014) found that almost half (41% n=21) of 50 e-pharmacies had a home and purchasing page hosted on servers in different countries and although 94%, (n=47) displayed a policy on medication quality assurance, 68% (n=34) did not verify what country the medication was manufactured in, with only 30% stating the medication was manufactured in India and one in the UK. Murtagh et al (2017) found that all of the products were labelled as having been manufactured in India. They also found evidence of multiple websites being run by the same vendor, with one website disappearing and reappearing several days later during the data collection period. Fittler et al (2013) had similar findings and found one in five online pharmacy websites closed down and reopened again within a four-year period, presumably to avoid prosecution from regulatory bodies or unsatisfied customers.

A major concern identified by pregnant women was whether the medication they received would be of good quality (Sinclair et al, 2018). EUROmediCAT (2011) also highlighted concerns from pregnant women regarding whether the medication was effective or not for their particular condition. Lagan et al (2014) conducted laboratory tests on n=7 samples of isotretinoin purchased from online pharmacies and of these the quality of the compound in all samples was verified to be authentic. Murtagh et al (2017) also conducted chemical assay testing on samples of mifepristone and misoprostol tablets purchased online without prescription. They found the mifepristone tablets contained mifepristone within 8% of 200mg, ranging from 184.3mg to 204.1mg/tablet and misoprostol between 34.1mcg to 201.4mcg.

Lagan et al (2014) found that the medication purchased online had minimal information supplied and none had a patient information sheet. None of the samples were supplied in a box or container, two samples were wrapped in bubble wrap and one tapped between two pieces of cardboard. However, four samples did highlight a warning to female patients that the medication may cause severe birth defects and should not be taken if pregnant or they are likely to become pregnant during treatment. Three samples contained no reference or warning regarding pregnancy. Murtagh et al (2017) found that none of the samples of medication they purchased online came with any form of instruction or written communication. All of the tablets in this study did arrive in blister packs. However, eight of the products had small pin-prick holes and one product arrived damaged with the blister packs split open and some of the tablets broken.

Another concern of online purchasing is whether the product will be received. Murtagh et al (2017) ordered 22 products online from 18 websites and received 20 products from 16 websites. Lagan et al (2014) found of the eight online purchases of medication, seven resulted in the delivery of the product, with one purchase being blocked by the credit card company as it was on their fraudulent blacklist.

Influence of advertising and reviews

Pregnant women have acknowledged that they have read testimonials and blogs provided by other customer reviews to inform their decision to purchase medication online (EUROmediCAT, 2011). Pregnant women have also identified that they use Google as a search engine to identify pharmacy websites and other purchasing channels such as EBay and Amazon to obtain medication (EUROmediCAT, 2011). Lagan et al (2014) identified statements on e-pharmacy websites that were misleading and openly encouraged the online purchase of isotretinoin by promoting the purchase without a prescription and being as easy to obtain as a 'click of a mouse'. Lagan

et al (2014) also highlighted there was little to no adherence of the Pregnancy Prevention Programme (PPP) as a condition of licensing to safeguard pregnant women and women of a childbearing age from the teratogenic effects of isotretinoin.

Mothers relationship with healthcare professionals

Changing dynamic of the doctor/patient relationship

The accessibility of online pharmacies has altered the dynamic of the doctor/patient relationship and the consumer can directly bypass the safeguards provided by this relationship and go online to purchase prescription-only medication without a prescription (Lagan et al, 2014). Murtagh et al (2017) also recognised that purchasing medication online does not require a prescription and provides privacy and self-agency in countries where often restrictive laws, clinic closures and financial barriers inhibit a pregnant woman desiring an abortion.

Ability to bypass medical consultation

Murtagh et al (2017) identified that none of the 18 websites they ordered online medication from required a prescription or medical documentation, with only two requiring an online medical history questionnaire to be completed. Also, none of the questions on the questionnaire asked about gestational age or specific contraindications for mifepristone. Pregnant women have voiced concerns that by purchasing medication online and not having a consultation with a healthcare practitioner, something harmful could be missed (EUROmediCAT, 2011).

Discussion

A pregnant woman has to take into consideration the effect of a medication on her unborn child. This alters the decision-making process from that of a general purchase, often generating reservation in not only purchasing medication online but on whether to take medication in general. Twigg et al (2016) identified the safety of their baby as one of the main concerns for pregnant women when deciding not to take medication. Clemow et al (2014) found pregnant women routinely overestimated the teratogenic risks of taking medication which subsequently effected whether the woman took medication during her pregnancy. Thorpe et al (2013) also discussed the other potential reason for not taking medication as being a lack of evidence and accessible safety information. However, the majority of literature regarding the online information seeking behaviour of pregnant women would suggest that safety information was readily available and accessed regularly by the pregnant population (Sinclair et al, 2018; Sayakhot and Carolan-Olah, 2016; Hamëen-Anttila et al, 2014; Gao et al, 2013; Song et al, 2013; Lagan et al, 2010). However, studies by Stephansson et al (2011) and Widnes et al (2012) suggested women with underlying co-morbidities are not compliant with taking prescribed medication during pregnancy. Sinclair et al (2018) attributed this to the possibility that a pregnant woman's own online research regarding prescribed medications influences their informed decision making.

The papers from the review highlighted the benefits of online medication purchasing for pregnant women as being cheaper, convenient, accessible, non-prescribed, and the ability to purchase across geographical boundaries contrary to regulation (Sinclair et al, 2018; Murtagh et al, 2017; Lagan et al, 2014; EUROmediCAT, 2011). These factors are not new and there is similar data from the general population by Fitter et al (2013); Assi et al (2016) and Kennedy and Wilson (2017). There is now a recognised growing trend for people accessing over the counter medication, herbal and homeopathic medication in drug stores, health food stores and supermarkets (Holtgräfe and Zentes, 2012). All of these outlets now have online purchasing options without any meaningful engagement with healthcare professionals for guidance and can thus be a cause of concern and increase the purchasing risk for the pregnant woman.

Sinclair et al (2018) identified that only 5% of the pregnant population have purchased medication online during pregnancy which is a relatively small percentage. However, our recent pilot data of 44, shows that now almost 25% of pregnant women are purchasing medication online (Little et al, 2018) a sharp increase from the data collected in 2013 in the UK study by Sinclair et al (2018). This is indicative of the growing number of pregnant women who have purchased medication online in the past five years. Further research is required to examine the online purchasing behaviour currently in a larger, more international sample. In the UK the majority of prescription medications are free, therefore there is not the same inclination on the purchaser to have to look for alternative more cost effective treatment. Conversely, in the US one in four people who take prescription drugs have difficulty affording them and turn to more cost effective means of procurement (Cox et al, 2016).

Healthcare in the UK is rapidly changing. Press coverage has highlighted NHS England are cutting low-value medicines such as indigestion and heartburn medication from prescriptions (National Health Executive, 2017). With these trends and ever looming budget cuts, it will not be long before more pregnant women in the UK are starting to turn to the internet to obtain medication for pregnancy as a more cost effective means.

The dangers associated with illegitimate online pharmacies has been recognised by the NHS Choices (2015) and the US Food and Drug Administration (2016) who have provided online advice and guidance on how to purchase medication safely online. However, Kennedy and Wilson (2017) highlighted that consumers have difficulty in recognizing the signs of an illegitimate pharmacy and that advice alone may not prevent them from accessing such sources. Sinclair et al (2014) also identified 71% of women had never seen pregnancy warning symbols on online medications.

Lagan et al (2014) study demonstrated that women of a child bearing age or pregnant women can potentially purchase teratogenic medication online without any risk assessment, pregnancy prevention advice or adequate warnings of the dangers associated with taking teratogenic medication on a pregnancy. This highlights a strong concern regarding the safety of purchasing medication online with the potential teratogenic risk on the fetus. As such pregnant women and women of a childbearing age need educated on the effects

of potentially teratogenic medications and how to purchase medication safely online from legitimate websites.

The studies by Lagan et al (2014) and Murtagh et al (2017) both indicated that medications purchased online fall short of the Medicines and Healthcare Products Regulatory Agency (MHRA) guidance on medicines regarding packaging, labelling and patient information leaflets (MHRA, 2016). This evidence is consistent with studies by Fittler et al (2013) and Berard et al (2014) that found pharmaceutical products packaging falls short of what is to be expected, thus validating fears regarding the quality of products and potential risks associated with online purchasing for the pregnant woman. Ultimately, if purchasing a medication online the consumer wants to receive the product ordered. Sinclair et al (2018) have highlighted pregnant women have reservations regarding the quality of the product they receive. However, Lagan et al (2014) found that all the medications purchased online were chemically verified as isotretinoin, as per order. Murtagh et al (2017) study verified the active ingredient of the medication purchased online was mifepristone. However, the dosage of mifepristone tablets purchased had a range within 8% of the labelled 200mg amount of active chemical agent (ranging from 184.3mg to 204.1 mg/tablet), which is a lower range than would be expected. Berard et al (2014) found misoprostol stored outside a blister packet exhibited a 5% loss in the active ingredient within 48 hours and 10% decrease in the active ingredient dosage when exposed to 25 °c/60% relative humidity for one week, thus having the potential to adversely impact on the clinical efficacy of the product.

With the emphasis on empowering women in maternity care to make decisions, the use of the internet has facilitated women seeking information for themselves. It has also facilitated women to bypass the healthcare professional consultation, and allow the direct purchase of medication. The emerging trend for self-medication through online medication purchasing has been highlighted in the literature by Mehmood et al (2016) as giving patients an opportunity to take responsibility and build confidence in their ability to manage their own health. However, this has to be balanced with an individual's level of knowledge, information and healthcare support to avoid issues of misdiagnosis or availing of inappropriate treatment.

Bypassing the doctor-patient consultation can also be an advantage to pregnant women who have decided they no longer wish to continue with a pregnancy (Murtagh et al, 2017). A simple Google search with the search terms 'purchasing medication in pregnancy' produces several thousand 'hits'. However, the information provided was not on over the counter, prescription or herbal medications, rather it focused on the medications women do not conventionally want to discuss with their healthcare practitioner; those that relate to termination of pregnancy. Media releases have identified that women have bought termination of pregnancy medication over the internet and in places such as Northern Ireland where the termination of pregnancy is illegal, they have been prosecuted for their choices (McDonald, 2017). As such, further research is required to address these sensitive issues that have ethical and legal implications for women and healthcare practitioners.

Strengths and weaknesses of the review

The methodology adopted has demonstrated quality appraisal, replicability and transparency. However, the review is limited by the timeframe and by the inclusion of English only.

Conclusion

This structured review of the literature has highlighted there is a paucity of empirical studies that provide evidence on the online medication purchasing behaviour of pregnant women. Midwives and healthcare professionals need to have an awareness that women are now purchasing medication online and be able to guide women and their families to effective and accurate information on purchasing medication safely via the internet.

Research is needed to explore pregnant women's behaviour in relation to purchasing medication online and what factors influence their intention to purchase medication in relation to human/computer interaction and web site usability.

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Appendix 2: Phase 1: Online survey

This questionnaire was transferred into a web-based format using software package Qualtrics.

Online Medication Purchasing in Pregnancy

Thank you for agreeing to take part in this survey. Please only complete this survey if you are pregnant or have been pregnant in the past 2yrs, and are aged 18yrs or over.

- Please read each question carefully and tick a box to indicate your answer
- Once you have completed the survey please click on the "submit' button and the survey will be automatically forwarded to a secure web server at Ulster University.

You do not have to answer any of the questions if you do not wish to do so. If you decide you no longer wish to participate in the survey you can close the survey by exiting the webpage. Completion of the survey is voluntary and implies your consent to take part.

Please note when we refer to medications, we are referring to prescribed medications, over the counter medications, herbal/Homeopathic medications, vitamins and supplements.

Participant Information Sheet inserted in full

1. What age group are you?

☐ 18-24 years old
☐ 25-34 years old
☐ 35-44 years old
☐ Age 45 or older
☐

2. What is the highest level of education you have obtained?

☐ Primary School/Elementary School
☐ Grammar/Secondary/High School
☐ Technical College/Diploma
☐ Undergraduate Degree (e.g. BSc, BA)
☐ Postgraduate Degree (e.g. PGCert, PGDip, MSc, PhD)
☐ Other (please specify)

3. What is your employment status? (Please tick all that apply)

☐ Work part-time
☐ Work full-time
☐ Unemployed
☐ Self-employed
☐ Student full-time
☐ Student part-time

☐ Retired

Other (please specify)

4. What is your occupation?

5. In which country do you live?

☐ Drop down box of options

6. In your country do you have to pay for prescription medications during pregnancy?

☐ Yes
☐ No

7. Before you became pregnant did you take any medications for a medical condition?

☐ Yes
☐ No

If yes, please indicate your medical condition

8. Have you purchased medication or herbal supplements online during pregnancy?

☐ Yes
☐ No

9. Which of the following types of medications did you purchase online while pregnant? (Please tick all relevant)

☐ Alcohol
☐ Antibiotics
☐ Depression/Anxiety
☐ Diabetes
☐ Herbal/homeopathic medications
☐ Indigestion
☐ Labour inducing medication
☐ Pain relief
☐ Recreational drugs
☐ Sickness medication
☐ Vitamins and supplements

Other (Please provide as much detail as possible)

10. Which type of online retailer did you use when purchasing medication?

☐ Online pharmacy
☐ Online supermarket
☐ Online health store

Other (Please provide as much detail as possible)

11. Did you receive the medication you purchased online?

☐ Yes
☐ No

12. Did you feel the product was of good quality?

☐ Yes
☐ No
☐ Undecided

13. Would you purchase medication online in the future?

☐ Yes
☐ No
☐ Undecided

14. Purchasing medication online during pregnancy is:

Unsafe	1	2	3	4	5	6	7	Safe
Inconvenient	1	2	3	4	5	6	7	Convenient
Harmful	1	2	3	4	5	6	7	Beneficial
Expensive	1	2	3	4	5	6	7	Not expensive

Please tick how much you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
15. I would consider purchasing medications from the internet while pregnant					
16. I would purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor					
17. I would not purchase a medication from the internet because I do not know the difference between a fake and legal internet pharmacy					
18. I would purchase a medication from the internet if it was cheaper					
19. I would not purchase a medication from the internet because I would be concerned that the medication may not be of the same quality as the medication obtained from a local pharmacy					

20. Buying medications from the internet is safe					
21. I would not purchase a medication from the internet because I would be concerned it may cause harm to my unborn baby					
22. The thought of purchasing medications from the internet while pregnant would make me feel uncomfortable					
23. If I purchased a medication from the internet while pregnant people close to me would be concerned					
24. If I purchased a medication from the internet while pregnant I would always inform my doctor or midwife					
25. I would be concerned that my financial privacy might not be adequately protected if I bought medication from the internet					

