Buying Fake Medicines on the Internet: E-Consumer Behaviour Analysis

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Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Acknowledgement

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Dedication

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Abbreviations

ASOP	The Alliance for Safe Online Pharmacies
BCW	Behaviour Change Wheel
COM-B	Capability, Opportunity, Motivation and Behaviour model
DSCSA	Drug Supply Chain Security Act
EMA	European Medicines Agency
EU	European Union
FDA	Food and Drug Administration
FMD	Falsified Medicines Directive
GP	General Practitioner
GPhC	General Pharmaceutical Council
GSL medicines	General Sales list medicines
HBM	Health Belief Model
INTERPOL	The International Criminal Police Organisation
MMAT	Mixed Methods Appraisal Tool
MHRA	Medicines and Healthcare Products Regulatory Agency
NHS	National Health Services
OTC medicines	Over The Counter Medicines
P medicines	Pharmacy Medicines
POMs	Prescription Only Medicines
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
TAM	Technology Acceptance Model
TDF	Theoretical Domain Framework
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UK	The United Kingdom
USA	United States of America
WHO	World Health Organisation

Dissemination of Findings

List of publications and scientific outputs

The following is a compilation of publications that are related to the PhD thesis:

- Almomani, H., Raza, A., Patel, N. and Donyai, P., 2023. Reasons that lead people to buy prescription medicines on the internet: a systematic review. Frontiers in Pharmacology, 14, pp.1239507-1239507.

- Almomani, H., Patel, N. and Donyai, P., (2023). News media coverage of the problem of purchasing fake prescription medicines on the Internet: thematic analysis. *JMIR formative research*, 7, p.e45147. DOI: 10.2196/45147

- Almomani, H., Patel, N. and Donyai, P., (2023). Reasons that lead people to end up buying fake medicines on the Internet: qualitative interview study. *JMIR Formative Research*, 7(1), p.e42887. DOI: 10.2196/42887

- Almomani, H., Nilesh P., and Donyai P., (2023). Why Do People Buy Prescription Medicines Online? A Qualitative Interview Study. *International Journal of Pharmacy Practice*, 31(Supplement_1), Page i12, DOI: 10.1093/ijpp/riad021.013

- Donyai, P., Patel, N. and Almomani, H., (2021). Why do people end up buying fake medicines online? A thematic analysis of newspaper articles. *International Journal of Pharmacy Practice*, 29(Supplement_1), pp. i1-i1.DOI: 10.1093/ijpp/riab016.000

List of presentations

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Topic: Why do people end up buying fake medicines online? A thematic analysis of newspaper articles

Event: Postgraduate Research Showcase

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Type: Oral presentation.
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Thesis Abstract

Background:

Purchasing prescription medicines online is associated with significant risks to patient safety as the Internet abounds with fake medicines. To help reduce these risks, it is important to understand why people purchase prescription medicines online in the first place so that effective interventions might be designed in the future.

Aim:

This thesis aims to explore the breadth of reasons that drive people to purchase prescription medicines online.

Methods:

Three data sources were utilised; the news media, consumers who have purchased prescription medicines online, and the existing literature. A qualitative analysis approach was adopted, with the Theory of Planned Behaviour, The Capability, Opportunity, Motivation and Behaviour model, and the Theoretical Domains Framework underpinning the analyses.

Results:

An overarching conceptual model was developed to encompass the factors that could influence consumer's decision to purchase prescription medicines online. These reasons were categorised under nine super-ordinate themes; the perceived benefits of purchasing prescription medicines online, the perceived risks, consumer's emotions, facilitators that increase the possibility of the purchase, barriers that impede the purchase, consumers' knowledge about the purchase, trusting beliefs that lead consumers to trust the online sellers of medicines, social factors, and environmental factors that could encourage or discourage people from making the purchase.

Conclusion:

This research provides a holistic understanding of the drivers and challenges in online purchases of prescription medicines. It uncovers a multitude of factors, encompassing perceived benefits, risks, emotions, facilitators, barriers, consumer knowledge, trusting

beliefs, social influences, and environmental considerations. These findings hold practical and theoretical significance, underlining the need to acknowledge the complexity of this behavior. It serves as a foundation for future interventions focused on patient safety in the digital age. Further research can be built upon these insights for a safer environment in online prescription medicine purchases.

CHAPTER 1

Background, General Introduction and Literature Review

1.1. Online sales and marketing of pharmaceutical products

The Internet has transformed marketing since the first webpage (https://home.cern/) went live in 1991 (Chaffey and Ellis-Chadwick, 2016). With over five billion people worldwide using the Internet regularly for various needs in 2012 (Statista, 2022), consumers' behaviour has changed dramatically as a result. This practice has spread very fast in many countries in the world so that the Internet is now ubiquitous and an unavoidable part of many people's lives. Consequently, many companies have shifted their marketing plans and business models to focus on online marketing (Verhoef and Bijmolt, 2019).

Online marketing is defined as the utilization of the Internet to market products and services (Kotler and Armstrong, 2020). This kind of marketing has become the fastest-growing form of marketing in recent years (Kotler and Armstrong, 2020). Figure 1.1 illustrates the timeline of some important online services and channels in the marketing communication field (Chaffey and Ellis-Chadwick, 2016).
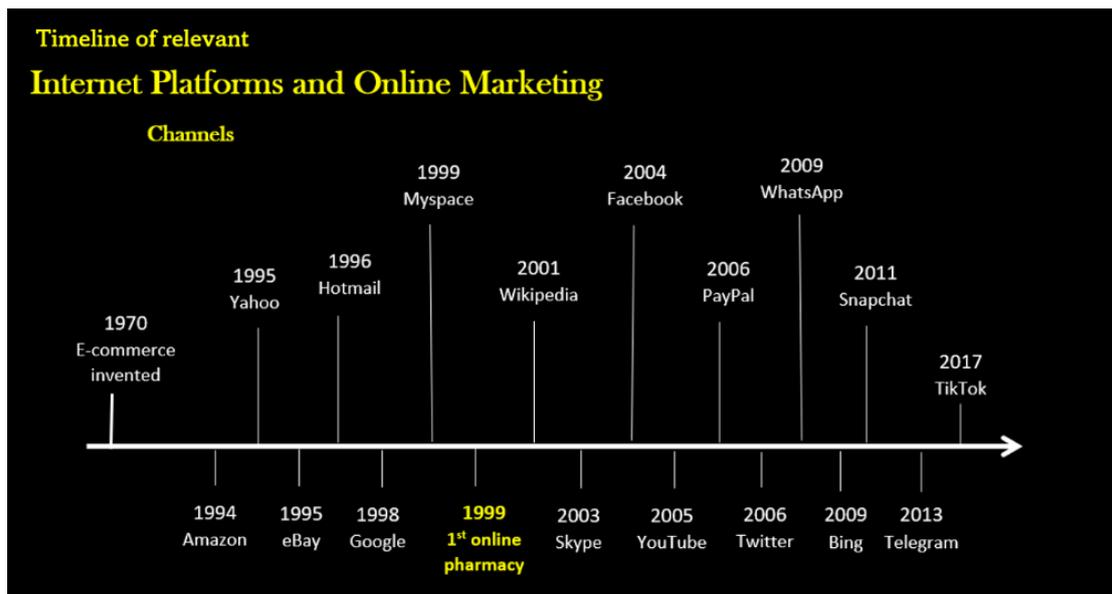
Figure 1.1. Timeline of online marketing channels (Chaffey and Ellis-Chadwick, 2016).

Online marketing is a very useful marketing tool in general because it targets huge audiences at any one time (Yurovskiy, 2014). Moreover, it has many benefits for both marketers and consumers. Marketers get many benefits from marketing their products using the Internet such as cost efficiency, infinite audiences, permanent availability of their marketing information, easy-to-measure outputs, and easy-to-customize format, as marketing material could be easily changed depending on the feedback (Todor, 2016). For consumers, the use of the Internet for purchasing products can be useful because of its efficiency, convenience, cost reduction, product diversity, and richer and participative information (Bhatti and Rehman, 2019).

The online sales and marketing of pharmaceutical products is key to the function of online pharmacies. Online pharmacies (known by several interchangeable names, for example, Internet pharmacies; e-pharmacies; cyber pharmacies) are any person, entity, or website offering pharmaceutical products and services to consumers online (Drug Enforcement Administration, 2022). The first online pharmacy was started in the United States in late 1999 (Orizio *et al*., 2011). Online pharmacies are classified into pharmacies that operate online

only, and brick-and-mortar pharmacies that also have an online presence (Mackey and Nayyar, 2016).

Online pharmacies entice consumers for different reasons. Convenience, privacy, and 24/7 accessibility might be considered the main reasons (Fittler *et al*., 2018a). They also can offer delivery, and flexibility in terms of people being able to order for themselves or others. The constant availability of the website of an online pharmacy, accessible in one's own home has made online pharmacies convenient, and this benefit is valued especially by disabled and elderly patients (Singh *et al*., 2020).

Online pharmacies adopt several online marketing tactics to promote their various services and some of their products through their official websites or smartphone applications. Table 1.1 illustrates these marketing tactics (Parekh *et al*., 2016).

Table 1.1. Online marketing tactics used by online pharmacies.

Online Marketing Tactic	Comments
Social media marketing	Social media platforms (such as Facebook, Twitter, Instagram … etc.) are used by online pharmacies to promote their products and services. Social media enable direct connections between online pharmacies and consumers.
Search Engine Optimization (SEO)	SEO is a marketing tactic used to improve web pages presence and visibility on search engines' results pages, thus it is about achieving the highest ranking on the natural (organic) listing in the Search Engine Results Pages (Giomelakis and Veglis, 2016).
Pay Per Click Ads (PPC)	Paid adverts on other websites or search engines such as Google might be used by online pharmacy websites if

	they are not having enough traffic (Chaffey and Ellis-Chadwick, 2016).
Direct E-mail	The widespread use of mobile phones and laptops increases the potential of email in marketing tactics used by companies because it is very quick and easy to send.

1.2. Types of medicines available online

There are several classifications of medicines based on the level of control, at least in the UK. According to the Medicines and Healthcare Products Regulatory Agency (MHRA) and the licensing laws in the UK, medicines are classified into two broad categories: Prescription Only Medicines (POMs), and the counter medicines (OTC) (Medicines and Healthcare products Regulatory Agency, 2023). The OTC medicines are divided into Pharmacy (P) medicines, and those on the General Sale List (GSL). POMs are medicines that require a prescription from an authorized prescriber, which can be in the form of a paper prescription or an electronic prescription. The supervision of both a doctor and a pharmacist may have traditionally been associated with these medicines, but it's important to note that the prescriber for POMs is not exclusively a doctor, and the supervisory roles can vary. The P medicines are available only in pharmacies and can only be sold under the supervision of pharmacists. Finally, GSL medicines are available in pharmacies and retail outlets and do not need the supervision of pharmacists for their sale. Generally, all the pharmaceutical products that are available in brick-and-mortar pharmacies and shops could be available via online pharmacies (Medicines and Healthcare products Regulatory Agency, 2023).

1.3. Laws and regulations

In terms of legality, online pharmacies are classified into two types (Fittler *et al*., 2013a). In the first type, these are legitimate online pharmacies that offer pharmaceutical products

and provide pharmacy services that meet relevant standards. Legitimate online pharmacies could either operate in the same country as the consumer ordering from or be in a different country, and they must adhere to both the laws and regulations of the country where the website operates. The second type is illegitimate online pharmacies; those online sellers of medicines are not verified and may not adhere to standards, law, and regulations. Hence, the second type raises public safety concerns.

Laws regulating the sales of medicines over the Internet vary from one country to another. In some countries, specific verification and accreditation programs for online pharmacies are available (Fittler *et al*., 2013a). For example, online pharmacies based in the UK can sell medicines legally if and only if, they are registered and accredited by the General Pharmaceutical Council (GPhC) or the MHRA (General Pharmaceutical Council, 2022). The GPhC Voluntary Internet pharmacy logo shown in Figure 1.2 is used to provide reassurance to the public that they are purchasing medicines from a registered online pharmacy that meets the GPhC standards (General Pharmaceutical Council, 2022). In Northern Ireland, online pharmacies must display the EU common logo shown in Figure 1.2 (so called distance selling logo).

In the European Union (EU), licensed online pharmacies must be registered with the national competent authorities in the EU Member States and must display the EU common logo (which is produced by the Falsified Medicines Directive, FMD) on every page of the website where medicines can be available (European Medicines Agency, 2019). The EU common logo is shown in Figure 1.2.

In the United States online pharmacies must be approved by the state boards of pharmacy and the US Food and Drug Administration (United States Food and Drug Administration, 2020a). These regulatory bodies recommended the use of the Digital Pharmacy Accreditation

logo (which is produced by the National Association of Boards of Pharmacy, NABP) to

provide reassurance to the public that they are purchasing medicines from a registered online

pharmacy that has met the state boards of pharmacy and the FDA standards (Fittler *et al*.,

2013a). The Digital Pharmacy Accreditation logo is shown in Figure 1.2. Moreover, online

pharmacies dealing with controlled substances must register with the US Drug Enforcement

Administration (DEA) (Hock *et al*., 2019). In Canada, online pharmacies must be approved

by the National Association of Pharmacy Regulatory Authorities (NAPRA) (Government of

Canada, 2021).
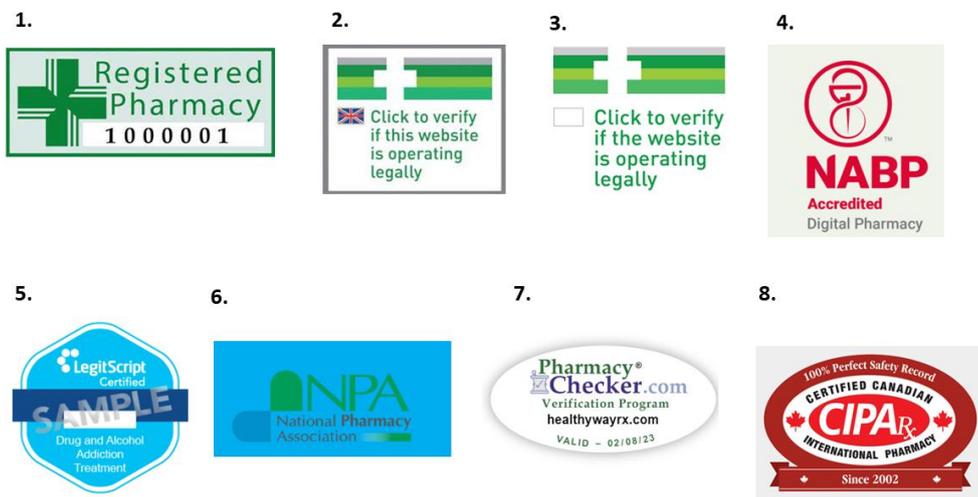
Figure 1.2. Accreditation logos for online pharmacies: (1) GPhC Voluntary Internet pharmacy logo (The United Kingdom), (2) distance selling logo (Northern Ireland), (3) EU common logo (The European Union), (4) Digital Pharmacy Accreditation (The United States), (5) LegitScript logo (Global), (6) National Pharmacy Association logo (The United Kingdom), (7) Pharmacy Checker (Global), (8) CIPA seal (Canada).

There are some private voluntary certification programs available such as the LegitScript

which is recommended by the FDA (Fittler *et al*., 2013a), Canadian International Pharmacy

Association (CIPA), National Pharmacy Association (NPA), or PharmacyChecker. The logos

or seals for these accreditation organisations are also shown in Figure 1.2.

Internationally, there is a shortage of effective global regulations and laws that control and regulate online pharmacies (Fittler *et al*., 2013a; Gabay 2015). Additionally, the verification systems are not mutually recognized globally (Fittler *et al*., 2022a). Moreover, around two-third (66%) of countries worldwide do not have regulations for the online trading of medicines. Thus, POMs can be sold over the Internet by anyone in those countries (Hock *et al*., 2019). These regulatory absences as well as the rapid development of technology have facilitated the expansion of illegal online pharmacies (Mackey and Nayyar, 2016). According to an estimate, over 95% of the 35,000 active online pharmacies worldwide operate illegally (Alliance for Safe Online Pharmacies, 2022; LegitScript, 2020). The following sections explore the prevalence and characteristics of illegal online pharmacies as well as the substantial patient safety concerns associated with the uncontrolled proliferation of such illegal pharmacies.

1.4. The prevalence and characteristics of illegal online pharmacies

1.4.1. The prevalence of illegal online sellers of medicines

The Internet hosts a range of virtual marketplaces of medicines. The overall volume of online pharmacies varies, with around 35,000 websites found to be accessible in 2016 (Legitscript, 2020). While some of those online pharmacies are legal and safe, the majority are illegal and dangerous sellers (Alliance for Safe Online Pharmacies, 2022).

Several studies have explored the prevalence of illegal online pharmacies. Table 1.2 summarises recent data extracted from previous studies that explored the prevalence of illegal online pharmacies which offer various types of medicines. For example, a recent study conducted in the US explored the prevalence of illegal online pharmacies selling anticancer treatment (Imatinib) using 4 search engines (Google, Bing, Yahoo!, and DuckDuckGo) with the search term "buy imatinib online" between February 2021 and April 2021 (Sun *et al*.,

2022). A total of 44 websites selling Imatinib were analysed, of which 40 (91%) websites were illegal (i.e., not approved by LegitScript). Likewise, a study conducted in the UK explored the prevalence of illegal online pharmacies that offer antibiotics (Boyd *et al.*, 2017). Google and Yahoo were used. The researchers analysed 20 websites and found that 15 (75%) websites were illegal (i.e., these were not approved by MHRA and GPhC).

Table 1.2. Prevalence of Illegal online pharmacies.

Citation	Search period	N of websites analysed	Medicines explored	Legitimacy indicator	N (%) of illegal websites
Penley *et al.*, 2021	Dec. 2019 - Feb. 2020	62	Amphetamine-dextroamphetamine	Approved by LegitScript	61 (98.3%)
Penley *et al.*, 2022	Sep. 2019 to Dec. 2019	49	Insulin	Approved by LegitScript	29 (59%)
Ozawa *et al.*, 2021	Jun. 2020 - Aug. 2020	117	COVID-19 treatments (dexamethasone, hydroxychloroquine, lopinavir/ritonavir)	Approved by LegitScript	92 (78.6%)
Boyd *et al.*, 2017	Not specified	20	Antibiotics	Approved by MHRA and GPhC	15 (75%)
Monteith *et al.*, 2016	Jul. 2018 - Aug. 2018	30	Psychotropic drugs	Approved by LegitScript	17 (57%)
Fittler *et al.*, 2013a	Feb. 2008 - Feb 2012	136	15 active ingredients (which include POMs and OTC medicines)	Approved by LegitScript	136 (100%)
Vida *et al.*, 2016	Jun. 2014 - Aug. 2014	17	Biopharmaceuticals (Somatropin)	Approved by LegitScript	17 (100%)

Sun *et al.*,	Feb. 2021 -	44	Chemotherapy	Approved by	40 (91%)
2022	Apr. 2021		medication (Imatinib)	LegitScript	

1.4.2. Characteristics of illegal online sellers of medicines

As shown in the previous section, illegal online pharmacies are prevalent in search engine results, enabling the purchase of different types of medicines including high-risk controlled medicines. Thus, it is important to understand the characteristics of this kind of seller. Several previous studies have explored the characteristics of illegal pharmacies using various evaluation tools (Fittler *et al.*, 2013a; Penley *et al.*, 2021; Peneley *et al.*, 2022). These evaluation tools include the range of products offered, prescription requirements, marketing tactics used, and healthcare provider involvement.

1.4.2.1. Range of products offered

Various pharmaceutical products ranging from OTC medicines to high-risk POMs such as controlled medicines can be obtained through illegal online pharmacies. According to operation Pangea, which targets the illegal online sellers of medicines, millions of medicines from various therapeutic groups have been detected and seized, and these medicines include controlled medicines, erectile dysfunction tablets, painkillers, and anabolic steroids (Interpol, 2022).

In previous studies, researchers have provided evidence of the online availability of branded and generic medicines from different therapeutic categories offered by illegal online sellers of medicines (Fittler *et al.*, 2013a). Researchers from Hungary explored the online availability of several active ingredients and found that both branded and generic medicines are widely available online (Fittler *et al.*, 2013a). They also provided evidence of the online availability of both POMs and OTC medicines through illegal online pharmacies. Table 1.3

illustrates some studies that have also provided evidence of the availability of different types of medicines through illegal medicine sellers on the Internet.

Table 1.3. Availability of different types of medicines on the Internet.

Therapeutic group	Explored by
Opioid analgesic (Tramadol)	Fittler *et al*., 2013a; Raine *et al*., 2009
Anxiolytics (diazepam, alprazolam)	Fittler *et al*., 2013a
Antidepressants (venlafaxine, fluoxetine, sertraline, Fluoxetine)	Bate, 2010; Fittler *et al*., 2013a; Gelatti, 2013
CNS stimulant	Hockenhull *et al*., 2020; Penley *et al*., 2021
Psychotropic drugs	Monteith *et al*., 2016
Antipsychotic medication	Monteith *et al*., 2015
Acne treatment (Isotretinoin)	Lagan, 2014
COVID-19 treatment	Fittler *et al*., 2021; Ozawa *et al*., 2021
Treatment of premature ejaculation	Dean, 2010
Antimicrobial	Boyd, *et al*., 2017; Fittler *et al*., 2013; Mainous, 2009
Anticancer	Fittler *et al*., 2013; Sun *et al*., 2022
Anti-inflammatory Agents	Bate, 2010; Fittler *et al*., 2013; Raine *et al*., 2009
Antilipemic Agents	Bate, 2010
Proton Pump Inhibitors	Bate, 2010; Rahman, 2018
Biopharmaceuticals (Somatropin)	Fittler *et al*., 2013a
Haematopoietic	Fittler *et al*., 2013a
Antidiabetics	Penley *et al*., 2022
HIV medications	Wang, 2015

Growth hormones	Vida *et al.*, 2017

1.4.2.2. Prescription requirement

A common practice of illegal online pharmacies is offering POMs without requiring prescriptions (Boyd *et al*., 2017; Penley *et al*., 2022). Online sellers of medicines offer easy access to POMs and controlled medicines which in regulated systems require a prescription before they can be purchased. Table 1.4 illustrate studies that have explored accessibility to different types of POMs without needing a prescription, using the Internet.

Table 1.4. Online accessibility to POMs without prescription.

Citation	POMs explored	N of websites analysed	N of websites offer POMs without prescription
Penley *et al.*, 2021	Amphetamine-dextroamphetamine	61	31(51%)
Penley *et al.*, 2022	Insulin	29	15 (51.7%)
Ozawa *et al.*, 2021	COVID-19 Treatments (dexamethasone, hydroxychloroquine, Lopinavir / Ritonavir)	107	82 (76.7%)
Boyd *et al.*, 2017	Antibiotics	15	5 (33.3%)
Monteith *et al.*, 2016	psychotropic drugs	30	26 (86.7)
Fittler *et al.*, 2013a	15 active ingredients	136	63 (46.3%)

Vida *et al.*, 2016	Biopharmaceuticals (Somatropin)	17	3 (17.6%)
Sun *et al.*, 2022	Chemotherapy medication (Imatinib)	41	38 (92.7%)

1.4.2.3. Marketing tactics adopted by the illegal online pharmacies

Several marketing strategies and tactics are used by illegal online sellers of medicines to entice consumers to purchase medicines through their websites. These strategies and tactics are used to magnify positive aspects of online purchasing of medicines that consumers might find convenient as well as minimising and overshadowing the actual risks of the product they sell (Orizio *et al*., 2011). The marketing strategies and tactics used by illegal sellers of medicines include price discounts, bulk purchase discounts, coupons or promo codes, claims registration, customer testimonials, product reviews, refill reminders, gift cards, and newsletters (Monteith *et al*., 2016; Penley *et al*., 2021; Penley *et al*., 2022).

1.4.2.4. Healthcare provider involvement

Under normal circumstances, clear communication between the patient and their healthcare provider enables the practitioner to collect relevant medical information (i.e., patient's past and current diseases, treatment history, allergies) and make sure that the patient receives the proper treatment when a prescription for a drug is issued (Al Zoubi *et al*., 2021). The absence of proper healthcare provider involvement and oversight in the prescribing process could lead to serious complications for patients, such as the use of medications that interact with existing medications or using contraindicated medicines.

Prescriptions, therefore, whether electronically or paper-based, should normally be issued through authorised prescribers (Medicines and Healthcare products Regulatory Agency, 2014). On the Internet, there are nowadays what are known as prescribing services where

consumers complete an online consultation (online questionnaire, video or phone call, online chat, or email) according to which a prescription might then be issued and sent to the pharmacy for dispensing (Fittler *et al*., 2013a).

Regrettably, evidence has also found that the majority of illegal sellers of medicines offer POMs and controlled medicines without a valid prescription and without the involvement of a healthcare provider (Boyd *et al*., 2017; Fittler *et al*., 2013a; Ozawa *et al*., 2022), thus putting patients at risk and complications caused by the absence of healthcare professional oversight.

1.4.3. Illegal sellers of medicines on the web

There are two places in which the online trading of medicines occurs, the '*Surface Web*' and the '*Deep Web*' (Koenraadt, 2018). The Surface Web is what the average user thinks of as online trading of products and represents a group of websites indexed by search engines such as Google and Yahoo that can be easily accessed through standard browsers and this type is thought to represent the 'tip of the iceberg' (Chertoff, 2017). The second virtual place is the Deep Web which represents a major part of the websites available on the Internet, and it is described as the hidden part of the iceberg. This type includes websites that are not indexed by search engines, including password-protected websites. Thus, this kind of websites is more complex and difficult to track. Emails, social media accounts (Twitter, Facebook, and Instagram) are classified as an example of the Deep Web because they are less accessible to a general audience.

One subset of the Deep Web is the 'Dark Web'. The Dark Web is hard to access and requires a special web browser and authorization to access. It is very small and accounts for less than 0.01% of the sites on the Internet (Chertoff, 2017). Nonetheless, as the Dark Web is anonymous and more private, this makes it a sanctuary for illegal sellers.

Illegal online pharmacies operate on all these 3 types of the web. This makes the online supply chain of medicines complex and hard to track.

1.4.4. Digital marketing channels used by illegal sellers of medicines

Illegal online sellers of medicines advertise and sell their products on various Internet platforms and digital marketing channels. Although online pharmacies are considered the primary site for trading in medicines over the Internet (Hall & Antonopollus, 2015), several other Internet platforms are also used by illegal sellers of medicines such as social media platforms (e.g., Facebook and Twitter) or instant messaging services (e.g., Telegram, WhatsApp). Table 1.5 lists these online channels and examples from the literature that have highlighted the use of these channels to sell medicines illegally.

Table 1.5. Online marketing channels used by illegal sellers of medicines.

Online marketing channel	Description/Example	Highlighted by
Online pharmacies	The primary websites used by illegal sellers to supply medicines	Hall & Antonopoulos, 2015; Moyle *et al*., 2019
Search-engine	Search engines manipulation (Google, Bing, Yahoo)	Fittler *et al*., 2022a; Leontiadis *et al*., 2011
Social media	Facebook, Twitter, Instagram, Snapchat, YouTube, Pinterest, TikTok	Demant *et al*., 2019; Hall & Antonopoulos, 2015; Moureaud *et al*., 2021; Mackey *et al*., 2020; Moyle *et al*., 2019; Mackey *et al*., 2017

E-forums:	The use of online discussion forums with links to medicines sellers' websites	Hall & Antonopoulos, 2015; Liang and Mackey 2012
E-retailers and E-wholesalers	Selling small or large quantities of active ingredients of finished medicines to consumers or distributors.	Moureaud *et al*., 2021; Hall & Antonopoulos, 2015
Instant messaging services	Text-based applications which provide two-way communication in which the sellers can contact consumers directly or by creating groups in which they advertise and sell their products (e.g., Kik, Telegram Messenger, QQ, WeChat, WhatsApp, and Wickr)	Moureaud *et al*., 2021; Moyle *et al*., 2019
E-mail	Using email spam to advertise and sell products; however, due to the low conversion rates, the use of this channel has been reduced.	Gelatti *et al*., 2013; Hall & Antonopoulos, 2015
Dark web	Most private channel requires a special web browser and authorization to access.	Hall & Antonopoulos, 2015; Martin *et al*., 2020

1.4.5. Deception techniques

Illegal online pharmacies deceive members of the public, by assembling the webpage to be perceived as legitimate. Multiple illegal online pharmacies have been found to mimic the layout and appearance of legal online pharmacies' websites (Fittler *et al*., 2013a). Table 1.6 illustrates these deception methods.

Table 1.6. Deception techniques used by the illegal sellers of medicines.

Deception method	Description	Mentioned by
Website Appearance	No broken links and easy navigation between webpages	Monteith *et al.*, 2016
Location of operation	The declared location of operation is unmatched by the actual location which is detected using the IP address of the website	Boyd *et al.*, 2017; Fittler *et al.*, 2013a; Ozawa *et al.*, 2022
Fake accreditation seals	Using fake accreditation seals and verification logos to build trust with consumers	Fittler *et al.*, 2013a; Monteith *et al.*, 2016
Fake contact details	Using fake phone numbers and addresses	Ozawa *et al.*, 2022; Penley *et al.*, 2021
Deceptive marketing tactics	Using deception marketing methods such as customers' testimonials and fake reviews	Monteith *et al.*, 2016; Orizio *et al.*, 2011; Ozawa*et al.*, 2022; Penley *et al.*, 2021

In light with the above, the deception methods used by illegal sellers of medicines makes it hard for consumers to distinguish legal sellers of medicines from illegal ones. Thus, it is challenging for the consumer to select a genuine and safe source of medicines when they decide to source medicines from the Internet. The next section explores the risks of purchasing medicines from illegal sellers of medicines on the Internet.