Please tick how desirable or undesirable the following statements are to you:

	Extremely undesirable	Undesirable	Neither desirable or undesirable	Desirable	Strongly desirable
26. Being able to purchase medications from the internet while pregnant is:					
27. Being able to purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor is:					
28. Knowing the difference between a fake and legal internet pharmacy is:					
29. Being able to purchase a medication cheaper from the internet is:					
30. Purchasing a medication from the internet of the same quality as that obtained from a local pharmacy is:					
31. Buying medications from the internet that are safe to take is:					
32. Being able to purchase a medication from the internet that					

will not harm my baby is:					
33. Being comfortable with purchasing medications from the internet while pregnant is:					
34. Having people who are close to me concerned if I purchased a medication from the internet while pregnant is:					
35. If I purchased a medication from the internet while pregnant informing my doctor or midwife would be:					
36. Having my financial privacy adequately protected if I bought medication from the internet during pregnancy is:					

Please tick how much you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
37. My family would be okay with me purchasing medication online during pregnancy					
38. Friends purchase medications online and therefore I would feel safe enough to follow their behaviour					
39. I feel under pressure to purchase medications online					
40. People who are important to me would be very unhappy if I purchased medication online during pregnancy					

41. My friends and family think I:
Should not 1 2 3 4 5 6 7 Should
purchase medication online during pregnancy

42. Doctors and Midwives would
Disapprove 1 2 3 4 5 6 7 Approve
of me purchasing medication online during pregnancy

43. I feel under social pressure to purchase medication online during pregnancy
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

44. Pregnant women
Do not 1 2 3 4 5 6 7 DO
purchase medication online

45. Friends and family approval is important to me
Not at all 1 2 3 4 5 6 7 Very much

46. What doctors and midwives think I should do matters to me
Not at all 1 2 3 4 5 6 7 Very much

47. Doing what other pregnant women do is important to me
Not at all 1 2 3 4 5 6 7 Very much

Please tick how much you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
48. I am confident I can use the internet to purchase medication online during pregnancy					
49. I do not have the skills to purchase medications online					
50. My previous experience of online purchasing gives me confidence					

51. Pregnant women it difficult to navigate websites to purchase medication online
Unlikely 1 2 3 4 5 6 7 Likely

52. Pregnant women get frustrated trying to purchase medication online
Unlikely 1 2 3 4 5 6 7 Likely

53. Pregnant women find difficulty determining the quality of the website they are using
Unlikely 1 2 3 4 5 6 7 Likely

54. The information provided on the purchasing site is difficult to understand
Unlikely 1 2 3 4 5 6 7 Likely

55. When purchasing medication online I am
Unlikely 1 2 3 4 5 6 7 Likely
to have difficulty navigating websites

56. I am
Unlikely 1 2 3 4 5 6 7 Likely
to get frustrated purchasing medication online

57. I am
Unlikely 1 2 3 4 5 6 7 Likely
to have difficulty determining the quality of the website I am using to purchase medication

58. I am
Unlikely 1 2 3 4 5 6 7 Likely
to have difficulty understanding the information on the purchasing website

Please tick how much you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
59. I have no issue with purchasing medication online during pregnancy					

60. I will purchase medication online during pregnancy if it is cheaper					
61. I intend to purchase medication online during pregnancy as I think it is safe					
62. Purchasing medication online is very easy					

63. Where did you access the survey?

- ☐ Email
- ☐ Family/Friend
- ☐ Internet website
- ☐ Facebook
- ☐ Twitter
- ☐ Pregnancy Blog
- ☐ Pregnancy Chatroom
- ☐ Healthcare Professional
- ☐ Other

Within the next 3 to 4 months I wish to conduct an online focus group and eye tracking study to explore in more detail the reasons why pregnant women intend to purchase medication online.

Online focus group

This will involve you participating in a group chat on a closed Facebook Group account with 8-10 other women to discuss your thoughts, views and experiences of purchasing medication online during pregnancy. The group is a closed Facebook group therefore only members that will be in the group can find it and see posts, it will not be accessible to the general public, therefore protecting the confidentiality of the group.

Online eye tracking study

As part of the study you will require the use of a computer with a web cam and a facility to download the eye tracking software from a link I will forward to you. During the study you will be asked to review scenarios regarding purchasing medication. Where you look on the computer screen will be recorded using eye tracking technology that allows us to observe in real time where you focus your attention on the computer screen while searching. The study can be completed online at a time that is convenient to you and should last no longer than 40 minutes.

Eye tracking study at Ulster University

The study will take place in a computer laboratory in Ulster University Jordanstown, Northern Ireland. During the study you will be asked to review scenarios regarding purchasing medication. Where you look on the computer screen will be recorded using eye tracking technology that allows us to observe in real time where you focus your attention on the computer screen while searching. You will be given an allocated date and time to participate in and the study should last no longer than 40 minutes.

If you wish to participate further in this study with Ulster University Northern Ireland, please click the box below to indicate which part/parts you wish to be involved in and provide your email address in the box below and I (Alison) will contact you with further information.

- ☐ **Online Focus Group**
- ☐ **Online Eye Tracking Study**
- ☐ **Eye tracking study in Ulster University Jordanstown, Northern Ireland**

Your email Address:

Thankyou.

Your email address will remain strictly confidential to the researcher and will be used solely to contact you about the study.

If you have been affected in any way or have concerns regarding medication you may have purchased or taken in pregnancy, please contact your General Practitioner or midwife for advice. If you would like further information about the use of medication in pregnancy, please click on the link below:
http://www.medicinesinpregnancy.org
https://mothertobaby.org
Thank you for taking the time to complete this questionnaire.
Once you have responded to all of the questions please click on the “Submit” button

Submit

Appendix 3: Social media advertisement

Appendix 4: Websites contacted to share survey link

Top websites based on google search ‘pregnancy’ first 100 hits on 27/09/17 gives:

www.motherandbaby.co.uk
www.babycentre.co.uk
www.bounty.com
www.nct.org.uk/pregnancy
www.mumsnet.com
www.netmums.com
www.tommys.org
www.emmasdiary.co.uk
www.babycentre.com

Top websites based on Google search ‘medicines in pregnancy first 100 hits on 28/09/17

www.medicinesinpregnancy.org
www.uktis.org
www.cdc.gov/pregnancy/meds
www.tommys.org
www.babycentre.co.uk
www.babycentre.com
www.madeformums.com
www.womenshealth.gov
www.parents.com
www.babymed.com
www.americanpregnancy.org
www.babble.com
www.pregnancybirthbaby.org
www.mayoclinic.org
www.whattoexpect.com
www.momjunction.com
www.thebump.com
www.safefetus.com
www.bounty.com
www.cqwellwomen.com
www.pregnancyandmedicine.org
www.healthhub.sg
www.emmasdiary.co.uk

Appendix 5: Survey Pilot Test-Re-test Analysis: Kappa and Kendall's Tau B reliability results

The following set of questions asks what medications you have purchased online during pregnancy

Question	Kappa	% Agreement
8. In your country do you have to pay for medications during pregnancy?	0.842	97.222%
9. Before you became pregnant did you take any medications for a medical condition?	0.861	97.142%
10. Have you purchased medication or herbal supplements online during pregnancy?	0.929	97.222%
11. Which of the following types of medications did you purchase online while pregnant? (Please tick all relevant) Pain relief	No variation	100%
Sickness medication	No variation	100%
Indigestion	No variation	100%
Depression/Anxiety	No variation	100%
Antibiotics	No variation	100%
Diabetes	No variation	100%
Alcohol	No variation	100%
Recreational Drugs	No variation	100%
Herbal/Homeopathic medications	0.357	91.666%
Vitamins and supplements	0.722	91.666%
Labour inducing medication	1.000	100%
12. Which type of online retailer did you use when purchasing medication? ☐ Online pharmacy	-0.038	91.666%
☐ Online supermarket	1.000	100%
☐ Online health store	0.442	88.888%
13. Did you receive the medication you purchased online?	0.852	94.444%
14. Did you feel the product was of good quality?	0.929	97.222%
15. Would you purchase medication online in the future?	0.860	87.222%

	Kendall Tau B	Approx Significance
16. Purchasing medication online during pregnancy is: Safe-Unsafe	0.548	0.000
Inconvenient- Convenient	0.355	0.053
Harmful- Beneficial	0.349	0.039
Expensive-Not expensive	0.298	0.132
17. I would consider purchasing medications from the internet while pregnant	0.805	0.000
I would purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor	0.707	0.000
I would not purchase a medication from the internet because I do not know the difference between an illegal and legal internet pharmacy	0.501	0.001
I would purchase a medication from the internet if it was cheaper	0.620	0.000
I would not purchase a medication from the internet because I would be concerned that the medication may not be of the same quality as the medication obtained from a local pharmacy	0.598	0.000
Buying medications from the internet is safe	0.720	0.000
I would not purchase a medication from the internet because I would be concerned it may cause harm to my unborn baby	0.746	0.000
The thought of purchasing medications from the internet while pregnant would make me feel uncomfortable	0.664	0.000
If I purchased a medication from the internet while pregnant people close to me would be concerned	0.804	0.000
If I purchased a medication from the internet while pregnant, I would always inform my doctor or midwife	0.669	0.000
I would be concerned that my financial privacy might not be adequately protected if I bought medication from the internet	0.322	0.025

	Kendall Tau B	Approx Significance
18. Being able to purchase medications from the internet while pregnant is:	0.714	0.000
Being able to purchase a medication from the internet while pregnant if I could not obtain/buy the medication from my local pharmacy/doctor is:	0.674	0.000
Knowing the difference between an illegal and legal internet pharmacy is:	0.213	0.172
Being able to purchase a medication cheaper from the internet is:	0.629	0.000
Purchasing a medication from the internet of the same quality as that obtained from a local pharmacy is:	0.514	0.000
Buying medications from the internet that are safe to take is:	0.640	0.000
Being able to purchase a medication from the internet that will not harm my baby is:	0.746	0.000

Being comfortable with purchasing medications from the internet while pregnant is:	0.809	0.000
Having people who are close to me concerned if I purchased a medication from the internet while pregnant is:	0.327	0.038
If I purchased a medication from the internet while pregnant informing my doctor or midwife would be:	0.487	0.002
Having my financial privacy adequately protected if I bought medication from the internet during pregnancy is:	0.463	0.003

The following section asks questions relating to the social influences to purchase medication online during pregnancy

	Kendall's Tau B	Approx Significance
19. My family would be okay with me purchasing medication online during pregnancy	0.735	0.000
Friends purchase medications online and therefore I would feel safe enough to follow their behaviour	0.640	0.000
I feel under pressure to purchase medications online	0.378	0.074
People who are important to me would be very unhappy if I purchased medication online during pregnancy	0.630	0.000

	Kendall's Tau B	Approx Significance
18. My friends and family think I: Should not -3 -2 -1 0 +1 +2 +3 Should purchase medication online during pregnancy	0.722	0.000
19. Doctors and Midwives would Disapprove -3 -2 -1 0 +1 +2 +3 Approve of me purchasing medication online during pregnancy	0.526	0.000
20. I feel under social pressure to purchase medication online during pregnancy Strongly disagree 1 2 3 4 5 6 7 Strongly agree	0.337	0.027
21. Pregnant women Do not 1 2 3 4 5 6 7 DO purchase medication online	0.376	0.010
22. Friends and family approval is important to me Not at all 1 2 3 4 5 6 7 Very much	0.664	0.000
40. What doctors and midwives think I should do matters to me Not at all 1 2 3 4 5 6 7 Very much	0.591	0.000

41. Doing what other pregnant women do is important to me Not at all 1 2 3 4 5 6 7 Very much	0.556	0.000

	Kendall Tau B	Approx Significance
23. I am confident I can use the internet to purchase medication online during pregnancy	0.480	0.000
I do not have the skills to purchase medications online	0.489	0.000
My previous experience of online purchasing gives me confidence	0.505	0.000

	Kendall's Tau B	Approx Significance
24. Pregnant women find it difficult to navigate websites to purchase medication online Unlikely 1 2 3 4 5 6 7 Likely	0.359	0.012
25. Pregnant women get frustrated trying to purchase medication online Unlikely 1 2 3 4 5 6 7 Likely	0.403	0.001
26. Pregnant women find difficulty determining the quality of the website they are using Unlikely 1 2 3 4 5 6 7 Likely	0.299	0.038
27. The information provided on the purchasing site is difficult to understand Unlikely 1 2 3 4 5 6 7 Likely	0.473	0.000
28. When purchasing medication online I am Unlikely 1 2 3 4 5 6 7 Likely to have difficulty navigating websites	0.413	0.006
29. I am Unlikely 1 2 3 4 5 6 7 Likely To get frustrated purchasing medication online	0.358	0.027
30. I am Unlikely 1 2 3 4 5 6 7 Likely to have difficulty determining the quality of the website I am using to purchase medication	0.226	0.147
31. I am Unlikely 1 2 3 4 5 6 7 Likely	-0.012	0.939

to have difficulty understanding the information on the purchasing website		

The following section asks you about your intention towards purchasing medication online.

	Kendall's Tau B	Approx Significance
32. I have no issue with purchasing medication online during pregnancy	0.832	0.000
I will purchase medication online during pregnancy if it is cheaper	0.853	0.000
I intend to purchase medication online during pregnancy as I think it is safe	0.784	0.000
Purchasing medication online is very easy	0.396	0.018

Appendix 6: Ethical Approval for Phase 1 and Phase 2

UNIVERSITY OF ULSTER **RESEARCH GOVERNANCE**

RG3 Filter Committee Report Form

Project Title	Online medication purchasing behaviour in pregnancy
Chief Investigator	Professor Marlene Sinclair
Filter Committee	Institute of Nursing and Health Research

This form should be completed by Filter Committees for all research project applications in categories A to D (*for categories A, B, and D the University's own application form – RG1a and RG1b – will have been submitted; for category C, the national, or ORECNI, application form will have been submitted).

Where substantial changes are required the Filter Committee should return an application to the Chief Investigator for clarification/amendment; the Filter Committee can reject an application if it is thought to be unethical, inappropriate, incomplete or not valid/viable.

Only when satisfied that its requirements have been met in full and any amendments are complete, the Filter Committee should make one of the following recommendations:

The research proposal is complete, of an appropriate standard and is in

- category A and the study may proceed* [x]
- category B and the study must be submitted to the University's Research Ethics Committee** Please indicate briefly the reason(s) for this categorisation [ ]
- category C and the study must be submitted to ORECNI along with the necessary supporting materials from the Research Governance Section*** [ ]
- category D and the study must be submitted to the University's Research Ethics Committee** [ ]

Signed: George Kernohan Date: 17-Aug-17
Chairperson of Filter Committee

***The application form and this assessment should now be returned to the Chief Investigator. The Filter Committee should retain a copy of the complete set of forms.**

** The application form and this assessment should now be returned to the Chief Investigator so that he/she can submit the application to the UUREC via the Research Governance section. The Filter Committee should retain a copy of the complete set of forms for their own records.
*** The application form and this assessment should now be returned to the Chief Investigator so that he/she can prepare for application to a NRES/ORECNI committee. The Filter Committee should retain a copy of the complete set of forms for their own records.

For all categories, details of the application and review outcome should be minuted using the agreed format and forwarded to the Research Governance section

Appendix 7: Phase 1: Participant Information sheet online survey

Online Survey Participant Information Sheet

Study Title

Online medication purchasing behaviour in pregnancy

Invitation

You are being invited to take part in a research study. Before you decide whether or not to take part it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully to decide whether or not you wish to take part.

This research is being undertaken as part of a PhD study at Ulster University.

This study has been approved by the Ulster University Research Ethics Filter Committee.

What is the purpose of the study?

The study aims to explore what factors influence a pregnant woman's intention to purchase medication online. The reason for this is to help us understand a pregnant woman's behaviour and reasons for purchasing medication online to maintain safety and provide effective services in the future.

What are the eligibility criteria for the study?

You are eligible to take part in the study if you are currently pregnant or have been pregnant in the past 2yrs, are aged 18yrs. or over, with the ability to read and understand English.

These criteria have been determined because women meeting these criteria are likely to have had experience relevant to the study.

What do I have to do?

You will be asked to complete an online survey that asks about your thoughts regarding purchasing medication online. If you have never purchased medication online during pregnancy you can still complete the survey as your views and thoughts are important to the study too. The survey should take no longer than 10-15 minutes to complete.

Do I have to take part?

It is up to you to decide whether or not to take part. You are free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your care provision in any way. If your participation raises any concerns or issues, please contact your GP or midwife.

What are the possible benefits of taking part?

Whilst there may be no personal benefits to your participation in this study, the information you provide can contribute to improving future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service development.

What are the possible disadvantages of taking part?

You will be asked to provide information on medication you may have purchased online during pregnancy that may not be recommended. All information provided by you will be kept confidential at all times. All responses to questions and information provided by you will be anonymized with no details relating to you recorded anywhere. Only members of the research team will have access to the information you provide to us. If your participation raises any concerns or issues, please contact your GP or midwife.

What will happen to my questionnaire responses?

All information you provide to us will be kept confidential. No identifying information (not even your computers IP address) will be collected from you so all your answers will be completely

anonymous. However, this does mean that once you have pressed “submit” you cannot withdraw your responses as there is no way of identifying it. Only members of the research team will have access to it. All data collection, storage and processing will comply with the principles of the Data Protection Act 1998.

Cost, Reimbursement and compensation

Your participation in this study is voluntary. You will receive no financial reimbursement or compensation in return for your participation.

What will happen to the results of the research study?

All information held electronically will be stored anonymously on a password protected computer kept in a locked room on Ulster University premises for 10 years and then confidentially destroyed in line with Ulster University policy.

All paper documents will be stored in a locked filing cabinet in the University for 10 years and then confidentially destroyed.

The results from these findings will be prepared and submitted for conference presentation and publication in peer-reviewed journals. The findings will be written up as part of a PhD thesis.

What if I wish to make a complaint about the study?

If you wish to make any complaint about the study or the manner in which it is directed, then you may do so through the complaints procedure of Ulster University or by contacting Professor Marlene Sinclair who is the Academic Supervisor overseeing this study.

Research Governance
Room 26A17
Shore Road
Newtownabbey
Co. Antrim
BT37 0QB
Tele: +44 28 9036 6629
Email: research@ulster.ac.uk

Who is funding the research?

The research is joint funded by the Department for the Economy and the Southern Health and Social Care Trust towards a PhD qualification at Ulster University.

Contact for further information

If you would like more information or have any questions you wish to discuss, please contact any member of the research team listed below:

Research Team:

Alison Little 02890368255 little-a4@.ulster.ac.uk

Institute of Nursing and Health Research,
Room 12J06
School of Health and Life Sciences,
Ulster University,
Newtownabbey,
Co Antrim,
BT37 OQB

Chief Investigator: Professor Marlene Sinclair 02890368118 m.sinclair@ulster.ac.uk

Co-Investigator: Professor Huiru Zheng 02890366591 h.zheng@ulster.ac.uk

Co-Investigator: Dr Patricia Gillen 02890368582 p.gillen@ulster.ac.uk

Appendix 8: Phase 2: Letter of invitation

Dear Participant

Study: Online medication purchasing behaviour in pregnancy

Online focus group

My name is Alison Little. I am a PhD student at Ulster University. I am conducting a research study as part of the requirements of my PhD, and I would like to invite you to participate.

The study aims to explore what factors influence a pregnant woman's intention to purchase medication online. The reason for this is to help us understand a pregnant woman's behaviour and reasons for purchasing medication online to improve safety and provide more effective services in the future. If you decide to participate you will be asked to join a closed Facebook group and participate in an online discussion regarding your thoughts and experiences regarding purchasing medication online during pregnancy. The group is a closed Facebook group therefore only members that will be in the group can find it and see posts, it will not be accessible to the general public, therefore protecting the confidentiality of the group.

Although you probably won't benefit directly from participating in the study, we hope that your input will help to improve future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service development.

Participation in the study is confidential. Study information will be kept in a secure location in Ulster University. The results of the study may be published or presented at professional meetings, but your identity will not be revealed. Participation is anonymous, which means no one will know your answers. Any identifying information will be deleted.

Taking part in the study is your decision. You do not have to take part in this study if you do not want to. You may also quit being in the study at any time or decide not to answer any question you are not comfortable in answering.

I will be happy to answer any questions you have about the study. You may contact me by email at little-a4@ulster.ac.uk. If, however you would like to read more information on the study, I have attached the study information sheet.

Thank you for your consideration.

With kind regards

Alison Little

little-a4@.ulster.ac.uk

Appendix 9: Phase 2: Participant Information sheet online focus group

Online Focus Group: Participant Information Sheet

Study Title

Online medication purchasing behaviour in pregnancy

Invitation

You are being invited to take part in a research study. Before you decide whether or not to take part it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully to decide whether or not you wish to take part.

This research is being undertaken as part of a PhD study at Ulster University.

This study has been approved by the Ulster University Research Ethics Filter Committee.

What is the purpose of the study?

The study aims to explore what factors influence a pregnant woman's intention to purchase medication online. The reason for this is to help us understand a pregnant woman's behaviour and reasons for purchasing medication online to improve safety and provide more effective services in the future.

What are the eligibility criteria for the study?

You are eligible to take part in the study if you are currently pregnant or have been pregnant in the past 2yrs, are aged 18yrs. or over, with the ability to read and understand English.

These criteria have been determined because women meeting these criteria are likely to have had experience relevant to the study.

What do I have to do?

If you decide to participate you will be emailed a link to join a closed Facebook group and participate in an online discussion as part of a group of 8-10 women regarding your thoughts and experiences of purchasing medication online during pregnancy. You would be expected to log on once a day to comment which should only take a few minutes. The discussion will take place over a set time period of 5 days to allow time for you and other participants to comment on the group discussion at a time that suits you.

Do I have to take part?

It is up to you to decide whether or not to take part. You are free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your care provision in any way. If your participation raises any concerns or issues, please contact your GP or midwife.

What are the possible benefits of taking part?

Whilst there may be no personal benefits to your participation in this study, the information you provide can contribute to improving future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service development.

What are the possible disadvantages of taking part?

You will be asked to provide information on medication you may have purchased online during pregnancy that may not be recommended. All information provided by you will be kept confidential at all times. All responses to questions and information provided by you will be anonymized with no details relating to you recorded anywhere. Only members of the research team will have access to the information you provide to us. If your participation raises any concerns or issues, please contact your GP or midwife.

What will happen to my online responses?

All information you provide to us will be kept confidential. No identifying information will be collected from you so all your answers will be completely anonymous. Only members of the research team will have access to it. All data collection, storage and processing will comply with the principles of the Data Protection Act 1998.

How will the group be managed?

The researcher and Chief Investigator will have access to the group administration. There are no right or wrong answers within the group chat but rather different points of view. As such please feel comfortable that you can share both positive and negative comments without judgement. However, during the course of the focus group if any member should post an

inappropriate comment, the researcher will intervene at an early stage to diffuse the situation. In the case that a possible defamatory post is made the participant will be informed the post will be deleted by the administrator and in a last resort the participant will be removed from the group discussion.

Cost, Reimbursement and compensation

Your participation in this study is voluntary. You will receive no financial reimbursement or compensation in return for your participation.

What will happen to the results of the research study?

All information held electronically will be stored anonymously on a password protected computer kept in a locked room on Ulster University premises for 10 years and then confidentially destroyed in line with Ulster University policy.

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The results from these findings will be prepared and submitted for conference presentation and publication in peer-reviewed journals. The findings will be written up as part of a PhD thesis.

What if I wish to make a complaint about the study?

If you wish to make any complaint about the study or the manner in which it is directed, then you may do so through the complaints procedure of Ulster University or by contacting Professor Marlene Sinclair who is the Academic Supervisor overseeing this study.

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Who is funding the research?

The research is joint funded by the Department for the Economy and the Southern Health and Social Care Trust towards a PhD qualification at Ulster University.

Contact for further information

If you would like more information or have any questions you wish to discuss, please contact any member of the research team listed below:

Research Team:
Alison Little 02890368255 little-a4@ulster.ac.uk
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Room 12J06
School of Health and Life Sciences,
Ulster University,
Newtownabbey,
Co Antrim,
BT37 OQB

Chief Investigator: Professor Marlene Sinclair 02890368118 m.sinclair@ulster.ac.uk
Co-Investigator: Professor Huiru Zheng 02890366591 h.zheng@ulster.ac.uk
Co-Investigator: Dr Patricia Gillen 02890368582 p.gillen@ulster.ac.uk

Appendix 10: Phase 2: Online focus group format

Welcome:

Welcome to our online focus group. Thank-you for taking the time to participate. My name is Alison Little and I'm a PhD student at Ulster University in Northern Ireland.

Overview of the topic

You have been invited as I would like to hear in more detail your thoughts on what influences a woman's intention to purchase medication online during pregnancy.

Guidelines

There are no right or wrong answers within the group chat but rather different points of view. As such please feel comfortable that you can share both positive and negative comments without judgement. Your participation in group chat will be taken as confirmation of your informed consent.

So let's begin.

Opening question/ice breaker:

Let us begin by introducing ourselves. I will begin….

Question 1: Measurement of Attitude: measuring behavioural beliefs

- What do you believe are the advantages for pregnant women of purchasing medication online?
- What do you believe are the disadvantages of for pregnant women of purchasing medication online?

  Prompt: Is there anything else you would associate with a woman's choice to purchase medication online?

Question 2: Measuring Subjective Norm

- Are there any individuals or groups who you think would approve of you purchasing medication online during pregnancy?
- Are there any individuals or groups who you think would disapprove of you purchasing medication online during pregnancy?

  Prompt: Is there any other social influences you think would affect a pregnant woman's decision to purchase medication online during pregnancy?

Question 3: Measuring Perceived Behavioural Control

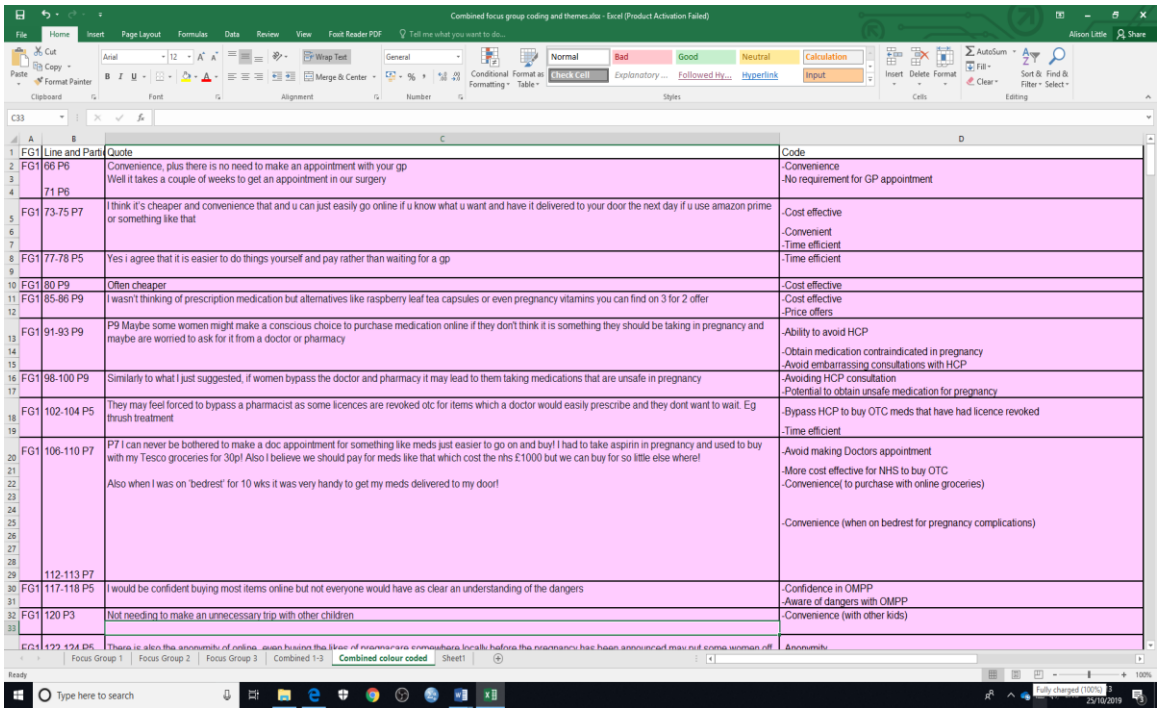
- What factors or circumstances do you think enable a pregnant woman to purchase medication from the internet?
- What factors or circumstances do you think make it difficult for a pregnant woman to purchase medication from the internet?

  Prompt: Are there any other issues or factors that come to mind when you think about the actual process involved in purchasing medication online during pregnancy?