1.5. Patient safety concerns associate with purchasing medicines on the Internet

Online marketing and sales of pharmaceutical products, in general, is considered a critical issue by professional bodies and regulators, meaning it needs to be standardized and regulated because the core products or services offered are related to the health and safety of patients. Online marketing of medicines is strongly linked to online pharmacies. Although the use of online pharmacies has many benefits for consumers such as convenience and privacy (Singh *et al*., 2020), it also has the potential to create substantial and serious health problems. This is because, as explained above, the Internet provides access to both legal and illegal sellers of medicines, which are difficult to distinguish between. A common practice of illegal online sellers of medicines is to provide prescription medicines without any input from professional healthcare providers (Monteith et al., 2016; Ozawa et al., 2021; Penley et al., 2021; Sun et al., 2022). Additionally, illegal sellers of medicines can provide medicines from unknown origins which could comprise of low qualities of the actual drug and high associated risks (Ashames et al., 2019; Sanada et al., 2020). Consequently, people might put themselves at many health risks when they select to buy medicines from the Internet. Table 1.7 shows the main health risks and patient safety concerns associated with consuming medicines purchased from the Internet.

Table 1.7: Main problems associated with selling POMs online.

Problems	Description	Highlighted by
Medicines misuse by the patients	Consequences happen due to the absence of healthcare provider oversight when medicines are bought using the Internet, such as taking the incorrect doses or taking medicines at the wrong time which	Boyd *et al*., 2017; Gelatti *et al*., 2013; Festinger *et al*., 2016; Mackey and Liang, 2013

	could lead to serious side effects, drug-drug interactions, and the use of unnecessary medications.	
Medicine abuse by the patients	The easy accessibility to POMs over the Internet can lead people to purchase and use POMs for purposes other than those for which they are meant to be used, or in excessive amounts which could lead to health, social, emotional, and job-related problems	Cicero and Ellis, 2012; Fittler *et al*., 2013a; Hockenhull *et al*., 2020; Raine *et al*., 2009
Antimicrobial resistance	The wide availability of antimicrobials as well as the easy accessibility can lead people to purchase antimicrobials without limits or regulations which may increase the antimicrobial resistance	Boyd *et al*., 2017; Mainous *et al*., 2009
Falsified medicines	These are medicines that contain the wrong types or amounts of active ingredients which may cause individual or mass poisoning.	Hall and Antonopoulos, 2015; Lavorgna, 2014; Mackey and Nayyar, 2017

Due to the absence of face-to-face contact in the online purchasing of prescription medicines, lack of appropriate professional oversight is also found to be a problem related to online pharmacies that operate illegally. Consumers may participate in self-diagnosing and self-prescribing of their condition without the intervention of healthcare professionals (Mackey and Liang, 2013). This behaviour could lead patients to buy unnecessary medicines, contraindicated medicines, or have a drug-drug interaction. Side-stepping the involvement of healthcare professional intervention can mean that adverse events, unwanted drug-drug

interactions, and the use of unnecessary medications go unchecked, contributing to the worsening of illness rather than its cure.

Controlled medicines, referring to Schedule 2-5 controlled drugs, are found to be widely available on the Internet and accessible without the involvement of healthcare providers (Cicero and Ellis, 2012; Fittler *et al*., 2013a; Hockenhull *et al*., 2019; Raine *et al*., 2009). Thus, this unregulated access is likely to increase non-medical use and dependence on controlled medicines. In a study conducted in the UK, the researchers explored the availability of Modafinil and Methylphenidate over the web and found that these controlled medicines are widely available to purchase online from the UK and are accessible without a prescription (Hockenhull *et al*., 2019). Likewise, another research conducted in 2013 explored the availability of the opioid analgesic tramadol and found that these controlled medicines are available and accessible without the need for a prescription (Fittler *et al*., 2013a). The unregulated use of controlled medicines can cause addiction or fuel the worsening of existing addiction making their availability on the Internet a major public health concern as well as creating social, emotional, and job-related problems (National Cancer Institute., 2023).

Besides this, the availability of antibiotics online without a prescription is considered as one of the problems related to online pharmacies. Boyd *et al*. (2017) have conducted a cross sectional survey in which they explored the legality of the online pharmacies that offer antibiotics online in the UK. The results revealed that some online pharmacies that are unclear about their locations were offering a wide range of prescribed antibiotics without prescriptions. Likewise, Mainous *et al*., (2009) searched engines (Yahoo and Google) using keywords related to the purchasing of antibiotics online and found that 138 vendors were selling antibiotics without a prescription. Antibiotics should not be sold without a

prescription as their indiscriminate use can lead to antibiotic resistance which is a problem for patient safety and the quality of the healthcare system, and an undiagnosed condition may not even be treated effectively.

Finally, a key problem related to purchasing and using medicines from the Internet is the risk of falsified or fake medicines. Falsified medicines could contain low or wrong ingredients; thus, these medicines might contain toxic ingredients that could cause individual or mass poisoning (European Medicines Agency, 2019). Several researchers have studied the problem of the online availability of falsified medicines offered via illegal online pharmacies. The next section will focus on this issue.

1.6. Risks of fake medicines

Illegal online pharmacies are exploiting rising public demand for convenience, lower costs, and all-day everyday accessibility, to sell various types of prescription medicines including falsified medicines which are very profitable to online sellers, but potentially risky and life-threatening to people (Fittler *et al*., 2018a). Falsified medicines are dangerous and might cause different consequences including treatment failure, toxicity, loss of confidence in healthcare providers, economic losses, and even death (Buowari, 2012).

1.6.1. Falsified/ Counterfeited/ Substandard/ Fake medicines: definitions and terminology.

Falsified or counterfeited (counterfeit) medicines are terms that have been used interchangeably in many studies. However, all these terms refer to medicines produced under illegal and unregulated conditions (World Health Organisation, 2018). Some health organisations differentiate between these terms, as follows:

Counterfeited medicine: "A counterfeit medicine is one which is deliberately and fraudulently mislabelled with respect to identity and/or source. Counterfeiting can apply

to both branded and generic products and counterfeit products may include products with the correct ingredients or with the wrong ingredients, without active ingredients, with insufficient active ingredients or with fake packaging." (World Health Organisation, 1999). The European Medicine Agency EMA (2019) proposes that counterfeited medicines are products produced and copied illegally by someone other than the original producer and these medicines infringe intellectual property rights (i.e. copying original medicines without the right and authority).

Falsified medicines: "medical products that deliberately/fraudulently misrepresent their identity, composition or source." (World Health Organisation, 2017). Likewise, the EMA (2019) proposes that falsified medicines are fake medicines that are passed off as real medicines (i.e., the same packaging and appearance).

Based on previous definitions, the "counterfeit" term generally appears to be broader than the "falsified" one (Figure 1.3). Moreover, Isles (2017) studied the different definitions of this phenomenon. Isles proposed that "counterfeit" is linked more to the infringer of intellectual property, while "falsified" medicines are related to the threat to public health.

As for "substandard" medicines, these medicines do not match the quality and safety standards due to a manufacturing defect. However, these medicines are different from falsified medicines because they are produced by an authorized manufacturer with no intent to work illegally and defraud the patient (World Health Organisation, 2017). Finally, 'fake medicines' is considered the best term for communication with the public about counterfeited and falsified medicines according to Isles (2017).
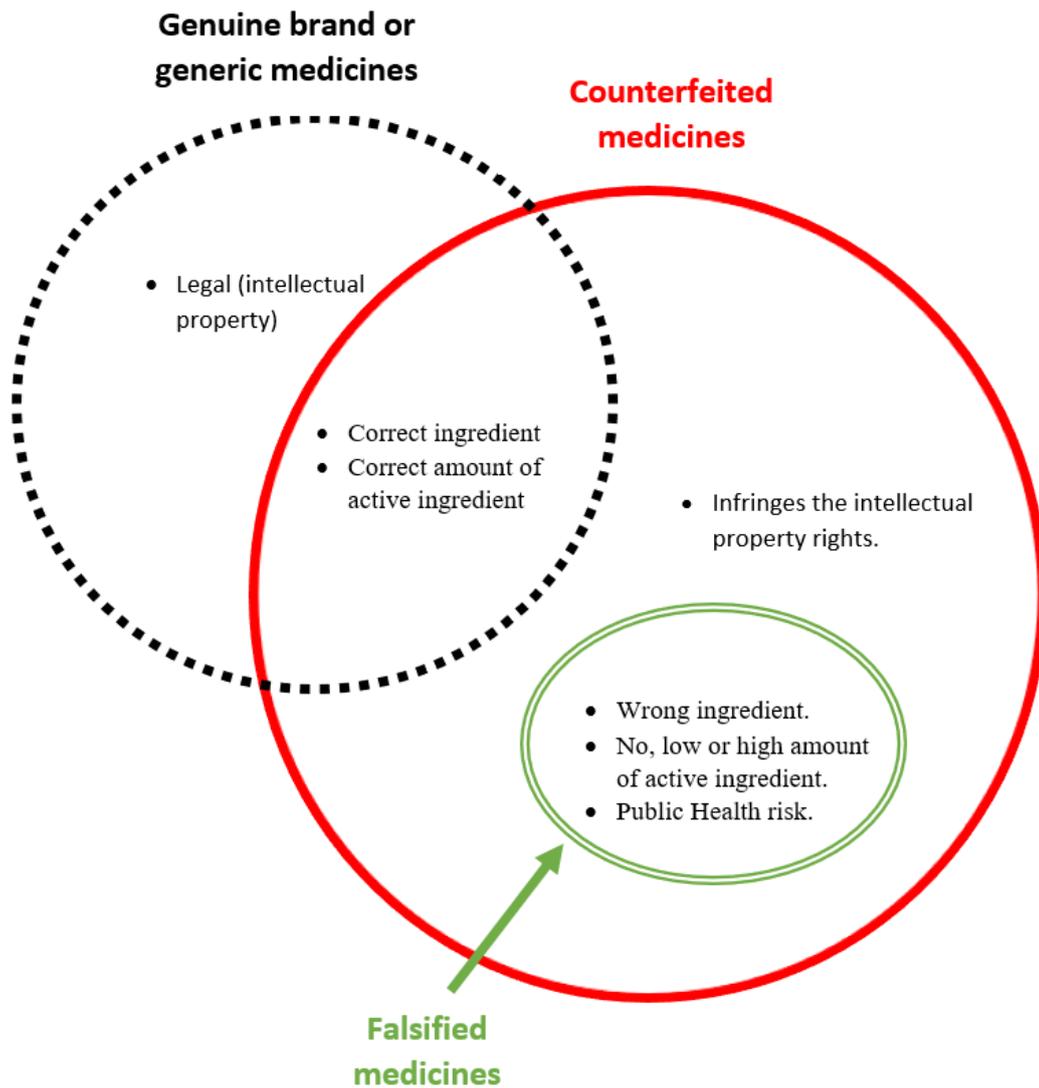
Figure 1.3. Counterfeited vs falsified medicines

This research will focus on the green circle in Figure 1.3 and the terms "falsified" and "fake" will be used interchangeably when referring to counterfeited or falsified medicines as both these terms deal with unsafe and harmful medicines illegally produced.

1.6.2. The negative impact of fake medicines

Fake medicines are medicines that are passed off as real, genuine, and authorised medicines (UK government, 2021). Table 1.8 shows some key facts about fake medications (World Health Organisation, 2018).

Table 1.8. Key facts about fake medical products.

Key facts about fake medicines
↓ May be toxic, not effective, and even might cause death.
↓ May contain low quality, the wrong dose of ingredients including active ingredients. Also, they may have fake packaging.
↓ May lead to loss of confidence in medications and healthcare providers including pharmacists.
↓ 1 in 10 medicines in low- and middle-income countries are falsified.
↓ Fake medicines from all categories have been reported to the WHO.
↓ Brands and generic medicines can be falsified.
↓ Can be found offline or online online.

For illegal online sellers of medicines, fake medicines are very profitable and a highly attractive market, especially if the active ingredients of the genuine drug are normally expensive. The active ingredients in some pharmaceutical products can reach about 80% of the cost of the medicine (OECD/EUIPO, 2020). For example, in one of the interventions run by the MHRA, around 100,000 fake pills were seized which were imported at the price of £0.25 each and sold for up to £20 each (profit margin of 7,900%) (OECD/EUIPO, 2020). On the other hand, fake or falsified medicines pose negative impacts and consequences on various levels including the consumers, healthcare systems, manufacturers, and governments.

At the consumer level, fake medicines could be harmful for patients as these medicines could include wrong ingredients or extra doses of the active ingredients, thus they might have several adverse effects which include toxicity (World Health Organisation, 2018). Moreover, fake medicines could be ineffective due to the absence or low amount of active ingredients which might cause a failure to cure, thus increasing mortality and morbidity of diseases (Blackstone *et al*., 2014). Finally, fake medicines can raise concerns among patients about

safety in general as these medicines could have several side effects which may reduce patient

adherence to appropriate medication in the future (Blackstone., 2014).

At the healthcare system level, consuming fake medicines might lead to treatment failure

which in turn can destroy the credibility and success of healthcare systems and could lead

consumers to loss of confidence in medications and healthcare providers including doctors

and pharmacists (World Health Organisation, 2018).

At the manufacturer's level, pharmaceutical companies could incur a loss of sales and

revenues if the fake version of their medicines are available at lower and competitive prices.

According to one estimate, EU pharmaceutical companies have incurred losses of 9.6 billion

between 2012 and 2016 due to falsified and counterfeited medicines (OECD/EUIPO, 2020).

Additionally, pharmaceutical companies could incur losses while fighting falsified medicines

due to the utilisation of anti-counterfeiting technologies such as the unique identifier used to

differentiate genuine medicines from fake ones. One more problem is that the image and

reputation of the pharmaceutical companies might be affected as those products do not meet

expectations and could harm consumers (OECD/EUIPO, 2020).

At the governmental level, governments might incur financial costs due to introducing

regulations and legislation to combat fake medicines as well as the costs needed to combat

complex criminal networks (OECD/EUIPO, 2020). Additionally, governments could incur

more costs to handle the failure of treatments and other consequences including adverse

effects (OECD/EUIPO, 2020).

1.6.3. Fighting fake medicines

Several studies have investigated the online supply chain of fake medicines (Hall and

Antonopoulos, 2015; Hall *et al*., 2017; Lee *et al*., 2017; Mackey and Nayyar, 2017;

Tremblay, 2013). There is generally a consensus that the supply chain of falsified medicines is complex and hard to track. This complexity is attributed to the presence of many intermediaries in the online supply chain of medicines, the regulatory difference between countries and the loss of product information as the product spreads across international borders (Tremblay, 2013).

The Alliance for Safe Online Pharmacy (ASOP) classifies the medicines supply chain on the Internet according to being "supply generated" and "demand-led" (Alliance for Safe Online Pharmacies, 2018). In considering fake medicines online context, the supply-side looks at suppliers and the sources of fake medicines. On the other hand, the demand-side focusses on the public (patients, pharmacists, physicians, and other healthcare providers) interacting with the suppliers. Several organisations have to date focused on these sides to 'fight' falsified medicines.

1.6.3.1. Fighting the supply-side

On the supply side, several efforts have been made to combat fake medicines available on the Internet and to protect consumers from the hazardous consequences of using these products. In the EU, the Falsified Medicines Directive (FMD) legislation was introduced in 2011 by the European Council and the European Parliament and aims to make sure that the trade in medicines is rigorously controlled by increasing the security of the supply chain of medicines across Europe and protect patients from fake medicines (European Commission, 2023). The FMD introduced various measures to tackle the availability of fake medicines. These measures include the use of a common, EU-wide logo to identify legal online pharmacies, whereby clicking on the logo directs the consumer to a list of legal/registered online pharmacies. Other measures are the use of obligatory safety features, which include

the use of a unique identifier and an anti-tampering device, on the outer packaging of medicines (European Commission, 2023).