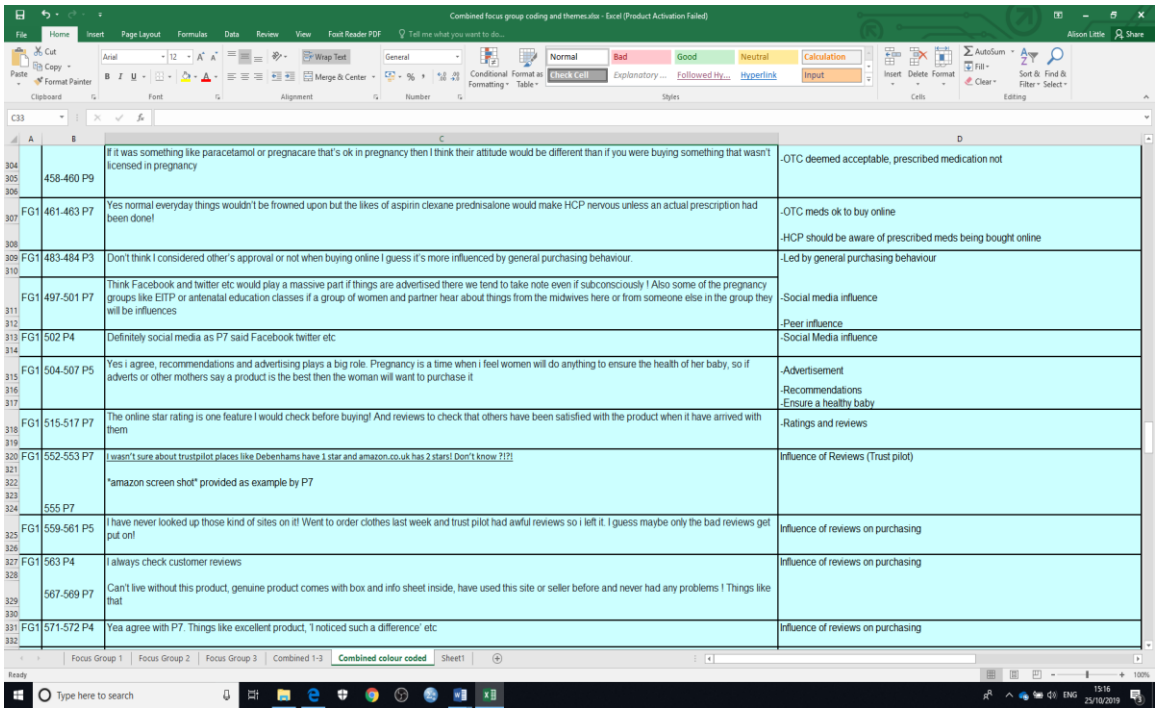
Finally, thank you for your participation. If there is any other information you would like to add?

Thankyou.

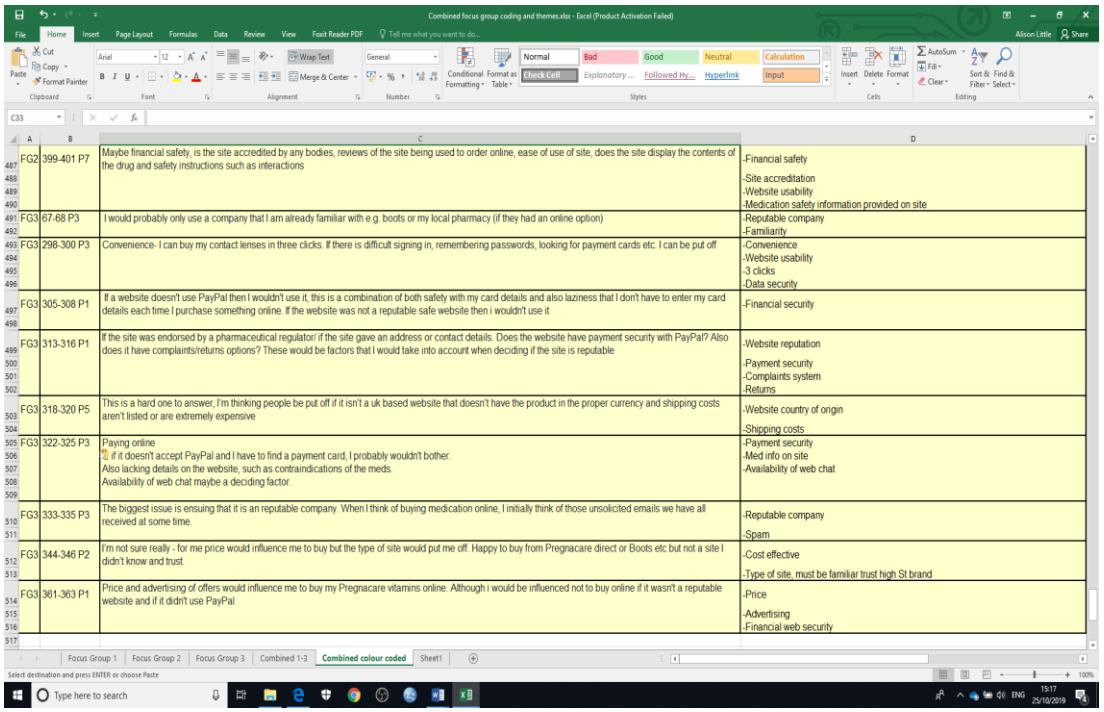
Appendix 11: Example of coding and identification of themes



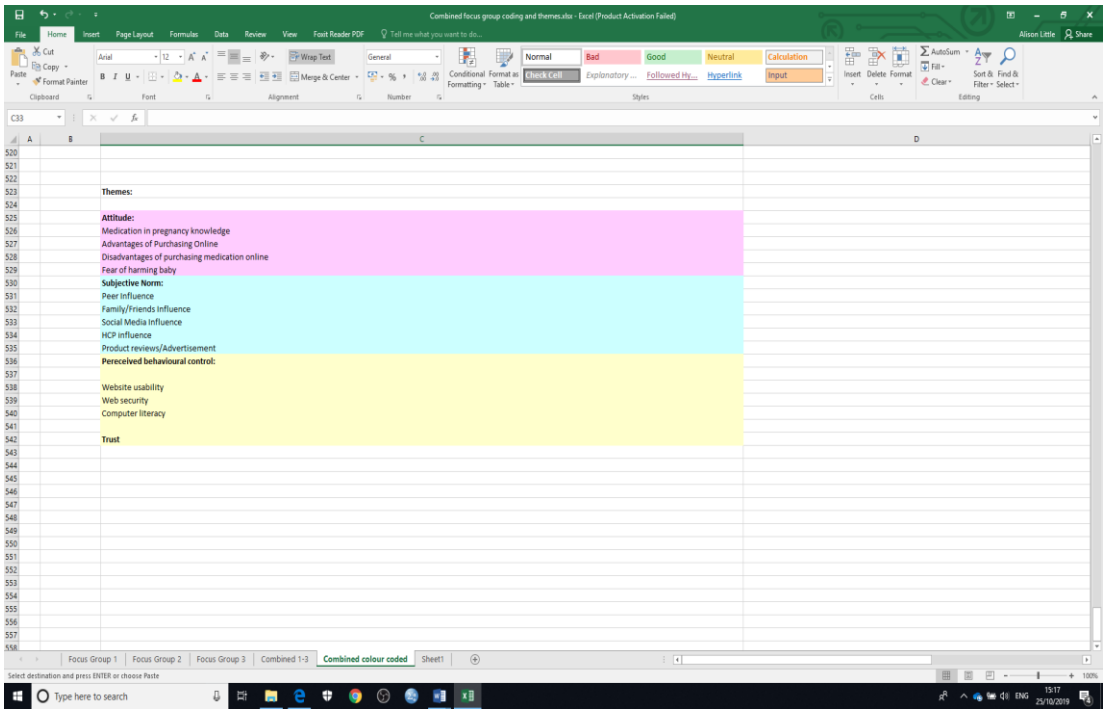
	A	B	C	D
1	FG1	Line and Partic	Quote	Code
2	FG1	66 P6	Convenience, plus there is no need to make an appointment with your gp Well it takes a couple of weeks to get an appointment in our surgery	-Convenience -No requirement for GP appointment
4		71 P6		
5	FG1	73-75 P7	I think it's cheaper and convenience that and u can just easily go online if u know what u want and have it delivered to your door the next day if u use amazon prime or something like that	-Cost effective -Convenient -Time efficient
8	FG1	77-78 P5	Yes i agree that it is easier to do things yourself and pay rather than waiting for a gp	-Time efficient
10	FG1	80 P9	Often cheaper	-Cost effective
11	FG1	85-86 P9	I wasn't thinking of prescription medication but alternatives like raspberry leaf tea capsules or even pregnancy vitamins you can find on 3 for 2 offer	-Cost effective -Price offers
13	FG1	91-93 P9	P9 Maybe some women might make a conscious choice to purchase medication online if they don't think it is something they should be taking in pregnancy and maybe are worried to ask for it from a doctor or pharmacy	-Ability to avoid HCP -Obtain medication contraindicated in pregnancy -Avoid embarrassing consultations with HCP
16	FG1	98-100 P9	Similarly to what I just suggested, if women bypass the doctor and pharmacy it may lead to them taking medications that are unsafe in pregnancy	-Avoiding HCP consultation -Potential to obtain unsafe medication for pregnancy
18	FG1	102-104 P5	They may feel forced to bypass a pharmacist as some licences are revoked otc for items which a doctor would easily prescribe and they dont want to wait. Eg thrush treatment	-Bypass HCP to buy OTC meds that have had licence revoked -Time efficient
20	FG1	106-110 P7	P7 I can never be bothered to make a doc appointment for something like meds just easier to go on and buy! I had to take aspirin in pregnancy and used to buy with my Tesco groceries for 30p! Also I believe we should pay for meds like that which cost the nhs £1000 but we can buy for so little else where! Also when I was on 'bedrest' for 10 wks it was very handy to get my meds delivered to my door!	-Avoid making Doctors appointment -More cost effective for NHS to buy OTC -Convenience(to purchase with online groceries) -Convenience (when on bedrest for pregnancy complications)
29		112-113 P7		
30	FG1	117-118 P5	I would be confident buying most items online but not everyone would have as clear an understanding of the dangers	-Confidence in OMPP -Aware of dangers with OMPP
32	FG1	120 P3	Not needing to make an unnecessary trip with other children	-Convenience (with other kids)
33				
	FG1	122-124 P5	There is also the anonymity of online, even buying the likes of pregnacare somewhere locally before the pregnancy has been announced may put some women off	Anonymity



	A	B	C	D
304		458-460 P9	If it was something like paracetamol or pregnacare that's ok in pregnancy then I think their attitude would be different than if you were buying something that wasn't licensed in pregnancy	-OTC deemed acceptable, prescribed medication not
307	FG1	461-463 P7	Yes normal everyday things wouldn't be frowned upon but the likes of aspirin clexane prednisalone would make HCP nervous unless an actual prescription had been done!	-OTC meds ok to buy online -HCP should be aware of prescribed meds being bought online
309	FG1	483-484 P3	Don't think I considered other's approval or not when buying online I guess it's more influenced by general purchasing behaviour.	-Led by general purchasing behaviour
311	FG1	497-501 P7	Think Facebook and twitter etc would play a massive part if things are advertised there we tend to take note even if subconsciously ! Also some of the pregnancy groups like EITP or antenatal education classes if a group of women and partner hear about things from the midwives here or from someone else in the group they will be influences	-Social media influence -Peer influence
313	FG1	502 P4	Definitely social media as P7 said Facebook twitter etc	-Social Media influence
315	FG1	504-507 P5	Yes i agree, recommendations and advertising plays a big role. Pregnancy is a time when i feel women will do anything to ensure the health of her baby, so if adverts or other mothers say a product is the best then the woman will want to purchase it	-Advertisement -Recommendations -Ensure a healthy baby
318	FG1	515-517 P7	The online star rating is one feature I would check before buying! And reviews to check that others have been satisfied with the product when it have arrived with them	-Ratings and reviews
320	FG1	552-553 P7	I wasn't sure about trustpilot places like Debenhams have 1 star and amazon.co.uk has 2 stars! Don't know ?!?! *amazon screen shot* provided as example by P7	Influence of Reviews (Trust pilot)
324		555 P7		
325	FG1	559-561 P5	I have never looked up those kind of sites on it! Went to order clothes last week and trust pilot had awful reviews so i left it. I guess maybe only the bad reviews get put on!	Influence of reviews on purchasing
327	FG1	563 P4	I always check customer reviews Can't live without this product, genuine product comes with box and info sheet inside, have used this site or seller before and never had any problems ! Things like that	Influence of reviews on purchasing
329		567-569 P7		
331	FG1	571-572 P4	Yea agree with P7. Things like excellent product, 'I noticed such a difference' etc	Influence of reviews on purchasing



FG2	399-401 P7	Maybe financial safety, is the site accredited by any bodies, reviews of the site being used to order online, ease of use of site, does the site display the contents of the drug and safety instructions such as interactions	-Financial safety -Site accreditation -Website usability -Medication safety information provided on site
FG3	67-68 P3	I would probably only use a company that I am already familiar with e.g. boots or my local pharmacy (if they had an online option)	-Reputable company -Familiarity
FG3	298-300 P3	Convenience- I can buy my contact lenses in three clicks. If there is difficult signing in, remembering passwords, looking for payment cards etc. I can be put off	-Convenience -Website usability -3 clicks -Data security
FG3	305-308 P1	If a website doesn't use PayPal then I wouldn't use it, this is a combination of both safety with my card details and also laziness that I don't have to enter my card details each time I purchase something online. If the website was not a reputable safe website then i wouldn't use it	-Financial security
FG3	313-316 P1	If the site was endorsed by a pharmaceutical regulator/ if the site gave an address or contact details. Does the website have payment security with PayPal? Also does it have complaints/returns options? These would be factors that I would take into account when deciding if the site is reputable	-Website reputation -Payment security -Complaints system -Returns
FG3	318-320 P5	This is a hard one to answer, I'm thinking people be put off if it isn't a uk based website that doesn't have the product in the proper currency and shipping costs aren't listed or are extremely expensive	-Website country of origin -Shipping costs
FG3	322-325 P3	Paying online if it doesn't accept PayPal and I have to find a payment card, I probably wouldn't bother. Also lacking details on the website, such as contraindications of the meds. Availability of web chat maybe a deciding factor.	-Payment security -Med info on site -Availability of web chat
FG3	333-335 P3	The biggest issue is ensuing that it is an reputable company. When I think of buying medication online, I initially think of those unsolicited emails we have all received at some time.	-Reputable company -Spam
FG3	344-346 P2	I'm not sure really - for me price would influence me to buy but the type of site would put me off. Happy to buy from Pregnacare direct or Boots etc but not a site I didn't know and trust.	-Cost effective -Type of site, must be familiar trust high St brand
FG3	361-363 P1	Price and advertising of offers would influence me to buy my Pregnacare vitamins online. Although i would be influenced not to buy online if it wasn't a reputable website and if it didn't use PayPal	-Price -Advertising -Financial web security