In the US, the Drug Supply Chain Security Act (DSCSA) legislation was passed by Congress in 2013 to address the dangers of fake medicines (United States Food and Drug Administration, 2022). The DSCSA outlines the use of an electronic track-and-trace system on products at the package level which enables the FDA to prevent fake medicines from entering the legitimate supply chain.

Internationally, the international criminal police organisation (Interpol) established the "Pangea Operation" in 2008 (Interpol, 2019). The Pangea operations (I to XI) target the online sales of fake pharmaceutical products and medical devices, i.e., the supply-side (Figure 1.4). One of the objectives of Pangea is to stop the selling of fake medicines online. Also, it works to increase awareness of dangerous fake medicines available on the Internet (Interpol, 2019). According to Pangea, erectile dysfunction was the dominant type of condition being targeted by sellers of fake medicines. Other categories of fake medicines include, for example, those for the treatment of diabetes and antidepressants (Interpol, 2019).

INTERPOL
Pangea operations (I to XI)

105 million Units seized

1.1 million packages seized

3000 arrests

12.9 million packages inspected

82000 websites shutdown

153 participating countries
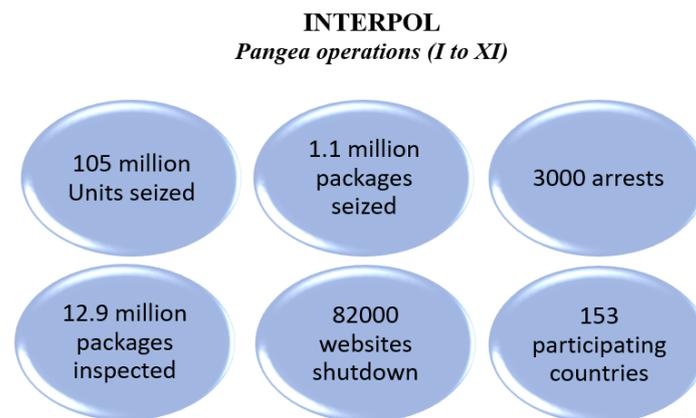
Figure 1.4. Operation Pangea – International Initiative Against Online Sale of Counterfeit Medicines.

1.6.3.2. Focusing on the demand-side

On the demand-side, several awareness campaigns have been conducted in the past by different not for profit organisations (NPOs), governmental, and international organisations to educate consumers on how to purchase medicines from safe online sources and to warn consumers about the dangers of fake medicines available on the Internet. An example from the UK, the MHRA in 2016 launched campaigns to fight fake medicines under the name of "#FakeMeds". The objective of this campaign was to inform the public of the potential risks when buying medicines online and to educate them on how to choose a safe source to buy medicines (Medicines and Healthcare products Regulatory Agency, 2022a). The campaign involved the running of waves of activities to target specific consumers based on the medicines they used. Table 1.9 lists the organisations that have run or are currently running awareness campaigns about the threat of fake medicines for the public (Alliance for Safe Online Pharmacies, 2018; Anderson *et al*., 2016).

Table 1.9. Organisations involved in public awareness campaigns.

Organisations	Organisation Type	Campaigns Location
MHRA (#Fakemeds)	Governmental	UK
United States Food and Drug Administration (BuySafeRx)	Governmental	USA
World Health Organisation	International organisation	Global
Pfizer	Pharmaceutical company	Global
Alliance for Safe Online Pharmacy - EU	NPO	Europe
Alliance for Safe Online Pharmacies - Global	NPO	Global

The Centre for Safe International Pharmacies (CSIP)	NPO	Global
European Alliance for Access to Safe Medicines (EAASM)	NPO	Europe
The European Medical Association (EMA)	NPO	Europe
Fight the Fakes	NPO	Global
Fondation Chirac	NPO	Global
International Institute of Research Against Counterfeit Medicines	NPO	Global
LegitScript	Private	Global

1.7. Research problem

Illegal online sellers of medicines could be operating on the surface web, deep web, or the dark Web. Therefore, it is difficult to track those sellers through the complex online supply chain of medicines. Furthermore, online sellers of medicines use professional avoidance techniques to avoid regulations and health enforcement such as buying their domains from 'rogue registrars' or hiding their physical location (Hall and Antonopoulos, 2015). All of the aforementioned, juxtaposed with the absence of effective international laws and legislations that regulate the online trading of medicines, as well as the rapid development of technology, have resulted in a pronounced prevalence of illegal online sellers of medicines on the internet (Ozawa et al., 2021; Fittler et al., 2013a; Vida et al., 2016). According to a global estimate, less than 5% of the 35,000 active Internet pharmacies operate in full compliance with the legislation and regulation created by the regulatory bodies (e.g., MHRA, FDA … etc)

(LegitScript, 2020). Thus, it is challenging to keep the Internet free of illegal websites selling medicines (Fittler *et al*., 2013a). Furthermore, the deception and hiding techniques used by the illegal sellers of medicines (appearance and layout, fake location of operations, using deception features such as fake address and phone numbers, and fake accreditation seal) have made it difficult for consumers to distinguish legal sellers from illegal ones.

From another angle, a potential solution could come from focusing on the consumers themselves (the demand-side) not the sellers of medicines (the supply-side), by exploring the factors that motivate them to purchase medicines over the Internet. Particularly, focusing on their internal beliefs as well as the external circumstances that lead them to make this purchase.

There is an ongoing effort by governmental and non-governmental organisations through public awareness campaigns to prevent consumers from purchasing fake medicines on the Internet by educating consumers on how to purchase medicines from the Internet safely as well as the risks of such a purchase (Table 1.9). However, people still trust and purchase medicines from unofficial websites. According to one estimate by the UK government, 1 in 10 people in the UK bought fake medical products online in 2020 (Medicines and Healthcare products Regulatory Agency, 2022a). Recent literature also provides evidence that people still purchase prescription medicines online without medical oversight. For example, a study conducted in Hungary found that the number of people purchasing medicines on the Internet has increased in the Hungarian population from 4.17% in 2018 to 44.25% by 2020 (Fittler *et al*., 2022b). In line with this, the researchers in the United States found that 131 out of 730 of their participants (17.9%) had purchased different types of POMs including controlled medicines from the Internet without input from healthcare professionals (Moureaud *et al*, 2021). These findings give rise to questions about the effectiveness of existing public

awareness campaigns as people are still purchasing medicines from the Internet for unclear reasons.

Arguably then, it is vital to analyse and interpret consumers' behaviour of purchasing medicines on the Internet, specifically in order to understand the reasons that lead people to do this, which in turn would enable the development of evidence-based public awareness campaigns that might be more effective. Identifying the factors that influence people's decision to buy medicines over the Internet could enable the development of interventions and behavioural change strategies that could alter this behaviour and minimise the purchasing of medicines using the Internet, thus, protecting consumers from fake medicines. There is a shortage of literature that explores this problem from consumers' perspective and further research is required to fill the knowledge gap to discover more information about this issue.

1.8. Research aims & objectives

This research aims to explore the reasons why people end up buying fake medicines online. Particularly, this research explores the factors that could affect peoples' decision to buy POMs from the Internet which might put them at risk of purchasing fake medicines. Exploring and detecting these reasons addresses a gap in the literature and could help in changing/controlling the behaviour of the public in the future. The research adopts different complementary research methodologies to underpin the work. To achieve this the following objectives were identified:

- To build an initial map of ideas about the factors that influence consumer's decision for purchasing POMs on the Internet, using a thematic analysis of news articles about this topic.
- To explore consumers' perception of the factors that influence their decision to buy POMs online using semi-structured interviews with participants who had experience of purchasing POMs on the Internet.

- To explore the knowledge in existing literature about factors that could affect consumer's decision to buy POMs online to complement the interview study.

- To explore the possible future research agenda and to provide tentative recommendations for research, education, policy, and practice.

1.9. Methodology

To achieve the objective of this research, data-source triangulation was adopted. Triangulation is defined as the use of multiple sources or methods to explore a specific phenomenon (Cater *et al*., 2014). This technique adds depth as well as richness to a research inquiry (Heale and Forbes, 2013). Data source triangulation is one of the four types of triangulation. The four types of triangulation are method triangulation, theory triangulation, investigator triangulation, and data source triangulation (Carter *et al*., 2014).

Method triangulation refers to the use of multiple methods (interviews, focus groups, ethnography, or surveys) to collect data about the same research subject. Investigator triangulation refers to the participation of more than one researcher in the same study to provide multiple perspectives and observations and thus provide confirmation of findings. Theory triangulation refers to the use of different theories to analyse data. Finally, data-source triangulation refers to the use of multiple sources to develop a comprehensive understanding of phenomena, thus increasing the validity and credibility of the findings (Carter *et al*., 2014).

In the current study, three different sources of data have been explored including the news media by exploring the newspaper articles, consumers with actual experiences through interviews, and findings in previous studies using a systematic review (Figure 1.5).
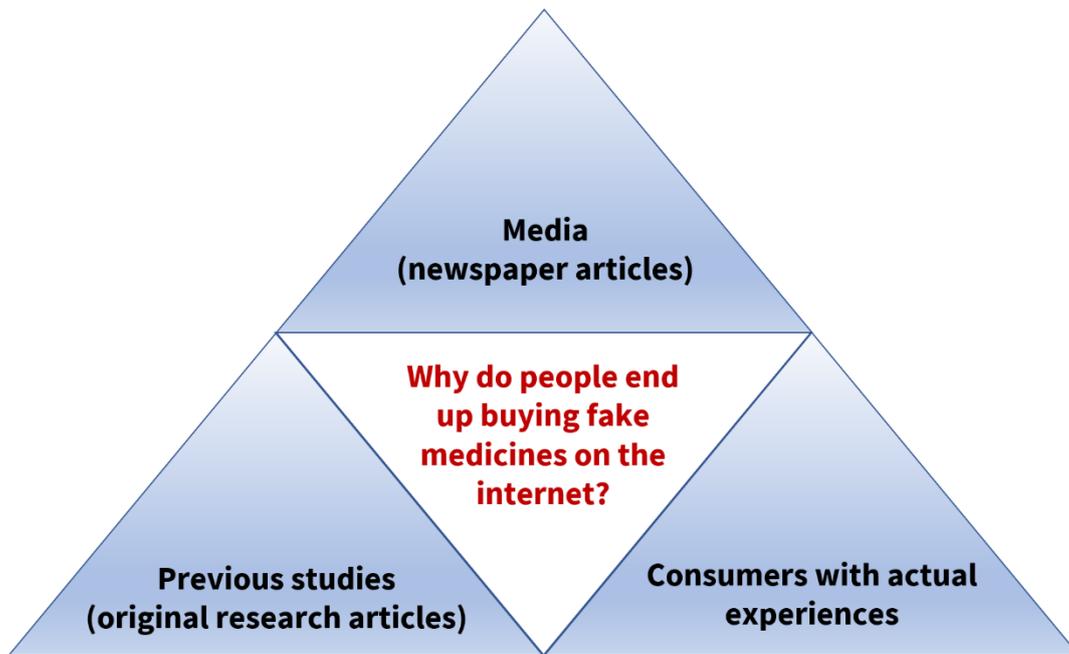
Figure 1.5. Triangulation of data source

1.9.1. Study 1: Newspaper articles and thematic analysis

In this phase, newspaper articles have been used as the main source of data to explore the problem of purchasing fake POMs on the Internet. The rationale for analysing newspaper articles is that firstly, newspaper coverage of the problem can provide some baseline information about the problem, for example, the reported views and experiences of the public including patients, healthcare providers, as well as the authorities that fight fake medicines purchased using the Internet such as Interpol. Secondly, newspapers can influence people's views by shaping the news agenda. Therefore, newspapers can affect people's views based on what they emphasise or deemphasise based on how their content is presented and this gives researchers insight about what might influence social norms (Chong and Druckman, 2007; Engel, 2013; Entman, 1989).

This phase aimed to explore the newspaper coverage of the problem of purchasing fake prescription medicines from the Internet. Articles were obtained via the electronic database

"ProQuest". The research was limited to the period from the beginning of April 2019 to the end of March 2022 to avoid an extremely high number of results and to keep the findings current and relevant. Articles that did not focus on the POMs were excluded. The retrieved articles were assessed using inclusion and exclusion criteria that are discussed in detail in chapter 2. Thematic analysis was employed to analyse the news articles. The theory of Planned behaviour (discussed in section 1.10.4) was used as an underpinning theory through which the study was conducted.

1.9.2. Study 2: Semi-structured interviews and thematic analysis

Although the newspaper articles could provide data from different points of view, the validity of these articles is untested. Thus, a semi-structured interview study was conducted to validate the themes generated in Study 1 – the themes from Study 1 guided the interview schedule. Semi-structured interviews were adopted here as this kind of data collections focuses on the interviewees' point of view which is known to be very useful when the researcher wants rich and detailed information (Bell *et al.* 2022).

The purposive sampling technique was employed to select the research sample with reference to the research objectives and to achieve diversity in participants' experiences and demographics. The recruitment was continued until sampling saturation was reached (i.e., the point when the concepts were fully explored, and a full understanding of the participants' perspective is achieved) (Saunders *et al.*, 2018). As well as using the themes generated in Study 1 to develop the interview questions, screening questions were used to determine whether participants had specific characteristics that would make them eligible to participate in the study.

After conducting the interviews, a transcript for each interview was written, coded, and then analysed using the thematic analysis technique. The Theory of Planned Behaviour was

used as an underpinning theory to guide the analysis. This resulted in the creation of a set of rich variables to illustrate what affects consumers' intentions to purchase medicines online.

1.9.3. Study 3: Systematic review and narrative synthesis

This systematic review explored other researchers' findings about the factors that influence people's decisions of purchasing POMs on the Internet. Relevant databases were searched to retrieve articles published from 2012 to 2021. Studies were included if they focused on POMs and focused on the consumer's perspective. A narrative synthesis was employed because of the heterogenicity of methodologies between the included studies (Harden *et al*., 2004), as I included quantitative, qualitative, and mixed-methods studies. The Capability Opportunity Motivation-Behaviour (COM-B) (discussed in section 1.10.5) and the Theoretical Domains Framework (TDF) (discussed in section 1.10.7) were employed as conceptual lenses to guide the synthesis of data.

1.10. Overview of some relevant health behavioural theories

The main aim of this thesis is to explore and understand what influences consumer's decision to purchase prescription medicines through the Internet. However, understanding this problem is complex and not straightforward. Therefore, this thesis has adopted psychological theories which have been widely applied in a variety of contexts for interpreting and explaining consumer and health behaviours. Theories act as "conceptual lenses" through which research could look at social and complex problems and enable researchers to look at data from different angles within which to conduct the analysis and define which key variables influence a phenomenon of interest (Reeves *et al*., 2008). Growing evidence supports the use of theory when understanding behaviour as theories could provide tentative explanations for why and under what circumstances behaviours occur (Alhusien *et al*., 2021). Moreover, using theories enables the development of interventions

and behavioural change strategies that might modify the behaviour. During the early stages of the research, various theories that are related to the topic area were explored and reviewed. The current section outlines these theories as well as the theories adopted in this thesis.

1.10.1. Health Belief Model

The Health Belief Model (HBM) is one of the psychological theories that emerged in the 1950s to understand what influences people's decision to adopt or change specific health-related behaviours (Green *et al*., 2020; Rosenstock *et al*., 1974). This theoretical framework suggests what people perceive and believe about a health-related behaviour will influence their decision to engage in that behaviour (Figure 1.6).
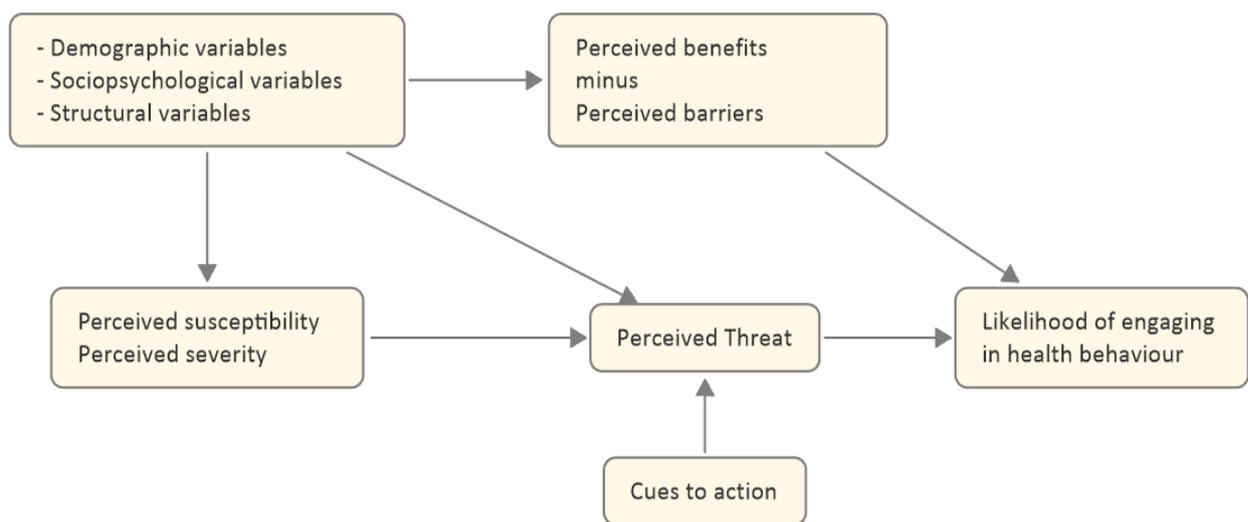
Figure 1.6. Health Belief Model (HBM)

According to the HBM (Becker *et al*., 1976; Becker *et al*., 1978), people will be more likely to adopt or change a specific behaviour if they perceive and believe that they are at risk of developing a disease (i.e., perceived susceptibility), and they perceive and believe that the complication and consequences of the disease are severe or life-threatening. The HBM also assumes people will be more likely to engage in the behaviour if they believe that the positive outcomes (i.e., perceived benefits) overcome the negative outcomes or barriers such as high

cost, more effort, pain, or/and embarrassment (i.e., perceived barriers). Additionally, The HBM suggests that some cues (that might come from the media, reminders from healthcare providers, or illness of a family member or friend) can trigger the action and influence people to make a health-related behaviour (i.e., cues to action).

The HBM has been applied successfully to understand and explain a wide range of health behaviours such as disease prevention, willingness to get medications such as COVID-19 vaccines, medication adherence, and healthy eating (Donyai., 2012; Guidry *et al*., 2021; Schifferstein *et al*., 1998; Yang *et al*., 2016). However, the predictive power of the HBM has been criticised for not accounting for other relevant psychological factors including social pressure, attention and emotions, environmental issues, and economical factors (Armitage and Conner 2000; Conner 2010; Glanz *et al*., 2008). Thus, the HBM was excluded as a potential theory to underpin the study.

1.10.2. Technology Acceptance Model

The Technology acceptance model (TAM) framework was introduced in (1986) and used to explore why users may or may not adopt new technologies (Figure 1.7) (Davis 1989, Davis *et al*.1989). The TAM framework has been based on the theory of reasoned action (described below) (Hu *et al*., 1999). According to the TAM, two factors predict whether a consumer will accept the use of new technology, these factors are the perceived ease of use and perceived usefulness (Davis 1989, Davis *et al*.1989).
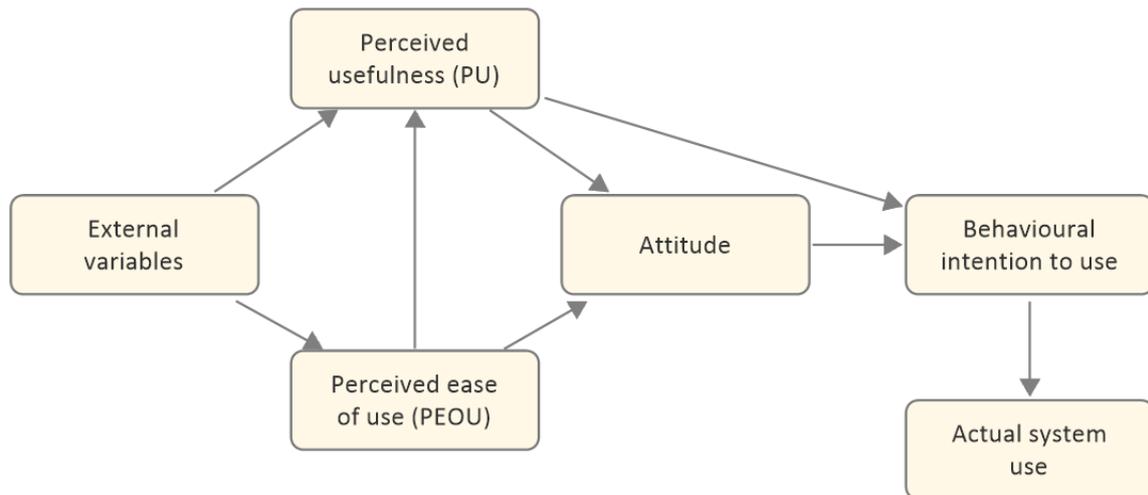
Figure 1.7. Technology Acceptance Model (TAM)

Perceived ease of use is the belief that the use of specific technology will be free of effort, and that the technology is easy to learn and use, while perceived usefulness refers to the belief that using a specific technology will enhance the performance and outputs (Davis 1989, Davis *et al*.1989). Both perceived ease of use and perceived usefulness could predict consumers' attitudes concerning the use of an application which in turn predicts the intention and the actual behaviour of the acceptance, adoption, and use of information technologies (Chen *et al*., 2011).

Although the TAM framework has been applied successfully in a different variety of contexts, the TAM has limitations as it overemphasises the individual factors meaning that it focuses on the consumers themselves and may not take into account the external influencing factors such as the social pressure and environmental factors (Ajibade *et al*.,2018). Moreover, the TAM would be useful to explore people's acceptance of using new online technology to purchase POMs online, however, this thesis aims to explore the influencing factors that affect consumer's decision in the first place to purchase POMs using the Internet. Therefore, this theory was excluded because it was not fit for the current thesis purpose.

1.10.3. The Theory of Reasoned Action

The Theory of Reasoned Action (TRA) shown in Figure 1.8 is one of the behavioural theories introduced in 1967 to predict consumers' behaviour based on their intention, which in turn was predicted by consumers' attitude toward the behaviour (consumers positive or negative evaluation of a specific behaviour) and the subjective norm (i.e., social pressure) surrounding the performance of the behaviour (Fisbein and Ajzen, 1975). Each of these two predictors of intention is affected by salient beliefs namely: behavioural beliefs and normative beliefs. Behavioural beliefs are beliefs about the consequences of a behaviour including the perceived risks and benefits of the behaviour, and these kinds of beliefs predict the attitude. Normative beliefs are consumers' beliefs about how other people would like them to perform the behaviour, and this kind of beliefs predict the subjective norms.
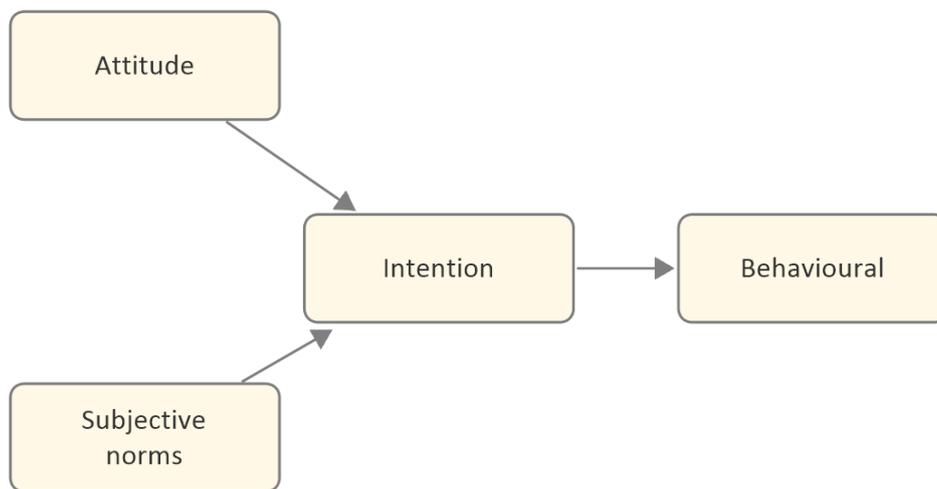
Figure 1.8. Theory of Reasoned Action

The TRA has been used successfully to explore the motivational influence on behaviour and to understand behaviours in various settings including healthcare behaviours such as smoking and dental care (Curtis *et al*., 2012; Hoogstraten *et al*., 1985) and online shopping behaviour (Yu and Wu 2007). However, the TRA has limited predictive power as this theory does not take into account situational factors, and the theory assumes that the behaviour is

under volitional control, thus, this theory is not applicable when the behaviour violates the assumption of volition control (Sarver, 1983). Thus, this theory was not deemed a good fit for the purpose of this study and was excluded.

1.10.4. The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) is a psychological theory that emerged in 1991 to explain human behaviour (Ajzen., 1991). The TPB is simply an extension of the TRA (Figure 1.9) by adding the perceived behaviour control to the model, which means that the TPB assumes that people do not have complete volition control over their behaviour (Montano and Kasprzyk, 2015). In this framework, the actual behaviour is predicted by the consumer's intention, which is shaped by three key factors: attitudes (positive or negative evaluation of performing a particular behaviour), subjective norms (social pressure placed by others on an individual's behaviour) and perceived behavioural control (consumers' perception of their ability to perform a particular behaviour) (Ajzen., 1991).

The TPB has been used extensively by previous studies to understand and interpret people's behaviour in different populations and contexts. The TPB has a strong predictive power across different domains including health-related behaviours such as medication adherence, medicines reuse (Alhamad et al., 2018; Chisholm et al., 2007) and consumer shopping behaviours including online shopping (Carfora et al., 2019; George et al., 2004). Moreover, the TPB is accompanied by a set of well-established guidelines to design a questionnaire that can be used to obtain reliable and valid measures (Ajzen, 2020; Francis et al., 2004).
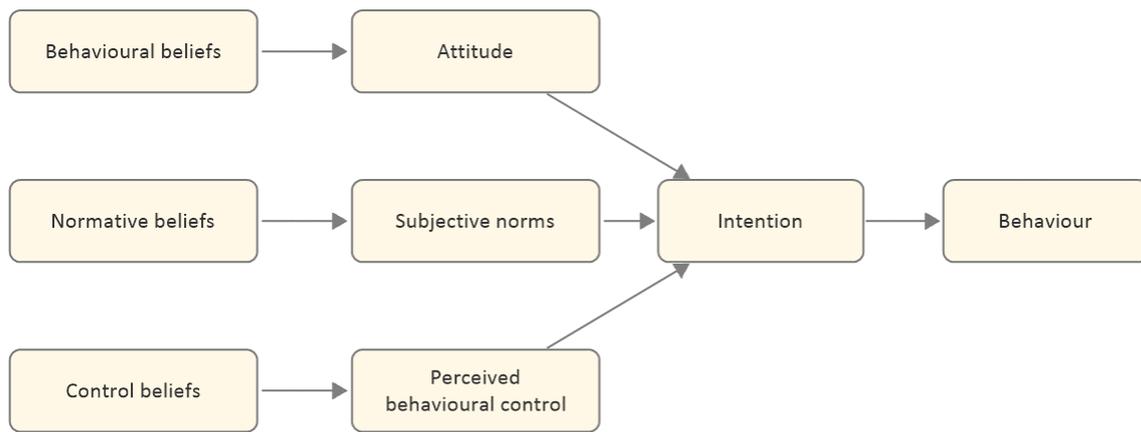
Figure 1.9. Theory of Planned Behaviour (TPB)

Intention's direct and indirect measures

Each of the three direct predictors of intention (attitude, subjective norms, and perceived behavioural control) is influenced by indirect determinants which are a set of salient beliefs namely: behavioural beliefs, normative beliefs, and control beliefs. These beliefs rely on the consumer's perceptions of the behaviour (Ajzen., 1991).

According to the TPB (Ajzen., 1991), attitude is predicted by behavioural beliefs. Behavioural beliefs refer to the consumer's perception and beliefs about the positive and negative outcomes associated with a particular behaviour. These beliefs influence the consumer's evaluation of the behaviour by forming a positive or negative attitude toward the behaviour. Thus, the more perceived positive outcomes, the more likely they are to form a positive intention to perform that behaviour, and vice versa. The TPB also assumes that subjective norms are formed by normative beliefs. Normative beliefs refer to the social influencing factors perceived by consumers that form a social pressure to perform or not perform a particular behaviour (i.e., subjective norms). This includes the expectations or opinions of individuals or groups that are relevant to the consumers. Another assumption by the TPB is that the perceived behavioural control is predicted by the control beliefs. Control beliefs represent consumers' beliefs of the existence or absence of external factors (i.e.,

facilitators and barriers) that could influence consumers' ability to control their behaviour. Thus, if a consumer believes that the behaviour is easy and under control, then the consumers will be more confident and the intention to perform the behaviour will be stronger.

It is also important to point out that the TPB has received frequent criticism that it treats people as too 'rational,' meaning that the TPB narrows the focus on conscious behaviour (Sheeran *et al*., 2013) and does not take adequate account of affective processes including emotions and desires (Conner *et al*., 2013) that are known to bias human judgments and behaviour (Ajzen, 2020). This exclusion of unconscious influences and the role of emotions on behaviour has limited the predictive power of the theory (Sniehotta *et al*., 2014) and caused a limitation of the concept's sufficiency when using this theory.