Themes:

Attitude:
Medication in pregnancy knowledge
Advantages of Purchasing Online
Disadvantages of purchasing medication online
Fear of harming baby

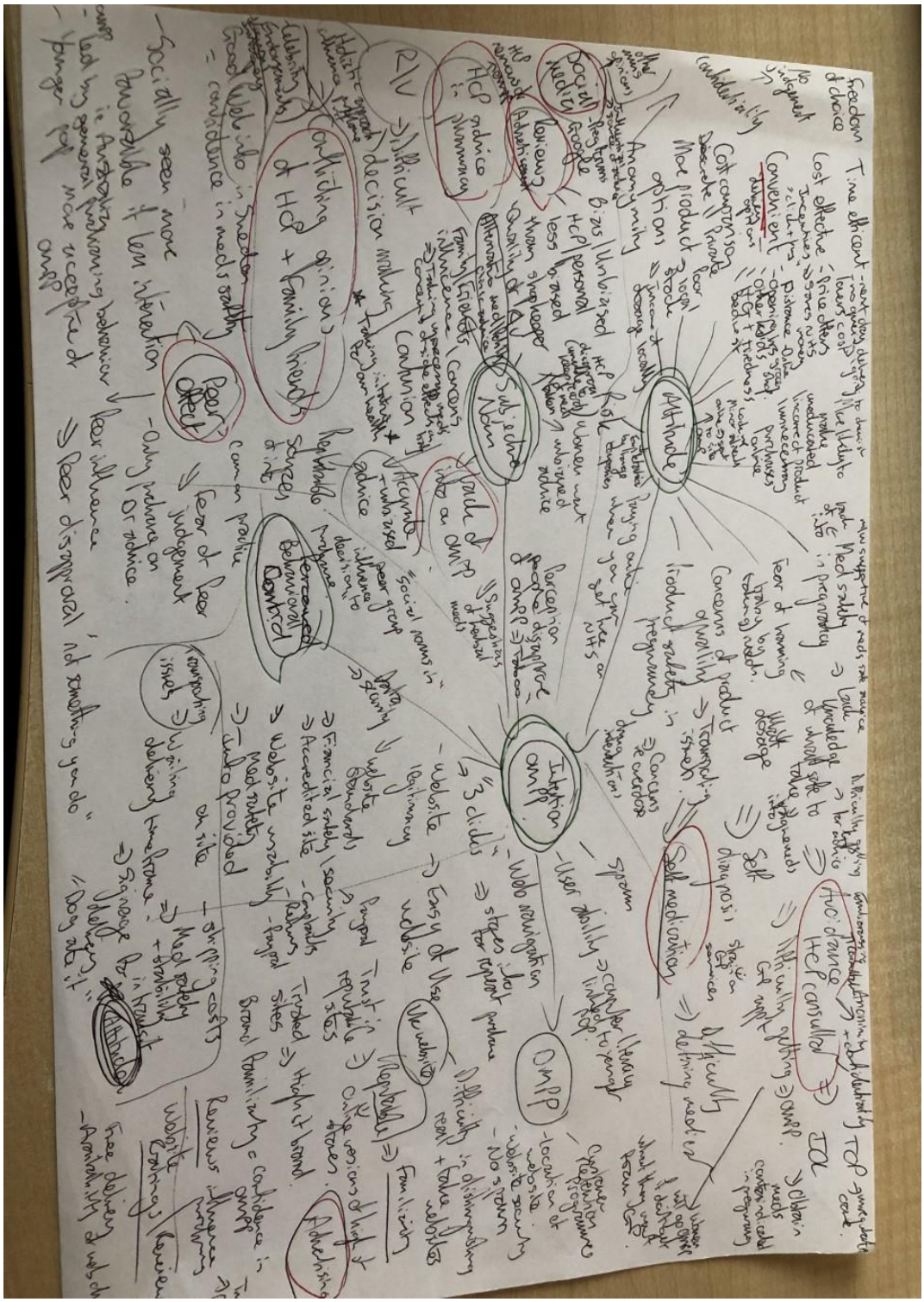
Subjective Norm:
Peer Influence
Family/Friends Influence
Social Media Influence
HCP influence
Product reviews/Advertisement

Perceived behavioural control:

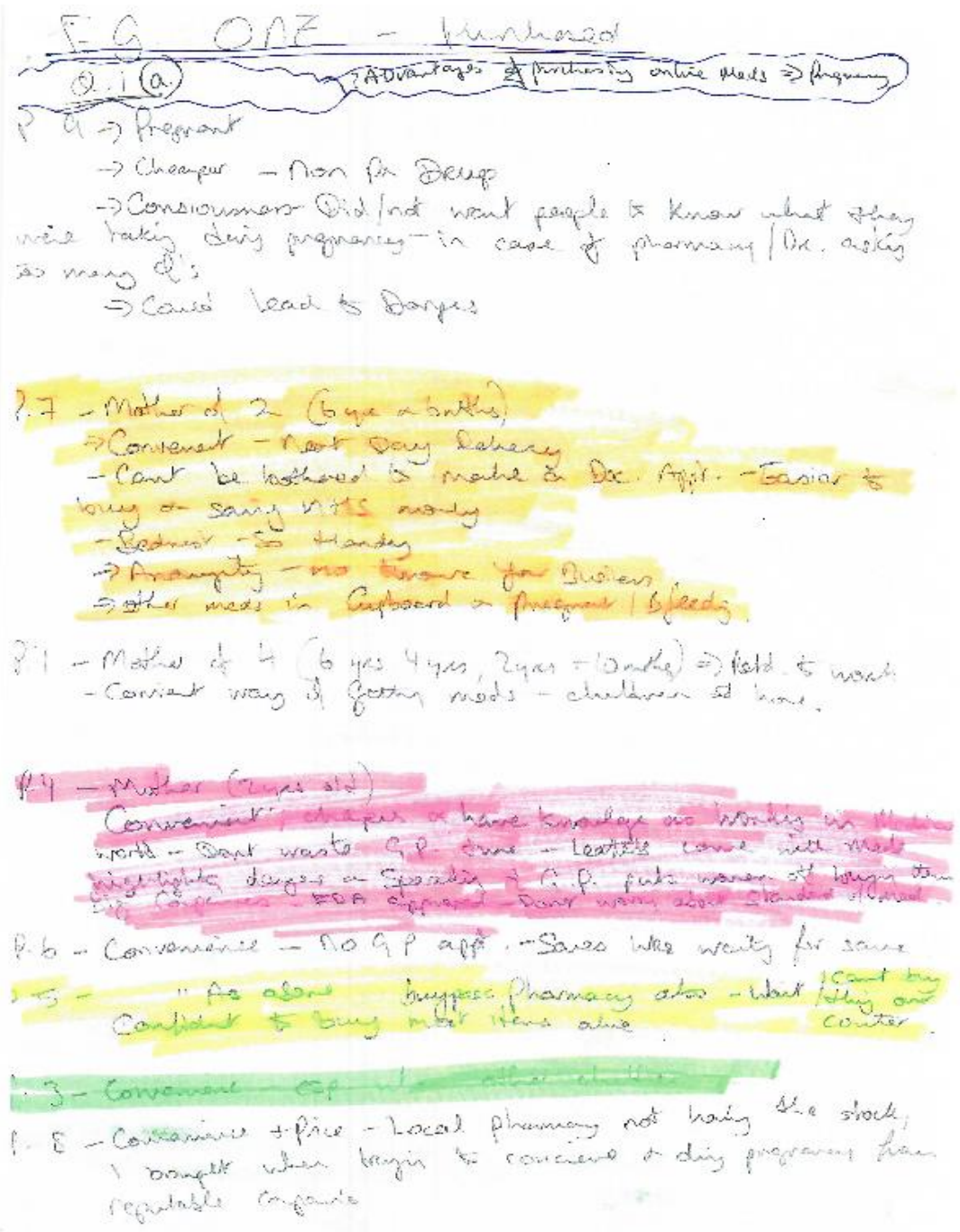
Website usability
Web security
Computer literacy

Trust

Appendix 12: Mind map of themes and subthemes



Appendix 13 Independent thematic analysis



Q1. Measurement of Attitude: measuring Beliefs-Advantages/Disadvantages and

Cost LESS Personally and to the NHS (Dr and Px) Cost less Discounts and promotions Cost less	Convenience Stay at home 24hrs service Convenience Convenience Quick delivery	No waiting for: Dr appoint. Up to 6 weeks 24hrs service	Purchase meds that can't be purchased over counter Purchase meds that can't be purchased over counter
Confidentiality and Anonymity Confidentiality and Anonymity	Choice is greater Choice is greater Chance to compare prices Choice in holistic care-growth Consumer freedom	Reputable co.-no worries Reputable co.-no worries	Many opinions

choice

No conversation re safety No conversation re safety No conversation re safety and medical hx	Uneducated guess	More risks More risks	Paying for meds-free NHS	Self-Diagnose-buy items not suitable Self-Diagnose-buy items not suitable
No evidence to support claims No evidence to support claims	Can't see what you are buying	More confusing	Buying termination tablets –no care being regulated	

PURCHASERS (FG1) NON-PURCHASERS (FG2) MIXED GROUP (FG3)

Recommendations'

Medication usage should be discussed with GP after maternity referral-however, self-referrals are up and running now so this might be covered at the booking clinic but that at 12 weeks and that's too late not a good time.

Education is important, perhaps when you get the letter re bloods and when they need to be done that's when we should be informed about medication and pregnancy

Only websites from UK or Europe and they must have a lock at the top before using the credit card.

Must buy from a reputable sources and read all the reviews

What is medication, it means different things to us all.

Look for sites that are official or from the government

Need to ensure information is correct-who published it etc.

Too much strain on a GP Service so many meds are PX only-nurses and midwives should be prescribers.

When I'm pregnant, I present myself and my bump to reinforce I'm pregnant

Q.2 Measuring Subjective Norm-groups/people who approve/disapprove and factors that influence the purchasing of online medication during pregnancy.

Herself Herself, wouldn't ask others they may think she's stupid HCP- GP, Reflexologist and other professionals-advised re shortfall Family and friends Friends Family and friends HCP- Online pharmacist	Opinions from other mums	Younger generation Lots of group pressure advise from all sources Socio economic background and your Geographic's-norm
Fertility clinics		

HCP re safety HCP re safety HCP re safety	Small Pharmacies –do harm to them	Family Family and friends

Social Influences:

Husband

Myself

Facebook, twitter, google and friends

Nothing stops me-I prioritise family life

Mums net

Facebook, innerwest mums and northern beaches

Social media and if it's the norm-click and buy

No one really cares as long as it's not dangerous

Needing to buy something embarrassing-discrete and private

PURCHASERS (FG1) NON-PURCHASERS (FG2) MIXED GROUP (FG3)

Q.3 Measuring Perceived Behavioural Control-features pregnant women take into account when purchasing on meds during pregnancy-likely to buy/ difficult to buy other factors to take into consideration

Online Star Rating checks All reviews made available Availability of web chat Reviews re safety and costing All reviews made available, inc. complaints and returns	Lock on top for security Securities-financial payments	Availability of PILOT TRUST Cost Discounts Must have PayPal
Website from UK Celebrity endorsements Happy healthy looking pregnant women Website from UK-same currency Shipping costs	Familiar names (only) Familiar names (only) Good understanding of meds	Computer skills Ease of use-hassle free No waiting delays Ease of use-hassle free

Poor reviews Poor reviews	Cost-online consultation	Lack of safety restrictions re delivery-not in

Other factors to consider

Women's age –younger people find it easier, however, internet savvy can be dangerous-less cautious

Time available-wait 4-6 weeks for GP Appointment

Confidentiality and non-judgemental Confidentiality and non-judgemental-embarrassing orders

Costings of online meds-cheaper Costings of online meds-cheaper

Peoples opinion

PURCHASERS (FG1 NON-PURCHASERS (FG2) MIXED GROUP (FG3)

OVERALL THEMES: FROM ALL 3 QUESTIONS FROM ALL THREE FOCUS GROUPS:

Financial Implications:

Self –cost less/ promotions and discounts

Health Services-save them money-no Dr. appointment nor px.

Convenience:

Staying at home-doing the ordering

No delays in services (Dr waiting list /delivery of medication)

Choice:

Able to decide whether I want to but a Px drug or not-able to buy medication that you can't buy over the counter

Able to have the freedom to choose

Able to have the freedom to price medication at ease

More availability of medications and much more choices.

Confidentiality and Anonymity:

Freedom to remain anonymous

Ability to but embarrassing meds without anyone known

Ability to keep pregnancy private as well

Lack of fear:

Purchasing from Reputable Companies

Many opinions

Self-Belief

I approve myself

Belief that HCP support online purchasing of Meds during pregnancy

Support from family and friends

Belief in social media

Familiarity

Pilot Trust

Costs identified including shipping costs

Saving Money

Celebrity Usage-people and advertisements all looking good-believe in these

Web chats and reviews given

Hassle free

Fear:

Self-Diagnosing-meds not required

No conversation re safety and usage-non educational guess

Increase in risks-can't see the order

Increase in confusion

Increase re lack of regulation re care and after care with certain medications

Lack of evidence to support claims

Lack of belief in social media

Poor reviews

Hidden Costs-fears re delivery

Costs of online consultations

N.B.

ALARMING FINDING-OMISSION FROM STUDY

No one had a fear of harming their unborn child-the baby/child/foetus was never mentioned-very worrying observation, considering the education around medications/drug usage during pregnancy-i.e. Prescribed and un prescribed.

Here are a few suggestions of Overall (Superordinate Themes) for your study-(Personal opinion)

Lack of fear (Self Belief) Vs **Fear (Fear of the Unknown)**

OR

Convenience and Certainty Vs **Uncertainty and Inconvenience**

All the above concepts fit neatly into both these suggestions- just an opinion.

Great study, Congratulations and Well Done.