1.10.5. The Capability, Opportunity, Motivation, and Behaviour model

The Capability, Opportunity, Motivation, and Behaviour (COM-B) model is one of the modern and recent psychological frameworks used to understand the predictors of behaviour, and behaviour change (Michie *et al*., 2011). The COM-B model could act as a behavioural diagnosis tool for explaining the interaction and complexities between individual, social, and environmental factors that affect the behaviour (West and Michie, 2020). Furthermore, the COM-B model is said to enable the development of behavioural change strategies to promote better health (Michie *et al*., 2014). Figure 1.10 illustrates the COM-B model.
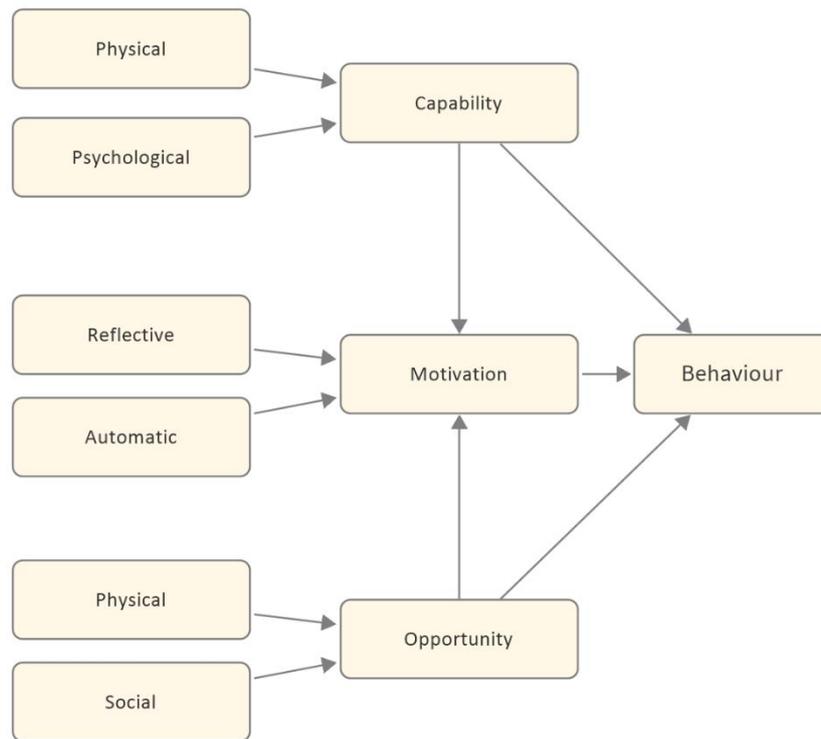
Figure 1.3. Capability, Opportunity, Motivation, and Behaviour model (COM-B)

The core construct of the COM-B model consists of; *Capability* which refers to the physical and psychological attributes of an individual that facilitates the behaviour. It could be physical capability (individual's physical characteristics needed to perform a behaviour), or psychological capability (individual's mental skills, knowledge needed to carry out a specific behaviour); *Opportunity* represents the external factor that facilitates or impede the behaviour, and it could be a physical opportunity (the external physical environmental), and the social opportunity which represents other people influence (social pressure); *Motivation* which refers to individual's cognitive and emotional drives that affect the behaviour. It could be reflective which refers to the conscious thinking processes (e.g., attitudes and beliefs), or automotive motivation which refers to the affective processes (emotions) (West and Michie, 2020).

The COM-B framework assumes that the behaviour is more likely to occur when an individual has the capability and the opportunity to perform the behaviour and is motivated to enact a specific behaviour than any other behaviour (Michie *et al*., 2011).

The COM-B model has been applied by many researchers to identify the determinants of behaviour (e.g., Madden *et al*., 2021; Saha *et al*., 2017; Zou *et al*., 2017). One strength of the COM-B model is that it uses multiple concepts which makes it a comprehensive framework as the model takes into consideration the affective process which is not included in the TPB. Additionally, The COM-B model has been adopted by several researchers to guide the development of behavioural interventions that could be used to change the behaviour using the behavioural changing wheel (e.g., Barker *et al*., 2016; Coupe *et al*., 2022; Zheng *et al*., 2022).

1.10.6. Behavioural Change Wheel

The Behavioural change wheel (BCW) is a theory- and evidence-based tool that emerged in 2011 and provides a systematic approach to design and evaluates behaviour change interventions (Michie *et al*., 2011; Michie *et al*., 2014). The BCW was developed using 19 behaviour change frameworks (Ojo *et al*., 2019). Figure 1.11 illustrates the constructs of the BWC.
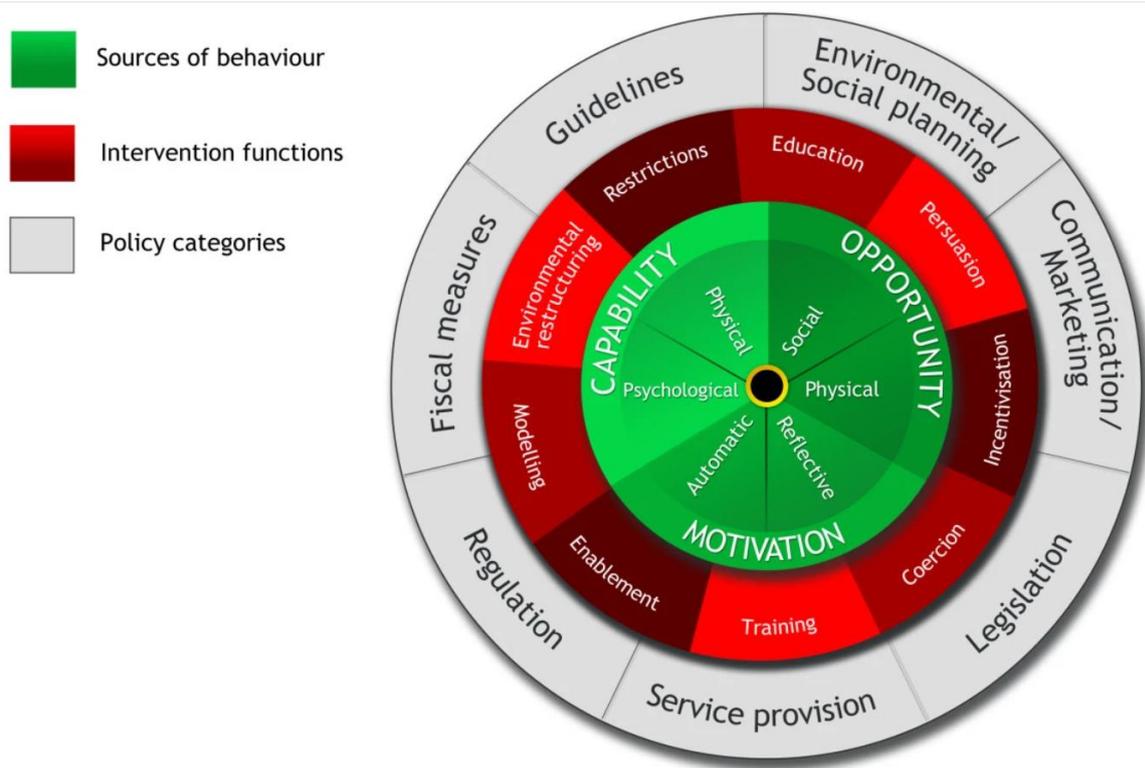
Figure 1.4. Behavioural Change Wheel (BCW) (source: Michie et al., 2011)

According to the BCW (Michie *et al*., 2011), the wheel consists of 3 areas, first, the hub (The green area) and this area represents the COM-B. Second, the Intervention functions (The red area) and this area represent the strategies for changing behaviours based on the COM-B model (Michie *et al*., 2011). These strategies include:

1- Conducting *training* to impart and build skills and enhance capability.

2- *Modelling* to inspire people by giving examples and cases that can be emulated.

3- *Environmental restructuring* by modifying the environmental factors to facilitate behavioural change.

4- *Enablement* by offering support to overcome or reduce barriers to the behaviour.

5- *Restriction* by designing rules to limit opportunities to discourage the behaviour.

6- *Education* by providing information to increase knowledge of the behaviour outcomes.

7-   *Persuasion* by using communication to induce positive or negative feelings toward the behaviour.

8-   *Incentivization* through offering rewards and recognition to encourage the behaviour.

9-   *Coercion* by using penalties and punishment to discourage the behaviour.

The third outer layer (the grey layer) represents the policy categories which are broad areas of policy that can be used to implement the intervention functions (Michie *et al*., 2011). These categories include:

1-   Creating *regulations* to regulate the behaviour.

2-   Creating or changing *legislation* to encourage the behaviour or discourage alternatives.

3-   *Environmental/ social planning* through creating or changing the physical or social environment to facilitate the behaviour.

4-   *Service provision* to encourage the behaviour or discourage alternatives.

5-   *Communication/marketing* using media as well as marketing strategies and tactics to promote the behaviour.

6-   Designing *guidelines* to make adaptable recommendations.

7-   Using *fiscal measures* and taxes policies to provide financial incentives to encourage healthy behaviours or discourage less healthy ones.

Regarding the identification of appropriate intervention functions and policy categories. Michie *et al*. (2011) have provided the links between the BCW's three parts (COM-B model, intervention functions, and policy categories) which enable the selection of the appropriate interventions and policies in accordance with the behaviour. Table 1.10 illustrates these links

between the COM-B model constructs and the intervention function, whereas Table 1.11 illustrates the links between the intervention functions and the policy categories.

Table 1.10. Linking the COM-B model constructs to the intervention functions

COM-B model construct	Intervention functions								
	Training	Modelling	Environmental restructuring	Enablement	Restriction	Education	Persuasion	Incentivization	Coercion
Physical capability	■			■					
Psychological capability	■			■		■			
Reflective motivation						■	■	■	■
Automatic emotions		■	■	■			■	■	■
Physical opportunity			■	■	■				
Social opportunity			■	■	■				

Table 1.11. Linking the intervention functions to the policy categories

Policy category	Intervention functions								
	Training	Modelling	Environmental restructuring	Enablement	Restriction	Education	Persuasion	Incentivization	Coercion
Regulation	■		■	■	■	■	■	■	■

	1	2	3	4	5	6	7	8	9
Legislation	■		■	■	■	■	■	■	■
Environmental/ social planning			■	■					
Service provision	■	■		■		■	■	■	■
Communication/ marketing		■				■	■	■	■
Guidelines	■		■	■	■	■	■	■	■
Fiscal measures	■		■	■			■	■	■

1.10.7. Theoretical Domain Framework

The TDF is a theoretical framework used to understand the factors that influence behaviour change by exploring the barriers and facilitators to implementing specific behaviours (Atkins *et al*., 2017). This framework was developed by a collaboration of a group of psychologists using 33 behavioural theories (Cane *et al*., 2012). The TDF is a theoretical framework rather than a theory as it does not propose relationships between constructs but provides a theoretical lens to identify the determinants of behaviour (Atkins *et al*., 2017) by focusing on the cognitive, affective (emotional), environmental and social influences on behaviour (Atkins *et al*., 2017). Table 1.12 shows the TDF domains and their definitions (Cane *et al*., 2012; Michie *et al*., 2005).

Table 1.12. The Theoretical Domains Framework domains and definitions

TDF domains	Definitions
Knowledge	The knowledge of the existence of something, the risks associated with it, and the procedural knowledge.

Skills	Cognitive or physical abilities acquired via practice.
Social/professional role and Identity	Professional identity, social identity, identity, professional confidence, or group identity.
Beliefs about capabilities	Self-confidence, perceived competence, self-efficacy, perceived behavioural control beliefs, self-esteem, empowerment, and professional confidence.
Beliefs about consequences	Positive or negative outcomes of a specific behaviour
Goals	Target that an individual wants to achieve
Memory, Attention and Decision Processes	Information retention ability
Environmental Context and Resources	Any environmental condition that discourages or encourages the development of skills, abilities, or adaptive behaviour
Social influences	Social influencing factors include social pressure, social comparisons, or group norms.
Emotion	Complex reactions and feelings by which people attempt to deal with a personally significant event.
Behavioural Regulation	Ability to manage or control specific behaviour
Optimism	The high level of confidence that things will happen for the good.
Reinforcement	Rewards or punishment.
Intentions	A conscious decision to perform a behaviour.

The TDF and COM-B model can be used together to provide a comprehensive framework for the identification of the predictors of behaviour and propose behaviour change (Ojo *et al.*, 2019). Moreover, the TDF has also been added to the BCW to help unpack the COM-B model and enable deeper understanding and exploration of the facilitators and barriers of behavioural change, thus, enhancing the effectiveness of behaviour change interventions. Figure 1.12 illustrate how previous studies have mapped the TDF domains against the COM-B model and the BCW (Alexander *et al.*, 2014; Alhusien *et al.*, 2021; Ojo *et al.*, 2019; Timlin *et al.*, 2020; Zou *et al.*, 2017).
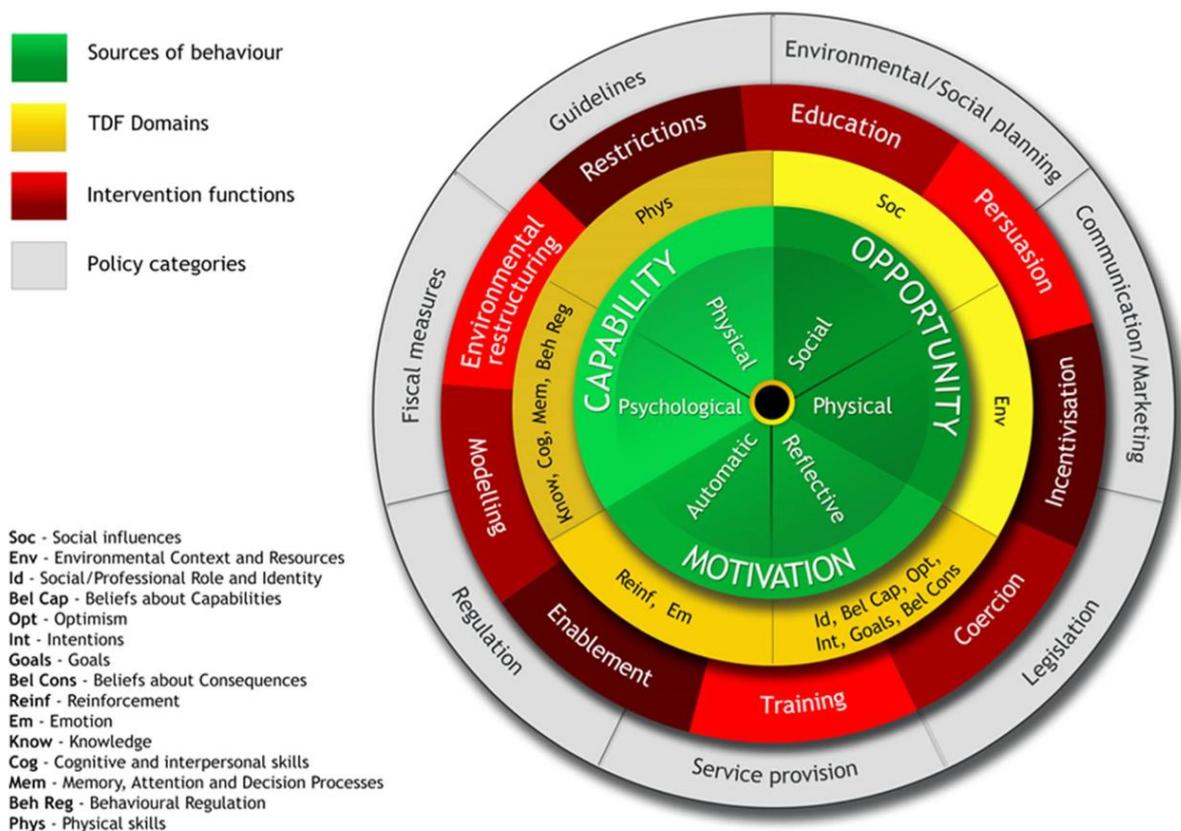
Figure 1.5. Adding the TDF domains to the BCW (source: Michie et al., 2011)

1.10.8. Rationale of selecting the theories

In this thesis, the COM-B model, TDF and the TBP have been adopted as underpinning frameworks through which the research and analysis have been conducted. These theories are

well-established and based on years of research and empirical evidence. Therefore, utilising these theoretical frameworks enabled a deeper understanding of complex problems such as the one that this thesis focused on. The TPB was used in Study 1 and Study 2 of this thesis, while the COM-B model has been used in Study 3 and the overall findings of the thesis.

The rationale for selecting the TPB was because of its high behaviour prediction power (Tylor *et al*., 2006). Furthermore, the TPB was applied successfully in contexts and domains that are near to the current thesis domain, i.e., purchasing different products online (George, 2004; Little *et al*., 2020; Ming-Shen *et al*., 2007; Tang *et al*., 2021).

However, due to a sufficiency problem in the construct of the TPB (as this theory assumes that people are rational, and does not consider the emotions (Conner *et al*., 2013) that are known to bias people's judgments and choices (Ajzen, 2020) this thesis has then adopted a more comprehensive model, namely, the COM-B model. Furthermore, the TDF framework has been used to unpack the constructs of the COM-B model which enables a more comprehensive interpretation of the behaviour (Ojo *et al*., 2019).

The COM-B model and the TDF can work together to provide a comprehensive framework that covers the cognitive, environmental, and social influences on behaviour (Atkins *et al*., 2017). Additionally, these models cover the affective (emotional) influence that has not been covered by the TPB, which enables a deep understanding of the research problem. Thus, the integration of the 14 domains in the TDF into the COM-B model enables a wider view by looking at research data from different angles (Ojo *et al*., 2019). Another advantage of using the COM-B model and the TDF is that those theoretical frameworks allow the development of behavioural change techniques that could alter consumers' negative behaviour (i.e., Purchasing POMs from the Internet) by using the BCW. The use of BCW shown in Figure 1.12 (section 1.10.8) which includes the COM-B model and the TDF

domains could enable the development of effective behavioural changing techniques in future research (Ojo *et al.*, 2019).

1.11. Thesis structure

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

Chapter 1: This chapter introduces the thesis, offering a background literature review on purchasing POMs from the Internet. It covers the types of medicines available online, the regulations governing their online sale, the characteristics of online medicine sellers, deceptive tactics employed by illegal sellers to attract consumers, and patient safety concerns, including the risk of counterfeit medicines. Furthermore, this chapter introduces the research problem, aims and objective, as well as the methods used to achieve the objectives of this thesis. Finally, this chapter provides an overview of the behavioural theories used to underpin the thesis.

Chapter 2: This Chapter explores the newspaper coverage of the problem of purchasing fake POMs from the Internet using thematic analysis and the TPB as a theoretical lens through which the analysis was done.

An original article that includes the findings of this chapter was published on (21-03-2023) in a peer-reviewed journal (the Journal of Medical Internet Research – JMIR formative research) under the title "News Media Coverage of the Problem of Purchasing Fake Prescription Medicines Online: Thematic Analysis". DOI: 10.2196/45147

Chapter 3: This chapter is a qualitative interview study that was conducted in the UK and explored the perspective of UK-based consumers about the breadth of factors that influence consumer's decision to buy POMs online. Thematic analysis was employed and an extended

model of the TPB that includes trust as an influencing factor was employed to interpret and analyse the determinants of the participants' behaviour of purchasing POMs on the Internet.

An original article that includes the findings of this chapter was published on (16-02-2023) in a peer-reviewed journal (the Journal of Medical Internet Research – JMIR formative research) under the title "Reasons That Lead People to End Up Buying Fake Medicines on the Internet: Qualitative Interview Study". DOI: 10.2196/42887

Chapter 4: This chapter provides a review of the existing knowledge and findings about the factors that could influence consumer's decision to buy POMs online. The COM-B model and the TDF were used as a theoretical lens through which the analysis was conducted. The findings of this study were submitted for publication in *Frontiers in Pharmacology*, at the time of writing this thesis.

Chapter 5: This chapter includes the general discussion and the integration of the principal research findings. Additionally, this chapter provides relevant recommendations for policymakers, practice, and education. Additionally, this chapter highlights the strengths and limitations of the research.

Chapter 6: This chapter provides potential areas for future research and further investigation and advancement of the thesis findings. Additionally, an overall conclusion has been provided in this chapter.

CHAPTER 2

Study 1: News Media Coverage of the Problem of Purchasing Fake Prescription Medicines on the Internet: Thematic Analysis

The current study has been published on 21st March 2023, by the Journal of Medical Internet Research - Formative Research, under the title "News Media Coverage of the Problem of Purchasing Fake Prescription Medicines on the Internet: Thematic Analysis".

2.1. Abstract

Background: More people are turning to Internet pharmacies to purchase their prescription medicines. This kind of purchase is associated with serious risks, including the risk of buying fake medicines, which are widely available on the Internet. This under-researched issue has been highlighted by many newspaper articles in the past few years. Newspapers can play an important role in shaping public perceptions of the risks associated with purchasing prescription medicines on the Internet. Thus, it is important to understand how the news media present this issue.

Objective: This study aimed to explore newspaper coverage of the problem of purchasing fake prescription medicines on the Internet.

Methods: Newspaper articles were retrieved from the ProQuest electronic database using search terms related to the topic of buying fake prescription medicines on the Internet. The search was limited to articles published between April 2019 and March 2022 to retrieve relevant articles in this fast-developing field. Articles were included if they were published in English and focused on prescription medicines. Thematic analysis was employed to analyze

the articles, and the Theory of Planned Behaviour framework was used as a conceptual lens to develop the coding of themes.

Results: A total of 106 articles were included and analysed using thematic analysis. The analysis revealed 4 superordinate themes that represent newspaper coverage of the topic of buying prescription medicines on the Internet. These themes are (1) the risks of purchasing medicines on the Internet (e.g., health risks and product quality concerns, financial risks, lack of accountability, risk of purchasing stolen medicines), (2) benefits that entice consumers to make the purchase (e.g., convenience and quick purchase, lower cost, the privacy of the purchase), (3) social influencing factors of the purchase (influencers, Healthcare providers), and (4) facilitators of the purchase (e.g., medicines shortages, pandemic disease such as COVID-19, social media, search engines, accessibility, low-risk perception).

Conclusions: This theory-based study explored the news media coverage of the problem of fake prescription medicines being purchased on the Internet by highlighting the complexity of personal beliefs and the range of external circumstances that could influence people to make these purchases. Further research is needed in this area to identify the factors that lead people to buy prescription medicines on the Internet. Identifying these factors could enable the development of interventions to dissuade people from purchasing medicines from unsafe sources on the Internet, thus protecting consumers from unsafe or illegal medicines.

Keywords: prescription medicine; Internet; online pharmacy; fake medicine; media; newspaper article; Theory of Planned Behaviour; thematic analysis

2.2. Introduction

2.2.1. Background

People are increasingly turning to the Internet for many of their needs, and it is anticipated that the number of people obtaining their medicines online will also increase significantly in the near future (Fittler *et al*., 2018a). This shift is attributed to the advantages that the Internet marketplace of medicines offers for consumers, such as convenience, privacy, and accessibility 24 hours a day and 7 days a week (Abanmy, 2017). It contrasts with traditional "brick and mortar" pharmacies, which are associated with longer queues, less privacy, and shorter opening times. Additionally, the COVID-19 pandemic has accelerated the purchase of medicines online (Fittler *et al*., 2022a). A study conducted by researchers from Hungary found that the rate of medicines purchased on the Internet increased from 4.2% in 2018 to 44.2% in March 2020 (Fittler *et al*., 2022a).

Many illegal sellers of medicines operate on the Internet and fail to meet national or international pharmacy regulations (Mackey and Nayyar, 2016). These sellers offer a wide range of medicines, including prescription medicines, without a prescription being issued and without medical supervision. According to an estimate, 95% of pharmacies on the Internet are operating illegally (Alliance for Safe Online Pharmacies, 2022). Several researchers have explored the Internet availability of prescription medicines offered by illegal sellers and the accessibility of those medicines without the need for prescriptions. Researchers from the United States conducted an Internet-based study to check the availability of prescription psychiatric medicines using Google (Monteith & Glenn, 2018). They found that 147 (88%) of 167 Internet-based pharmacies offered psychiatric drugs without a need for a prescription. In another study, the availability of antibiotics was explored using Yahoo and Google search engines (Boyd *et al*., 2017). A total of 20 unique URL addresses were analysed. The

researchers found that 16 (80%) of 20 websites offered antibiotics without a need for a prescription.

The Internet availability and accessibility of prescription medicines in the absence of medical oversight present many patient safety risks. Risks include the possibility of misusing medicines and consuming contraindicated medicines (Alliance for Safe Online Pharmacies, 2022). One of the most serious risks associated with purchasing medicines on the Internet relates to purchasing and consuming fake medicines (i.e., falsified medicines).

Fake, falsified, or counterfeit medicines are terms that have been used interchangeably in many studies. All these terms refer to medicines produced under illegal and unregulated conditions (World Health Organisation, 2018). However, some health organisations differentiate between these terms. Counterfeit medicine "are medicines that do not comply with intellectual property rights or that infringe trademark law," while falsified medicines are "fake medicines that are passed off as real medicines" (European Medicines Agency, 2019). In other words, counterfeit medicines are linked more to the infringement of intellectual properties, while the term falsified describes medicines that threaten public health. The term "fake medicines" has been deemed to be the best term for communicating with the public about falsified medicines (Isles *et al*., 2017). This study focuses on falsified medicines, with the term "fake medicines" used to represent these kinds of medicines.

Illegal sellers of medicines on the Internet are a potential source of fake medicines, and according to the WHO, 1 in 2 medicines sold on the Internet are fake (World Health Organisation, 2020). A report published by the UK government in July 2022 confirmed that over 285,000 fake medical products were seized across the United Kingdom by Interpol (Medicines and Healthcare products Regulatory Agency, 2022b). Thus, people could put themselves at serious risk if they purchase and consume medicines from the Internet.

To combat the Internet sale of fake medicines, Interpol established Operation Pangea in 2008, which targeted the illegal sellers of medicines (i.e., the supply side) (Interpol, 2019). This operation has resulted in the detection and confiscation of millions of fake medicines, as well as many illegal sellers' websites being closed. On the demand side (i.e., people who purchase medicines from the Internet), several public awareness campaigns have been run by different national and international organisations to alert consumers about the risks of fake medicines available on the Internet (e.g., Alliance for Safe Online Pharmacies campaigns, #FAKEMEDS, and Fight the Fake campaigns). Besides warning consumers about the risks of fake medicines available on the Internet, these campaigns aim to educate them on how to purchase medicines on the Internet safely. Despite the abundance of those campaigns, some people continue to buy their prescription medicines over the Internet without input from a Healthcare professional (Fittler et al., 2022a). This under-researched issue has been highlighted in newspaper articles in the past few years, particularly during the COVID-19 pandemic, when more people turned to the Internet to obtain various products (Thakur *et al*., 2020). Newspaper coverage of this problem can act in 2 ways. First, taken at face value, this coverage can provide accurate information, for example, on the views and experiences of public and health professionals, including patients, experts, and special authorities that fight fake medicines bought through Internet sources (e.g., Interpol, WHO, and pharmaceutical companies). There is precedence for using newspapers as a source of data in research (Donyai *et al*., 2013; De Melo *et al*., 2021; Mohd Hanim *et al*., 2021; Ueda *et al*., 2017). Second, newspaper coverage can have a direct effect on what people think by sharping the news agenda and influencing peoples' views. Thus, newspapers can influence people based on what they emphasize or deemphasize through their content and how this content is curated and presented (Chong & Druckman 2007; Engel *et al.*, 2018; Entman, 1989) In the context of this study, newspaper stories could potentially help influence social norms.

Accordingly, this study aims to explore the newspaper coverage of the problem of purchasing fake prescription medicines on the Internet using the Theory of Planned Behaviour (TPB) as a conceptual lens to develop a coding of themes to encapsulate how this issue is presented through news stories.

2.2.2. About the TBP

The TPB is a behavioural theory introduced by Ajzen in 1991 (Figure 1.9). The logic for using it in this study is that it can be used to interpret peoples' behaviours based on their intentions (Ajzen, 1991).

This theory stipulates that peoples' actual behaviour is determined by their intentions, which in turn, are predicted by their attitude toward the behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). Each of these 3 direct predictors of intention is influenced by indirect determinants, which are a set of salient beliefs, namely, behavioural beliefs, normative beliefs, and control beliefs. Behavioural beliefs about the consequences of a behaviour (i.e., beliefs about the risks and benefits of a specific behaviour) produce an attitude toward the behaviour. Normative beliefs about the behaviour (i.e., consumers' beliefs about how other people would like them to perform) will generate subjective norms. Finally, control beliefs (i.e., consumers' beliefs about the facilitators or barriers that influence their ability to control the behaviour) will generate the perceived behavioural control about the behaviour (Francis *et al*., 2004). The TPB was employed in this study as a conceptual framework to develop the coding of themes.

2.3. Methods

2.3.1. Data collection

Data were collected using ProQuest, one of the largest newspaper databases on the Internet. The objective was to retrieve articles covering the purchasing of fake prescription

medicines on the Internet by members of the public. By a consensus among the authors (HA, NP, and PD), the search was carried out using the following search strategy: (SU.EXACT("pharmaceutical product") OR SU.EXACT("pharmaceutical products") OR medicine OR medicines OR drug OR drugs OR medication OR medications OR remedy OR remedies) AND (On the Internet OR Internet OR web OR net) AND (Fake OR falsified OR counterfeited OR substandard). The search was limited to full-text news articles published in English between April 2019 and March 2022. The following databases were searched: International Newsstream, Global Breaking Newswires, US Newsstream, and Canadian Newsstream.