Appendix 14: Phase 3: Pre-experiment questionnaire

Eye tracking study Pre-test questionnaire

1. What age group are you?

☐ 18-24 years old
☐ 25-34 years old
☐ 35-44 years old
☐ Age 45 or older

2. What is the highest level of education you have obtained?

☐ Primary School/Elementary School
☐ Grammar/Secondary/High School
☐ Technical College/Diploma
☐ Undergraduate Degree (e.g. BSc, BA)
☐ Postgraduate Degree (e.g. PGCert, PGDip, MSc, PhD)
☐ Other (please specify)

3. What is your employment status? (Please tick all that apply)

☐ Work part-time
☐ Work full-time
☐ Unemployed
☐ Self-employed
☐ Student full-time
☐ Student part-time
☐ Retired
☐ Other (please specify)

4. What is your occupation?

5. Before you became pregnant did you take any medications for a medical condition?

☐ Yes
☐ No

If yes, please indicate your medical condition

6. Have you ever purchased medication or vitamin supplements online during pregnancy?

☐ Yes
☐ No

Appendix 15: Phase 3: Post-experiment questionnaire

Eye tracking Post-experiment Questionnaire

Participant Number……

Scenario ……...

How important were the following factors to you when you were searching for the medication in this scenario?

	No Importance	Little importance	Neither important or unimportant	Important	Very important
Convenience of not having to go to a pharmacy					
Price					
Quality of the medication					
To avoid a consultation with a healthcare provider					
Safety of your baby					
Ability to recognise an illegitimate pharmacy					
Family influence					
Friends influence					
Healthcare Professionals influence					
Social media influence					
Product advertisements					
Customer reviews/product ratings					
How easy the website was to navigate					

Your ability to navigate the website					
Delivery options available					
Secure payment options					
Familiar brand of product					
Accredited pharmacy logo					
A familiar trusted website					

Where there any other factors that would have influenced your decision whether or not to purchase the medication?

What is the likelihood you would have gone on to purchase the medication in this scenario?

Very Unlikely	Unlikely	Neither Likely or Unlikely	Likely	Very Likely

Appendix 16: Phase 3: Letter of invitation: Eye Tracking

Dear Participant

Study: Online medication purchasing behaviour in pregnancy
Eye Tracking Study

My name is Alison Little. I am a PhD student at Ulster University. You recently completed an online survey and expressed an interest in participating in an Eye Tracking study. I would like to invite you to participate in this part of the study.

The study aims to explore what factors influence a pregnant woman's intention to purchase medication online.

During the study you will be given a brief questionnaire then 3 scenarios and asked to perform a simulated search for a medication that you may wish to purchase online in a controlled website environment. During the scenarios you will be asked to talk aloud your thought processes as you view the screen in front of you. Where you look on the computer screen will be recorded using eye tracking technology that allows us to observe in real time where you focus your attention on the computer screen while searching. You will then receive a follow up questionnaire for completion.

You can participate in the study either in the computer laboratory at Ulster University Jordanstown or in Craigavon Area Hospital and it should take 30-40 minutes. The recordings from the study will only be reviewed by members of the research team, who will transcribe and analyse them. The recordings will then be stored securely until being destroyed. It is important for us to be able to video your search behaviour and we need you to know that your face will never be visible on the screen of the recording.

Although you probably won't benefit directly from participating in the study, we hope that your input will help to understand how we use the internet to search for information during pregnancy to improve future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service development.

Participation in the study is confidential. Study information will be kept in a secure location in Ulster University. The results of the study may be published or presented at professional meetings, but your identity will not be revealed. Participation is anonymous, which means no one will know your answers. Any identifying information will be deleted.

Taking part in the study is your decision. You do not have to take part in this study if you do not want to. You may also quit being in the study at any time or decide not to answer any question you are not comfortable in answering.

I will be happy to answer any questions you have about the study. You may contact me by email at little-a4@ulster.ac.uk or telephone 07395514305 If, however you would like to read more information on the study I have attached an information sheet with this email. Should you wish to participate please complete the consent and screening form and return via email. I will then forward details on date, time and location of the study.

Thank you for your consideration.

With kind regards

Alison Little

PhD Student
Institute of Nursing and Health Research,
School of Health and Life Sciences,
Ulster University,
Newtownabbey,
Co Antrim,
BT37 OQB
little-a4@ulster.ac.uk
Telephone: 07395514305

Appendix 17: Phase 3: Participant information sheet: Eye Tracking Study

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Participant Information Sheet
Eye Tracking Study

Study Title

Online medication purchasing behaviour in pregnancy: Eye Tracking Study

Invitation

You are being invited to take part in a research study. Before you decide whether or not to take part it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully, discuss it with others if you wish and take time to decide whether or not you wish to take part.

This research is being undertaken as part of a PhD study at Ulster University.

This study has been approved by the Ulster University Research Ethics Filter Committee.

What is the purpose of the study?

The study aims to explore what factors influence a pregnant woman's intention to purchase medication online. The reason for this is to help us understand a pregnant woman's behaviour

and reasons for purchasing medication online to improve safety and provide more effective services in the future.

Eye tracking technology is used by researchers to map the visual and focal activity of individuals who search online and offers us a way to capture a person's reaction to a visual display of data and what factors impact within the interface between the person and the technology.

This approach was selected for this study as it can monitor a pregnant woman's behaviour in searching for a medication information online that influence a person's decision to purchase.

What are the eligibility criteria for the study?

You are eligible to take part in the study if you are currently pregnant or have been pregnant in the past 2 years, are aged 18yrs. or over, with the ability to read and understand English.

These criteria have been determined because women meeting these criteria are likely to have had experience relevant to the study.

If you meet the eligibility criteria and participate you will be one of potentially 30 other people who will be included in the sample for the study.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this Information Sheet to keep and be asked to complete a consent form. However, even if you complete the consent form you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your care provision in any way.

What will happen if I take part?

During the study you will be given a brief questionnaire then 3 scenarios and be asked to perform a simulated search for a medication that you may wish to purchase online in a controlled website environment. During the scenarios you will be asked to talk aloud your thought processes as you view the screen in front of you. Where you look on the computer screen will be recorded using eye tracking technology that allows us to observe in real time where you focus your attention on the computer screen while searching. You will then receive a follow up questionnaire for completion.

If you are interested in participating in the research we will ask you to read this information sheet. If you are happy to be part of the study you should contact the researcher by email little-a4@ulster.ac.uk. or telephone 07395514305 to arrange the date, time and location of the study. Your participation in the study will be recorded using eye tracking technology, video and audio recording equipment. Your face will not be recorded on any of the video recordings to protect your identity. Your involvement in the study will last no longer than 40 minutes.

The audio recordings will be transcribed by the researcher. You will be identified on the transcription only by your participant number in order to maintain confidentiality.

The audio recordings will be stored securely in a locked cabinet in a secure office in Ulster University for 10 years following the study and then destroyed.

What are the possible disadvantages of taking part?

You may be asked to reflect on aspects of how you have previously searched for medication online and how this has potentially influenced what medications you have taken in pregnancy. All information provided by you will be kept confidential at all times. However, if you make a statement about purchasing or consuming medication which identifies an immediate risk to you or your baby you will be advised to seek guidance from your General Practitioner.

All responses to questions and information provided by you will be anonymized with no details relating to you recorded anywhere. Only members of the research team will have access to the information you provide to us.

What are the possible benefits of taking part?

Whilst there may be no personal benefits to your participation in this study, the information you provide can contribute to improving future communications between healthcare professionals and pregnant women regarding self-medication, medication safety and service development.

Will my taking part in the study be kept confidential?

All information you provide to us will be kept confidential. Only members of the research team will have access to it. All data collection, storage and processing will comply with the principles of the Data Protection Act 1998.

Under no circumstances will identifiable responses be provided to any other third party. The findings of the study will only be published in a completely anonymized format, and summaries of the overall findings will not identify any participants. Care will be taken when using verbatim quotations to ensure that the participant cannot be identified from their quotation.

What happens if I find participating in the study traumatic?

During the study you will be asked to reflect on circumstances where you have accessed medication information online and possibly purchased medication online that may have been detrimental to you or your baby. Reflecting on circumstances such as this can be traumatic and the study will be terminated at any time at your discretion.

Cost, Reimbursement and compensation

Your participation in this study is voluntary. You will receive no financial reimbursement or compensation in return for your participation.

What will happen to the results of the research study?

All information held electronically will be stored anonymously on a password protected computer kept in a locked room on University premises for 10 years and then confidentially destroyed in line with University policy.

The results from these findings will be prepared and submitted for conference presentation and publication in peer-reviewed journals. The findings will be written up as part of a PhD thesis.

What if I wish to make a complaint about the study?

If you wish to make any complaint about the study or the manner in which it is directed, then you may do so by contacting Professor Marlene Sinclair who is the Academic Supervisor overseeing this study.

Who is funding the research?

The research is joint funded by the Department for the Economy and the Southern Health and Social Care Trust towards a PhD qualification at Ulster University.

Disclaimer

All scenarios used in the study are hypothetical and the research team do not endorse purchasing medication online for pregnant women. If you wish to purchase medication online please discuss with your doctor, midwife or pharmacist.

Contact for further information

If you would like more information or have any questions you wish to discuss, please contact any member of the research team listed below:

Research Team:

Alison Little 07395514305 little-a4@ulster.ac.uk

Institute of Nursing and Health Research,
Room 12J06
School of Health and Life Sciences,
Ulster University,
Newtownabbey,
Co Antrim,
BT37 OQB
Chief Investigator: Professor Marlene Sinclair 02890368118 m.sinclair@ulster.ac.uk
Co-Investigator: Professor Huiru Zheng 02890366591 h.zheng@ulster.ac.uk
Co-Investigator: Dr Patricia Gillen 02890368582 p.gillen@ulster.ac.uk

Appendix 18: Phase 3: Eye tracking screening form for participants Pernice and Nielsen (2009)

Eye Information: I am going to ask you some questions about your eye because we are going to use some simple technology to track eye movements during the study.

1. Do you wear contacts or eyeglasses in order to read the computer screen?

   ☐ Yes **Continue**
   ☐ No **Skip to question 3**

2. Are your glasses for:

   ☐ Reading only **Continue**
   ☐ Seeing distant objects only **Continue**
   ☐ Both (Do you wear bifocals, trifocals, layered lenses, or regression lenses) **Terminate**

3. Can you read a computer screen and the Web without difficulty with your contacts and/or eyeglasses on?

   ☐ Yes **Continue**
   ☐ No **Terminate**

4. Do you have cataracts?

   ☐ Yes **Terminate**
   ☐ No **Continue**

5. Do you have eye implants?

☐ Yes **Terminate**
☐ No **Continue**

6. Do you have glaucoma?

☐ Yes **Terminate**
☐ No **Continue**

7. Do you use a screen reader, screen magnifier or other assistive technology to use the computer and the web?

☐ Yes **Terminate**
☐ No **Continue**

8. Are either of your pupils permanently dilated?

☐ Yes **Terminate**
☐ No **Continue**

The terms TERMINATE and CONTINUE are present to demonstrate the screening process for eligibility to take part in the study. They will not be included in the copy provided to participants

Appendix 19 Phase 3: Eye tracking study: Ethical approval

Summary of Changes (continued):

- The scenarios that will be used in the eye tracking study and the pre and post experiment questionnaire have been included in the appendix of the protocol (Appendix 7-9).
- All changes from the original protocol have been highlighted in yellow.

Additional ethical considerations:

PIS
As some of the women who have expressed an interest in participating in the study may be pregnant and not have purchased medication online; a disclaimer has been added to the PIS to advise that the study is scenario based and does not advise or advocate in any way pregnant women should buy medication online. Participants will be advised if they wish to purchase medication online to please discuss with their doctor, midwife or pharmacist.

Consent
Additional consent options have been added to ask for consent for the experiment to be both video and audio recorded.

List of enclosed documents: (Combined in PDF)

- Protocol version 5 (Including all documentation from original application)
- All changes to the original protocol for consideration have been highlighted in yellow
- Peer review RG2 for phase 3 and rebuttal table detailing amendments
- RG6

Declaration:

I confirm that the information in this form is accurate and that implementation of the proposed amendment will benefit the study appropriately.

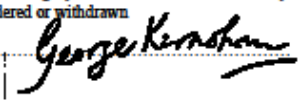
Signed ..... Date .....25/10/18.....
(Chief Investigator)

Filter Committee Decision

This amendment:

is appropriate to the needs of the study, is in category A and should be implemented [ ]
is appropriate to the needs of the study, is in category B and should be considered by the University REC [ ]
is NOT appropriate and should be reconsidered or withdrawn [ ]

Signed .....
(Chair of Filter Committee)



Date .....

Appendix 20: Phase 3: Eye Tracking Study: Consent form

CONSENT FORM

Title of Project: Online medication purchasing behaviour in pregnancy: Eye Tracking Study

Name of Researcher: Alison Little

Name of Chief Investigator: Professor Marlene Sinclair

Please initial boxes

- ☐ I confirm that I have been given and have read and understood the information sheet for the above study and have asked and received answers to any questions raised
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason and without my rights being affected in any way
- ☐ I understand that the researchers will hold all information and data collected securely and in confidence and that all efforts will be made to ensure that I cannot be identified as a participant in the study (except as might be required by law) and I give permission for the researchers to hold relevant personal data
- ☐ I agree to be digitally audio recorded in the above study
- ☐ I agree to be videotaped in the above study
- ☐ I agree to take part in the above study

Name of Participant ***Signature***
Date

Name of researcher ***Signature***
Date

One copy for the participant; one copy for the researcher.

Appendix 21: Phase 3: Eye tracking study: Disclosure Protocol

Phase 1: Cross sectional internet-based study

In this survey the participant will be asked if they have purchased medication online. Although they are not being asked directly regarding illegal or contraindicated activity, there is a possibility they may disclose this information in the free text response options. In completing this survey, the researcher will not have any access to the participant's personal details or medical notes. Therefore, the researcher will be unable to make a referral directly to the participant's healthcare advisor. However, if the participant enters information that would indicate a purchase of a contraindicated or illegal substance the survey will have an automated pop up box appear on the screen advising the participant to contact their General Practitioner or Midwife for advice and support. The survey will also provide links to websites that provide further information regarding medication safety in pregnancy.

Phase 2: Online focus group

During the focus group the participants will not be directly asked questions regarding illegal or contra indicated activity of purchasing medication online. However, if during the course of the discussion any participant discloses such information, the researcher will send them a private message through Facebook highlighting they have disclosed either contraindicated in pregnancy or illegal activity and strongly advising them to seek advice and support from their General Practitioner or Midwife. The researcher will have no contact details other than an email address of the participants in the focus group and as such cannot make a direct referral to a General practitioner or midwife. The Facebook group page will provide links to websites that provide further information regarding medication safety in pregnancy that all participants can access.

Phase 3: *Eye tracking study*

For this phase the participant will be asked if they have ever purchased medication online in the pre-test questionnaire. This is to establish previous purchase behaviour. They will not however be asked what medication they purchased. The eye tracking scenarios they will be asked to perform are simulated, only looking at the process in how they interact with the computer, therefore it is unlikely that any disclosure will be made. If the participant discloses illegal or contraindicated activity during the course

of the study, the researcher will strongly advise them to seek guidance with their general practitioner or midwife for advice and support. The researcher will not have access to any hospital/medical notes or details of the participants' healthcare adviser therefore they cannot refer participants directly if there is a disclosure of illegal or contraindicated activity. However, a draft letter has been added to the disclosure protocol. This will be given to the participant to give to their GP/Midwife should they make a disclosure they have taken a medication contraindicated in pregnancy during the study. Online websites providing advice on medication use in pregnancy will be made available for the participant during the study.

Appendix 22: Phase 3: Letter to GP/Midwife following a disclosure

Dear GP/Midwife

Research Study: Online medication purchasing behaviour in pregnancy Eye Tracking Study

Your patient……. recently participated in the above research study. During the study she disclosed she had concerns having taken some medication during her pregnancy that may have affected her baby.

I have advised she attends to discuss the medication she has taken with you so she may receive professional advice and guidance.

Kind regards

Alison Little

PhD Student
Institute of Nursing and Health Research,
School of Health and Life Sciences,
Ulster University,
Newtownabbey,
Co Antrim,
BT37 OQB
little-a4@ulster.ac.uk
Telephone: 07395514305

Appendix 23: Independent pharmacy opinion on medications purchased online

Drug	BNF	NICE	SPC
Metaformin (Given out regularly in pregnancy as benefit outweighs risk)	https://bnf.nice.org.uk/drug/metformin-hydrochloride.html#indicationsAndDoses Can be used in pregnancy for both pre-existing and gestational diabetes. Women with gestational diabetes should discontinue treatment after giving birth.	https://www.nice.org.uk/guidance/ng3/chapter/1-Recommendations#antenatal-care-for-women-with-diabetes-2 Details preconception guidance to postpartum care for diabetes	https://www.medicines.org.uk/emc/product/594/smpc Uncontrolled diabetes during pregnancy (gestational or permanent) is associated with increased risk of congenital abnormalities and perinatal mortality. A limited amount of data from the use of metformin in pregnant women does not indicate an increased risk of congenital abnormalities. Animal studies do not indicate harmful effects with respect to pregnancy, embryonic or fetal development, parturition or postnatal development (see section 5.3). When the patient plans to become pregnant and during pregnancy, diabetes should not be treated with metformin but insulin should be used to maintain blood glucose levels as close to normal as possible in order to lower the risk of fetal malformations associated with abnormal blood glucose levels.
Peppermint oil (can cause heartburn which is often not desirable in pregnancy, bloating etc is very common in pregnancy but I would refer to GP)	https://bnf.nice.org.uk/drug/peppermint-oil.html#pregnancy Not known to be harmful.		https://www.medicines.org.uk/emc/product/1076#PREGNANCY There are no adequate and well-controlled studies in pregnant women. This product should not be used during pregnancy unless the potential benefit of treatment to the mother outweighs the possible risks to the developing fetus.
Ranitidine (Given out regularly in pregnancy on prescription after treatment with Gaviscon or similar items has failed. I	https://bnf.nice.org.uk/drug/ranitidine.html#pregnancy Manufacturer advises avoid unless essential, but not known to be harmful.	https://www.nice.org.uk/guidance/cg184/chapter/1-Recommendations#the-community-pharmacist Nothing specific in pregnancy	https://www.medicines.org.uk/emc/product/55/smpc#PREGNANCY Ranitidine crosses the placenta but therapeutic doses administered to obstetric patients in labour or undergoing caesarean

would only offer Gaviscon or similar without prior approval from GP)		1.1.1 Community pharmacists should offer initial and ongoing help for people with symptoms of dyspepsia. This includes advice about lifestyle changes, using over-the-counter medication, help with prescribed drugs and advice about when to consult a GP. **[2004]**	section have been without any adverse effect on labour, delivery or subsequent neonatal progress. Like other over the counter drugs, Zantac 75 Relief should not be taken during pregnancy without consulting a doctor or pharmacist.
Gaviscon Known to be safe and given out regularly in pregnancy	Nothing specific to use in pregnancy	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/113/smpc#PREGNANCY Clinical studies in more than 500 pregnant women as well as a large amount of data from post-marketing experience indicate no malformative nor feto/ neonatal toxicity of the active substances. Gaviscon can be used during pregnancy, if clinically needed.
Rennies Known to be safe and given out regularly in pregnancy https://www.rennie.co.uk/heartburn-during-pregnancy/#heartburn_in_pregnancy_treatments	Nothing specific to use in pregnancy	Nothing specific to use in pregnancy	not available
Paracetamol Known to be safe in pregnancy and used first line as painkiller and/or antipyretic	https://bnf.nice.org.uk/drug/paracetamol.html#pregnancy Not known to be harmful.	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/6512/smpc Epidemiological studies in human pregnancy have shown no ill effects due to paracetamol used in the recommended dosage, but patients should follow the advice of their doctor regarding its use.
Anusol (Would prefer not sell, usually aim pregnant women towards	Nothing specific to use in pregnancy	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/1486#PREGNANCY

preparation H which is licenced in pregnancy)			Whilst formal studies on the effect of this product during human pregnancy have not been conducted, there is no epidemiological evidence of adverse effect, either to the pregnant mother or foetus. This product should not be used during pregnancy and lactation unless the potential benefit of treatment to the mother outweighs the possible risk to the developing foetus or nursing infant.
Aspirin (often seen as 75mg for prevention of miscarriage on prescription even though its effectiveness is not proven but I would not sell in pregnancy unless to gargle and rarely seen or asked for now as a painkiller etc)	https://bnf.nice.org.uk/drug/aspirin.html#pregnancy Use antiplatelet doses with caution during third trimester; impaired platelet function and risk of haemorrhage; delayed onset and increased duration of labour with increased blood loss; avoid analgesic doses if possible in last few weeks (low doses probably not harmful); high doses may be related to intrauterine growth restriction, teratogenic effects, closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of newborn; kernicterus may occur in jaundiced neonates.	https://pathways.nice.org.uk/pathways/hypertension-in-pregnancy#path=view%3A/pathways/hypertension-in-pregnancy/chronic-hypertension-in-pregnancy.xml&content=view-node%3Anodes-treatment-lifestyle-and-diet use of 75mg for hypertension detailed	*Low doses (up to 100 mg/day)* Clinical studies indicate that doses up to 100 mg/day for restricted obstetrical use, which require specialised monitoring, appear safe. *Doses of 100- 500 mg/day*: There is insufficient clinical experience regarding the use of doses above 100 mg/day up to 500 mg/day. Therefore, the recommendations below for doses of 500 mg/day and above apply also for this dose range. *Doses of 500 mg/day and above:* Inhibition of prostaglandin synthesis may adversely affect the pregnancy and/or the embryo/foetal development. Data from epidemiological studies suggest an increased risk of miscarriage, and of cardiac malformation and gastroschisis after use of a prostaglandin synthesis inhibitor in early pregnancy. The absolute risk for cardiovascular malformation was increased from less than 1%, up to approximately 1.5 %. The risk is believed to increase with dose and duration of therapy. In animals, administration of a prostaglandin synthesis inhibitor has been shown to

			result in increased pre- and post-implantation loss and embryo-foetal lethality. In addition, increased incidences of various malformations, including cardiovascular, have been reported in animals given a prostaglandin synthesis inhibitor during the organogenetic period. During the first and second trimester of pregnancy, acetylsalicylic acid should not be given unless clearly necessary. If acetylsalicylic acid is used by a woman attempting to conceive, or during the first and second trimester of pregnancy, the dose should be kept as low and duration of treatment as short as possible. Regular or high dose use of salicylates late in pregnancy may result in: - kernicterus in jaundiced neonates During the third trimester of pregnancy, all prostaglandin synthesis inhibitors may expose the foetus to: - cardiopulmonary toxicity (with premature closure of the ductus arteriosus and pulmonary hypertension); - renal dysfunction, which may progress to renal failure with oligo-hydroamniosis; the mother and the neonate, at the end of pregnancy, to: - possible prolongation of bleeding time, an anti-aggregating effect which may occur even at very low doses. - inhibition of uterine contractions resulting in delayed or prolonged labour. Consequently, acetylsalicylic acid at doses of 100 mg/day and higher is contraindicated during the third trimester of pregnancy.

EMLA/lidocaine (Would advise against selling in pregnancy unless GP recommended)	Nothing specific to use in pregnancy	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/871/smpc#PREGNANCY Although topical application is associated with only a low level of systemic absorption, the use of EMLA Cream in pregnant women should be undertaken with care because insufficient data are available concerning the use of EMLA Cream in pregnant women. However, animal studies do not indicate any direct or indirect negative effects on pregnancy, embryo-foetal development, parturition or postnatal development. Reproduction toxicity has been shown with subcutaneous/intramuscular administration of high doses of lidocaine or prilocaine much exceeding the exposure from topical application (see section 5.3). Lidocaine and prilocaine cross the placental barrier and may be absorbed by the foetal tissues. It is reasonable to assume that lidocaine and prilocaine have been used in a large number of pregnant women and women of childbearing age. No specific disturbances to the reproductive process have so far been reported, e.g. an increased incidence of malformations or other directly or indirectly harmful effects on the foetus.
Cyclizine Would not sell OTC in general (once pack of 100 is open it breaks licence so would be selling unlicensed and if anything happened it would be on my head- was warned this by pharmaceutical society NI)	https://bnf.nice.org.uk/drug/cyclizine.html#pregnancy Manufacturer advises avoid; however, there is no evidence of teratogenicity. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, paradoxical	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/4318/smpc#PREGNANCY In the absence of any definitive human data, the use of Cyclizine Hydrochloride in pregnancy is not advised.

	excitability, and tremor.		
Ondansetron Not available OTC, rarely given by GP	https://bnf.nice.org.uk/drug/ondansetron.html#pregnancy No information available; avoid unless potential benefit outweighs risk.	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/5222/smpc#PREGNANCY The safety of ondansetron for use in human pregnancy has not been established. Evaluation of experimental animal studies does not indicate direct or indirect harmful effects with respect to the development of the embryo, or fetus, the course of gestation and peri- and post-natal development. However as animal studies are not always predictive of human response the use of ondansetron in pregnancy is not recommended.
Vitamins would always steer to a combination item to avoid doubling up/overdosing. Usually recommend pregnacare or similar. Galfer if extra iron needed if blood tests showed low iron. Always caution for vitamin A and caffeine in the likes of non-pregnancy vitamin combinations.			
Fluconazole (Would never sell in pregnancy. Minor ailments requires referral in pregnancy)	https://bnf.nice.org.uk/drug/fluconazole.html#pregnancy Manufacturer advises avoid—multiple congenital abnormalities reported with long-term high doses.	Nothing specific to use in pregnancy	**https://www.medicines.org.uk/emc/product/1065/smpc#PREGNANCY** An observational study has suggested an increased risk of spontaneous abortion in women treated with fluconazole during the first trimester. There have been reports of multiple congenital abnormalities (including brachycephalia, ears dysplasia, giant anterior fontanelle, femoral bowing and radio-humeral synostosis) in infants whose mothers were treated for at least three or more months with high doses (400 - 800 mg daily) of fluconazole for coccidioidomycosis. The relationship between fluconazole use and these events is unclear. Studies in animals have shown reproductive toxicity (see section 5.3). Fluconazole in standard doses and short-term treatments should not be

			used in pregnancy unless clearly necessary. Fluconazole in high dose and/or in prolonged regimens should not be used during pregnancy except for potentially life-threatening infections.
Canesten (seen often on prescription but minor ailments or pharmacist must refer in pregnancy)	https://bnf.nice.org.uk/drug/clotrimazole.html#pregnancy With topical use- Minimal absorption from skin; not known to be harmful. With vaginal use- Pregnant women need a longer duration of treatment, usually about 7 days, to clear the infection. Oral antifungal treatment should be avoided during pregnancy.	Nothing specific to use in pregnancy	**https://www.medicines.org.uk/emc/product/2206/smpc#PREGNANCY** There is a limited amount of data from the use of clotrimazole in pregnant women. Animal studies with clotrimazole have shown reproductive toxicity at high oral doses (see section 5.3). At the low systemic exposures of clotrimazole following topical treatment, harmful effects with respect to reproductive toxicity are not predicted. Clotrimazole can be used during pregnancy, but only under the supervision of a physician or midwife
aciclovir topical (use of cream gives very minimal help in healing a cold sores, especially once blistered so I would prefer not to sell In pregnancy)	https://bnf.nice.org.uk/drug/aciclovir.html#pregnancy Limited absorption from topical aciclovir preparations.	Nothing specific to use in pregnancy	https://www.medicines.org.uk/emc/product/8877/smpc#PREGNANCY A post-marketing aciclovir pregnancy registry has documented pregnancy outcomes in women exposed to any formulation of aciclovir. The registry findings have not shown an increase in the number of birth defects amongst aciclovir exposed subjects compared with the general population, and any birth defects showed no uniqueness or consistent pattern to suggest a common cause. No specific studies of topical aciclovir have been carried out in pregnant women or nursing mothers. So far, no relevant plasma levels have been measured and no systemic effects have been observed.

			However, use of the cream should be considered only when the potential benefit outweighs the possibility of unknown risks.

Appendix 24: Appendix: Survey scoring key/codebook

Question number	Response format	Items requiring reverse/ recoding	Items requiring internal consistency analysis	Items requiring multiplication	Data Analysis	Construct measured
1-5	-	-	-	-	Descriptives	Demographics
6-7	-	-	-	-	Descriptives	Previous medication behaviour
8-12	-	-	-	-	Descriptives	Previous purchasing behaviour
13	-	-	-	-	Descriptives	Future purchase behaviour
14	1 to 7	none	yes		Mean of item scores to give an overall attitude score	Attitudes, direct measure
15-25 (a-i)	1 to 5	none			A=total attitude score a-i are scores for behavioural beliefs l-t are scores for outcome evaluations relating to each behavioural belief A=(axl)+(bxm)+(cxn)+(dxo)+(exp)+(fxq)+(gxr)+(hxs)+(ixt)	Indirect measurement of attitude: Measuring behavioural beliefs and outcome evaluations
26-36 (l-t)	1 to 5	-2 to +2				
37-40	1 to 5		yes		Mean of item scores to give an overall subjective norm score	Direct measurement of subjective norm
41 a	1 to 7	-3 to +3			N= total subjective norm score a, b, c scores for each normative belief d, e, f scores for motivation to comply relating to each source of social pressure N=(axd)+ (bxe)+(cxf)	Indirect measurement of subjective norm: Measuring normative beliefs and motivation to comply
42 b	1 to 7	-3 to +3				
43 c	1 to 7	-3 to +3				
45 d	1 to 7					
46 e	1 to 7					
47 f	1 to 7					
48	1 to 5		Yes		Mean of item scores to give an overall perceived behavioural control score	Direct measurement of perceived behavioural control
49	1 to 5	Reverse coding	Yes			
50	1 to 5	-	Yes			
51 a	1 to 7	-			PBC= total PBC score a, b, c, d are scores for each of three control beliefs e, f, g, h are scores control belief power relating to each control belief PBC=(axe)+(bxf)+(cxg)+(dxh)	Indirect measures of PBC: Measuring control beliefs and their perceived power to influence behaviour
52 b	1 to 7	-				
53 c	1 to 7	-				
54 d	1 to 7	-				
55 e	1 to 7	-3 to +3				
56 f	1 to 7	-3 to +3				
57 g	1 to 7	-3 to +3				
58 h	1 to 7	-3 to +3				
59-62	1 to 5	-	Yes		Mean of the 4 intention scores	Purchase Intention
63	1-9	-	-	-	Descriptives	Where participant accessed survey

Appendix 25: Research questions explored and type of inferential statistic used

Question	Parametric statistic	Independent variable	Dependant variable
Is there a difference in direct attitude scores for those who have purchased meds online and those who have not?	T-Test	Previously purchased	Attitude (Direct)
Is there a difference in direct attitude score for women in different employments?	One way between group ANOVA	Employment	Attitude (Direct)
Is there a difference in direct attitude score for women in different age groups?	One way between group ANOVA	Age group	Attitude (Direct)
Is there a difference in indirect attitude scores for those who have purchased meds online and those who have not?	T-Test	Previously purchased	Attitude (Indirect)
Is there a difference in indirect attitude scores for women who have different educational attainment?	One way between group ANOVA	Education	Attitude (Indirect)
Is there a difference in indirect attitude scores for women who must pay for prescription medication?	T-Test	Pay for medication	Attitude (Indirect)
Is there a difference in indirect attitude scores for women who have different types of employment?	One way between group ANOVA	Employment	Attitude (Indirect)
Is there a difference in direct sub norm scores for those who have purchased meds online and those who have not?	T-Test	Previously purchased	Sub Norm (Direct)
Is there a difference in direct sub norm scores for women in different types of employment?	One way between group ANOVA	Employment	Sub Norm (Direct)
Is there a difference in indirect sub norm scores for women who have purchased meds online and those who have not?	T-Test	Previously purchased	Sub Norm (Indirect)
Is there a difference in indirect sub norm scores for women who have to pay for prescription medication?	T-Test	Pay for medication	Sub Norm (Indirect)
Is there a difference in indirect sub norm scores for women in different types of employment?	One way between group ANOVA	Employment	Sub Norm (Indirect)
Is there a difference in direct PBC scores for women who have purchased meds online and those who have not?	T-Test	Previously purchased	PBC (Direct)
Is there a difference in direct PBC scores for women in different age groups?	One way between group ANOVA	Age	PBC (Direct)
Is there a difference in indirect PBC scores for women who have purchased meds online and those who have not?	T-Test	Previously purchased	PBC (Indirect)
Is there a difference in indirect PBC scores for women who have previously taken medication for a medical condition?	T-Test	Previously taken meds for medical condition	PBC (Indirect)
Is there a difference in purchase intention for women who previously purchased medication online in pregnancy?	T-Test	Previously purchased	Purchase Intention
Is there a difference in purchase intention for women who have to pay for their prescription medication?	T-Test	Pay for medication	Purchase Intention

Is there a difference in purchase intention for women with different employment status?	One way between group ANOVA	Employment status	Purchase Intention
How much of the variance in purchase intention can be explained by attitude, sub norm and PBC?	Regression analysis	Attitude Sub Norm PBC	Purchase intention

Appendix 26: Eye tracking metric value tables

Table 1: Mean metric values for Areas of Interest in Task 1

AOI (Factors)	Fixation count		Fixation duration		Time to 1st fixation		Total fixation duration		Total visit duration		Visit count		Visit duration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Added to basket	5.18	4.490	0.313	0.184	123.074	81.403	1.649	1.536	1.789	1.671	2.394	1.600	0.716	0.573
Condition info	0.061	0.348	0.004	0.024	2.177	12.504	0.008	0.049	0.009	0.054	0.030	0.174	0.009	0.054
Delivery	3.909	7.401	0.089	0.132	37.757	60.139	3.869	10.413	1.152	2.492	2.061	3.517	0.185	0.372
Medication content	15.667	41.907	0.105	0.118	32.275	44.361	3.869	10.413	4.432	12.187	2.394	3.881	0.880	2.199
Medication info	58.000	94.590	0.152	0.105	39.626	41.677	13.052	21.658	15.296	25.257	5.849	6.437	1.418	2.255
Price	22.485	23.065	0.254	0.077	47.889	49.030	5.767	5.773	6.175	6.231	11.818	9.279	0.512	0.273
Product image	93.76	65.106	0.237	0.040	26.790	14.783	21.916	15.350	26.330	17.845	25.737	17.238	1.079	0.414
Searching links	43.788	42.462	0.259	0.099	25.598	18.588	11.241	10.193	14.437	12.991	4.121	3.100	4.429	5.321
Star rating /Reviews	4.455	8.475	0.108	0.112	93.408	113.833	1.789	1.672	1.088	2.293	2.636	4.588	0.192	0.227

Table 2: Mean metric values for Areas of Interest in Task 2

AOI (Factors)	Fixation count		Fixation duration		Time to 1st fixation		Total fixation duration		Total visit duration		Visit count		Visit duration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Added to basket	4.273	3.085	0.289	0.140	180.643	83.521	1.280	1.054	1.402	1.184	1.909	0.947	0.757	0.555
Condition info	96.970	127.985	0.126	0.112	29.581	36.754	21.309	27.155	27.21	34.782	5.424	11.522	4.936	6.638
Delivery	5.333	13.052	0.098	0.133	58.092	80.049	1.202	3.193	1.414	3.764	2.394	5.285	0.231	0.364
Medication content	7.727	18.524	0.057	0.106	36.941	76.281	2.004	5.069	2.499	6.433	0.909	1.843	0.557	1.262
Medication info	80.394	100.950	0.185	0.105	57.513	52.342	17.822	21.805	23.387	28.762	9.576	10.434	2.947	7.072
Price	13.394	16.144	0.176	0.115	48.243	48.409	3.122	3.801	3.413	4.164	7.212	7.223	0.401	0.389
Product image	64.121	58.905	0.214	0.091	43.086	45.111	14.704	13.351	17.364	15.783	19.849	15.476	0.788	0.521
Searching links	106.667	84.243	0.227	0.066	25.886	19.650	25.276	21.408	34.142	28.856	9.242	7.846	4.626	4.144
Star rating /Reviews	12.455	46.241	0.110	0.135	86.500	89.985	2.719	9.674	3.274	11.918	2.909	5.784	0.326	0.565

Table 3: Mean metric values for Areas of Interest in Task 3

AOI (Factors)	Fixation count		Fixation duration		Time to 1st fixation		Total fixation duration		Total visit duration		Visit count		Visit duration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Added to basket	4.484	2.693	0.257	0.134	133.584	109.613	1.185	0.702	1.319	0.772	2.212	1.341	0.636	0.432
Condition info	39.151	83.310	0.050	0.091	15.160	31.100	8.162	17.572	10.571	22.216	2.030	5.277	1.738	3.367
Delivery	1.758	6.457	0.036	0.081	35.946	84.072	0.389	1.435	1.069	5.247	0.576	1.458	0.201	0.878
Medication content	2.849	7.851	0.060	0.123	28.961	73.909	0.861	2.592	1.126	3.355	0.667	1.594	0.614	2.363
Medication info	65.152	91.542	0.198	0.111	65.124	66.963	13.872	20.106	17.746	24.407	6.212	11.067	2.758	3.275
Price	5.606	6.750	0.167	0.114	90.378	102.582	1.245	1.720	1.340	1.863	3.272	3.394	0.293	0.283
Product image	34.424	37.596	0.209	0.050	93.884	61.408	7.512	8.803	9.833	10.888	9.727	9.654	0.999	0.749
Searching links	127.546	118.588	0.238	0.061	22.572	16.649	30.601	28.593	42.415	37.210	7.485	7.782	6.639	4.168
Star rating /Reviews	1.364	2.956	0.068	0.119	69.615	107.848	0.294	0.617	0.321	0.661	0.849	1.873	0.117	0.209

Table 4: Mean metric values for Areas of Interest for all 3 tasks combined

AOI (Factors)	Fixation count		Fixation duration		Time to 1st fixation		Total fixation duration		Total visit duration		Visit count		Visit duration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Added to basket	4.647	3.494	0.286	0.154	145.767	94.856	1.371	1.155	1.504	1.268	2.172	1.325	0.703	0.521
Condition info	45.394	95.999	0.060	0.098	15.639	30.570	9.611	20.284	12.600	26.131	2.495	7.580	2.228	4.722
Delivery	3.667	9.450	0.074	0.117	43.538	75.241	0.879	2.409	1.212	3.958	1.677	3.806	0.206	0.583
Medication content	8.748	27.089	0.178	0.108	32.682	65.739	2.244	6.895	2.686	8.218	1.323	2.729	0.684	1.985
Medication info	67.849	95.256	0.178	0.108	53.975	55.002	14.915	21.090	18.809	26.164	7.212	9.588	2.374	4.686
Price	13.828	17.938	0.199	0.110	62.170	73.404	3.378	4.477	3.643	4.841	7.434	7.825	0.402	0.329
Product image	64.101	59.761	0.220	0.065	54.587	52.839	14.710	13.978	17.842	16.431	18.434	15.804	0.955	0.586
Searching links	92.667	93.692	0.242	0.078	24.685	18.212	22.374	22.758	30.332	30.303	6.950	6.898	5.231	4.641
Star rating /Reviews	6.091	27.323	0.095	0.123	83.174	103.798	1.344	5.768	1.561	7.058	2.131	4.448	0.212	0.378

Appendix 27: Research Training Credits, Publications and Awards

Date	Training	Credits
03-07/10/16	On boarding UUJ (5days)	30
11/10/16	Research integrity (Online) (0.5 day)	2
19/10/16	Effective use of the library UUJ (0.5 day)	3
25/10/16	Refworks UUJ (0.5 day)	3
01/11/16	Putting Pen to Paper UUJ (Full day)	6
20/12/16	Presenting to Presenters UUJ (0.5 day)	3
24/01/17	SPSS- An introduction workshop UUJ	6
30/01/17	Conferences, Presenting and Networking (Online) (0.5 day)	
30/01/17	Research Methods in Literature Reviewing (Online) (0.5 day)	3
31/01/17	Introduction to Good Clinical Practice eLearning (Secondary Care) Online (0.5 day)	2
27/02/17	Tobii webinar “Introduction to eye tracking research” (1hr)	
21/03/17	PGTA Introduction to learning and teaching UUJ (Full day)	6
22/03/17	Writing for publication workshop UUJ (0.5 day)	3
06/04/17	DIY (Design it Yourself) Questionnaire UUJ (0.5 day)	3
27-28/04/17	Mixed Methods: Research Summer School DCU (2 day)	12
08-09/06/17	Cochrane systematic Review Training Programme QUB (2 day)	12
03/10/17	Care to Write: Writing in the middle of your PhD UUJ (Full day)	6
31/10/17-01/11/17	RCM Annual Conference: Manchester Poster Presentation (2Day)	12
22/01/18	SPSS-An introduction workshop UUJ	(Full day)
07/02/18	Keeping going: Writing in the second year of your PhD	(Full day)
12-14/02/18	COSTbirth Innovation in Action Research Training School. Implementation Science for which I received funding from the European Cooperation in Science and Technology (COST) Action IS1405 Building Intrapartum Research Through Health (“Birth”)	(2.5days)
22/05/18	Your literature review: sorting fact from fiction	(0.5 day)
05/06/18	Festival of PhD Research Ulster University Jordanstown	(1 day)
14/06/18	Qualitative Interviewing Skills Workshop UUJ	(1day)
28/06/18	Drop in statistical analysis workshop UUC Prof Paul Dion	(1/2day)
29/06/18	Factor Analysis Course UUC Prof Paul Dion	(Full day)
06/07/18	Structural Equation Modelling Statistics Prof Paul Dion	Course (Full day)
09/07/18	Measurement Models and SEM Statistics Prof Paul Dion	Course (Full day)
4-5/10/18	Presented poster presentation at Annual RCM Conference in Manchester	(2days)
22/01/19	Building Your CV	(2hrs)
28/01/19	Writing in the 3rd Year of Your PhD	(Full day)
11/02/19	Prepare to submit your thesis	(1.5hr)
26/02/19	PhD Manager Seminar	(1hr)
01/03/19	Turbocharge Your Writing- Hugh Kearns	(2hrs)
30/04/19	Viva Survivor	(3hrs)

Funding Obtained

Scholarship 600 Euro awarded to attend COSTbirth Innovation in Action Research Training School in Lucerne Switzerland 12/14 February 2018. Implementation Science for which she received funding from the European Cooperation in Science and Technology (COST) Action IS1405 Building Intrapartum Research Through Health ("Birth")

INHR Ulster University £380 funding received to deliver a Doctoral College Research Led Initiative: Workshop titled 'Your literature review: sorting fact from fiction' February 2018.

Publications

Little A, Sinclair M, Zheng H, Gillen P. (2018) Online medication purchasing behaviour in pregnancy: a structured review of the literature. *Evidence Based Midwifery* 16(1): 13-20.

Workshops delivered

Your literature Review-Sorting Fact from Fiction 10:00-13:00 22/05/18
Aim: To provide a theoretical and practical overview of a range of literature review types to assist PhD researcher students to understand different review processes and how these are operationalized.

Teaching

25th June 2018 provided undergraduate obstetric emergency training (PROMPT) for midwifery students in Queen's University Belfast.

Committee Representative

MFIR PhD student representative on Doctoral Education Research Committee June 2018- July 2019.

Awards

Ulster University Broadening Horizons Travel Bursary to attend ICM Triennial Conference in Bali in June 2020.

Faculty award for Best Oral Presentation at Ulster University PhD Festival of Research 2018. *Online medication purchasing behaviour in pregnancy: A structured review of the literature.*