No article was excluded based on the country of origin or source so that we could obtain a diversified view of the research topic. Figure 2.1 illustrates the flow diagram of the selection process. The searches revealed 16,357 articles, from which duplicates were removed; these were articles with the same content published in different versions of a newspaper (eg, Sunday and weekday editions) and articles that appeared in both print and web versions of the same newspaper (e.g., appearing in both The Telegraph and telegraph.co.uk). Additionally, articles that did not focus on prescription medicines and those that only covered the supply side of fake medicines (e.g., efforts to combat illegal sellers of fake medicines) were excluded. The articles yielded were then reviewed by the first author (HA), who screened the titles and content of each article and collected all potentially ambiguous articles for discussion with the second and third authors (NP and PD). After evaluation of the articles using the exclusion criteria, 106 articles remained and constituted the study sample. Appendix 1 shows the characteristics of the selected articles (i.e., titles, publication date, publishers, and locations).
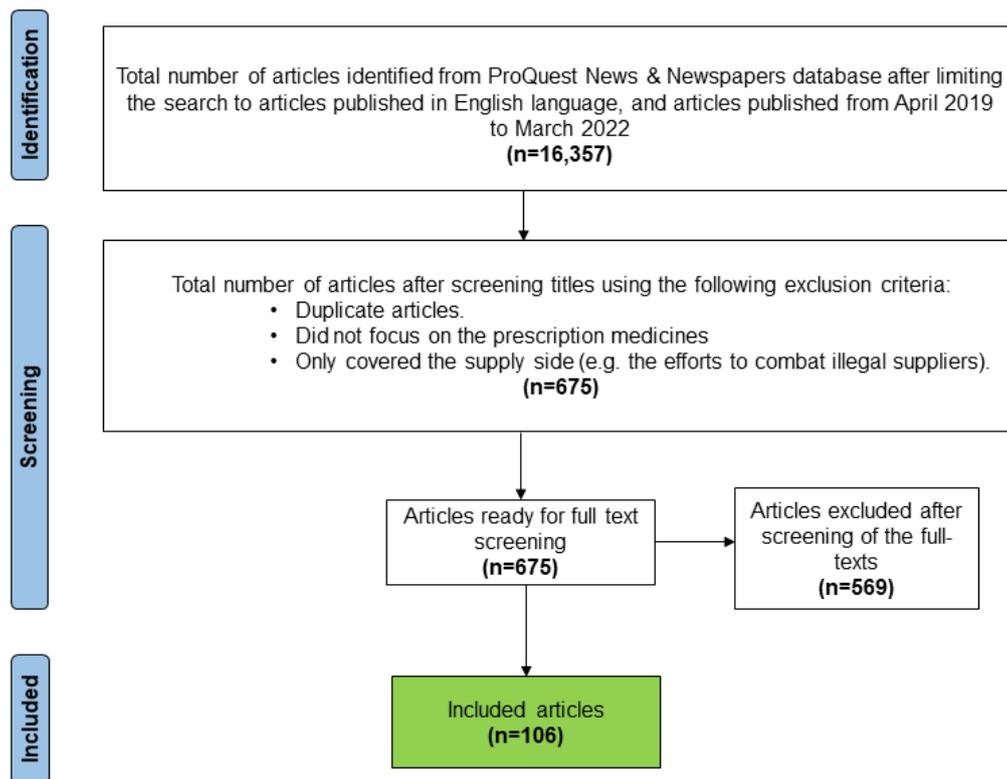
Figure 2.1. Flow diagram of the selection process

2.3.2. Data analysis

This study aimed to analyse the retrieved articles to deconstruct and then reconstruct data to explore the newspaper coverage of the problem of purchasing fake prescription medicines on the Internet. To do this, thematic analysis was employed according to the procedure set out by Braun and Clarke (Braun and Clarke, 2012). This process was carried out by the first author (HA) and reviewed step-by-step by the other authors (PD and NP). In summary, newspaper articles were read and reread in depth before being coded. Then, the articles were coded and organized into initial thematic groups (themes). The articles were then analysed and organized using NVivo software (version 12; QSR International). Finally, the initial themes were reviewed and gathered into overarching themes (superordinate themes) in an iterative process guided by the study aim.

2.3.3. Ethics approval

No ethical approval was required as all the newspapers analysed are available in the public domain.

2.4. Results

2.4.1. Overview

A total of 106 articles met the inclusion criteria and were included in the analysis (Appendix 1). Regarding the distribution of articles based on the location, the majority of articles were published in the United Kingdom (n=47, 44.3%), followed by the United States (n=26, 24.5%), Asia (n=17, 16.1%), Canada (n=5, 4.7%), Australia (n=4, 3.8%), Africa (n=4, 3.8%), and Ireland (n=3, 2.8%).

The thematic analysis of the included articles revealed four superordinate themes: (1) the risks of purchasing prescription medicines on the Internet, (2) the benefits that entice consumers to purchase prescription medicines on the Internet, (3) social influencing factors, and (4) the facilitators of purchasing prescription medicines on the Internet. A detailed mind map is shown in Figure 2.2.
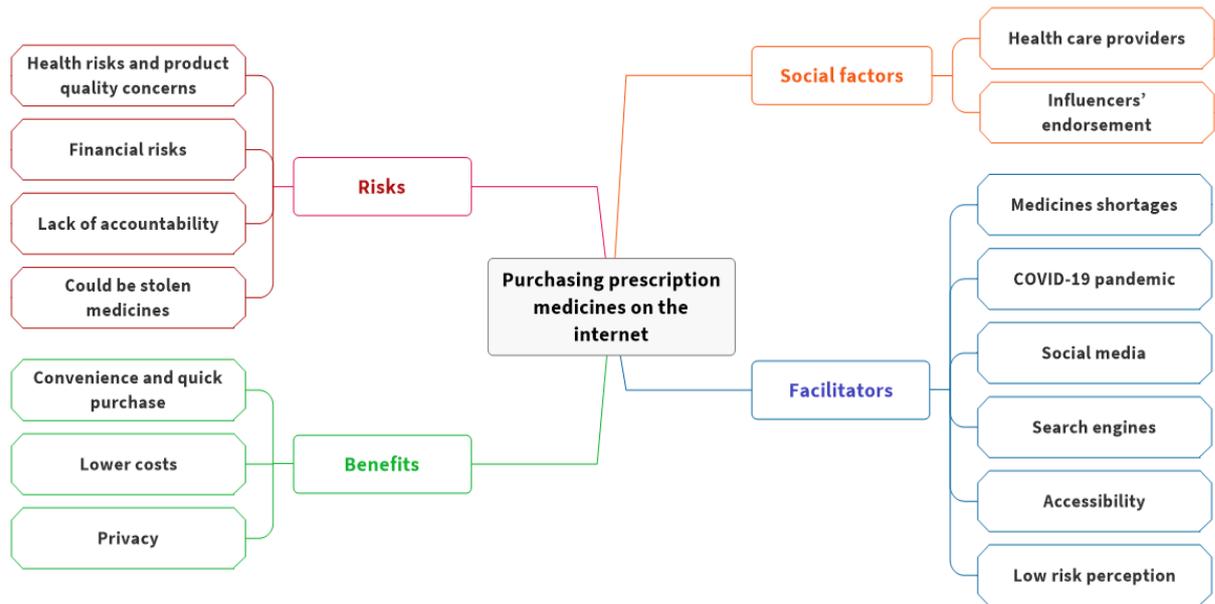
Figure 2.2. Analysis mind map

2.4.2. Risks of purchasing medicines on the Internet (Behavioural beliefs)

The first superordinate theme to appear presented the risks associated with purchasing prescription medicines on the Internet (Table 2.1).

There was a belief by part of the public that medicines offered on the Internet possess a health risk due to the absence of medical oversight, as patients could engage in self-medication, which increases the possibility of misusing or abusing medicines. An additional serious risk highlighted was the risk of fake medicines being available on the Internet. For example:

> *Some medicines bought online have been found to contain dangerous toxic*
>
> *substances. Because there is no certainty about what is in the medicine you buy*
>
> *on the Internet, you can't be sure if it is safe to use alongside medicines you may*
>
> *already be taking. There could be interactions with your regular medicines.*
>
> [Philadelphia Tribune, December 22, 2020; article 65 in Appendix 1]

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Another risk highlighted by the news articles was the possibility of purchasing low-quality medicines, as these might be ineffective due to an absence of active ingredients or an incorrect quantity of these ingredients. Moreover, medicines available on the Internet might not meet the standards of quality and hygiene, might not have been stored correctly, and could even contain expired ingredients. For example:

> *There is no way to be certain how or where the medicine was made. This means you cannot know if the manufacturer operates to acceptable standards of quality and hygiene. The medicine may not have been packaged, labelled or stored correctly and could be out-of-date. The active ingredient in a medicine is what makes it work. A medicine bought online may contain no active ingredient, too much or too little of an active ingredient or the wrong ingredients altogether. It could be useless in treating your medical complaint*. [Philadelphia Tribune, December 22, 2020; article 65 in Appendix 1]

Table 2.1. Risks of purchasing prescription medicines online

Theme	Code
Health risks and product quality concerns	Lack of medical oversight
	Risks of fake medicines
	Medicines could be ineffective (expired medicines, inappropriate storage conditions)
Financial risks	Financial losses
	Identity theft
Lack of accountability	Lack of accountability

Risk of purchasing stolen medicines	Medicines sold online could be stolen

The financial risks associated with these Internet purchases (including the risks of incurring financial losses or the risk of identity thieves who could illegally access personal information) were pointed out in some news articles. For example:

> *...There are reports of fraudsters falsely claiming to be from legitimate health organisations, selling fake medicines, vaccines, tests, and medical supplies, and using phishing scams to steal personal and financial information. Please don't fall victim to these frauds and crimes.* [Targeted News Service, March 25, 2020; article 35 in Appendix 1]

The lack of accountability was highlighted as another risk of buying prescription medicines on the Internet, where no one will be accountable if any problems occur with the purchase:

> *Rogue Internet registrars that knowingly facilitate illegal online pharmacies epitomize the types of notorious markets that USTR admirably seeks to combat [...] ASOP Global urges USTR to support specific, no-cost and common-sense policy measures to hold offenders accountable [...] Momentum is building for structural and policy reforms to increase accountability for Internet ecosystem actors-there are downstream effects on the global illicit drug trade.* [Targeted News Service, February 1, 2020; article 85 in Appendix 1]

One other risk highlighted was that the medicines available on the Internet could have been stolen:

South Africa's statutory health regulatory bodies have sent out a red alert

fearing that medication stolen during last week's looting could be consumed by

people without the supervision and guidance of health-care professionals [...]

SAHPRA has warned people not to buy medicines online or from unknown

sources. [The Daily News, July 20, 2021; article 98 in Appendix 1]

2.4.3. Benefits that entice consumers to purchase prescription medicines on the Internet (Behavioural beliefs)

Another theme that appeared was the benefits that consumers could experience if they

decide to purchase prescription medicines on the Internet (Table 2.2). For example, there was

the belief that buying prescription medicines on the Internet is more convenient because

medicines can be purchased easily and delivered promptly to the consumer's home:

I bought them online. They're easy to get, and they'll change everything. I

logged on to Day Night Healthcare, an online pharmacy based in India, and

ordered a pack of abortion pills [...] and in a week and a half, a small brown

envelope —bearing a postmark not from India but from New Jersey —arrived in

the mail. [The New York Times, August 5, 2019; article 3 in Appendix 1]

There was also the belief that purchasing prescription medicines on the Internet could save

time and effort by avoiding long waiting times to book an appointment with a doctor, which

could be over 2 years in some situations. In contrast, if consumers select the Internet route,

they can obtain their medicines within days to weeks. The following extract illustrates this

point from the perspective of a transgender woman who would otherwise face a long wait for

the hormonal medicine they wanted:

Law student Kara told the BBC's Victoria Derbyshire programme she began

buying oestrogen - the hormone prescribed to trans women-last summer online,

to begin her transition. She has been on an NHS gender identity clinic waiting

list now for two years […] She told the BBC she felt the waiting times had

"forced" her to make the choice to buy hormones online. [BBC News, February

18, 2020; article 68 in Appendix 1]

Table 2.2. Benefits enticing consumers to purchase prescription medicines on the Internet

Theme	Code
Convenience and quick purchase	Easy to obtain
	Fast delivery
	Save time by avoiding long waiting lists to be treated by doctors.
Lower cost	Cheaper prices
	More affordable for medicines that are not covered by insurance or that required a high surcharge
Privacy	Avoid admitting illness cases (e.g., addiction, sexual dysfunction, overweight)

Another benefit highlighted by the newspaper articles was the lower cost to consumers.

Some articles discussed how the low prices of medicines available on the Internet could

entice consumers to source their medicine on the Internet, which is particularly helpful for

patients or medicine not covered by medical insurance. The following 2 examples illustrate

this point:

Unlicensed versions bought online and from abroad can cause breathing

problems, experts warn. Prof Mahendra Patel, of Bradford University, said:

"People have been hospitalised. Sometimes people are led by price. Your health

should be the priority." [The Daily Mirror, August 30, 2019; article 9 in Appendix 1]

Faced with soaring costs and insurance restrictions, Minnesota diabetics are turning to Facebook, eBay, Craigslist, and other lesser-known markets where they can offer medication they no longer need and ask others for help. Reselling a prescription medication such as insulin, or even giving it away for free, is illegal under federal and state laws. [Star Tribune, June 24, 2019; article 12 in Appendix 1]

The privacy of an Internet purchase was highlighted as a factor that averts the need to consult a doctor or obtain a prescription. This is especially the case for sensitive health issues, where the shame of admitting a condition acts as a barrier to seeking care (eg, disclosing sexual dysfunction, addiction to psychoactive medicines, or using slimming pills for weight loss). The following newspaper excerpt highlights this:

Why does, as a British study reports, a young man prefers buying potency medicines such as Viagra at an illegal Internet pharmacy instead of going to a high street pharmacy? And what leads a young woman to act in a similar way to get slimming pills rather than go to a doctor? Clearly, this could be down to people feeling ashamed to openly admit sexual dysfunction or problems with losing weight. [iNews, June 27, 2019; article 26 in Appendix 1]

2.4.4. Social influencing factors (Social beliefs)

This superordinate theme focuses on the social factors that influence the purchase of prescription medicines on the Internet (Table 2.3).

Table 2.3. Social influencing factors

Theme	Code
Influencers	Endorsement by influencers such as politicians
Healthcare providers	Healthcare providers including doctors and pharmacists

Influencers, including politicians, who have a large number of followers were highlighted as a factor that could influence people to buy prescription medicines on the Internet. For instance:

> *Online demand for the anti-malaria drug hydroxychloroquine surged by more than 1,000% after Donald Trump endorsed it as a potential treatment for COVID-19 without providing evidence it worked, a new study has found.* [The Guardian Online, April 29, 2020; article 40 in Appendix 1]

Healthcare providers were highlighted as influencing people's decision to buy prescription medicine on the Internet by educating people on how to buy the medicines safely, as exemplified in the following extract:

> *The survey's findings underscore the critical role that healthcare providers play in educating consumers about how to buy medicines online safely* [PR Newswire, October 19, 2020; article 53 in Appendix 1]

2.4.5. Facilitators of purchasing prescription medicines on the Internet (Control beliefs)

Several facilitators and facilitating conditions that can trigger consumers to purchase medicines online were highlighted in the newspaper articles (Table 2.4).

Table 2.4. Facilitators of purchasing prescription medicines on the Internet

Theme	Code
Medicines shortages	Medicines shortages might be caused by a halt in production, increased demand, lack of alternatives, or political events (e.g., Brexit)
Pandemic disease (COVID-19)	Panic buying of medicines due to the fear of medicines running out of stock or being in shortages
	Online availability of COVID-19 cures (fake cures), for people desperate for treatment of COVID-19
	Spread of misinformation related to COVID-19
	Overburdened healthcare services
Social media	Facilitate the communication between buyers and sellers
Search engines	Facilitate the marketing of the online sellers of medicines, and thus help people finding those sellers.
Accessibility	People can purchase prescription medicines without the need for prescriptions
Low-risk perception	Unawareness about the risks associated with the purchase

One of the facilitating conditions was medicines shortages, which could be attributed to several reasons, such as halting the production of specific kinds of medicines or the increase in demand for specific medicines. It is also possible for a political event to affect the supply chain of medicines, such as fears about the impact of Brexit (i.e., the United Kingdom leaving the European Union) on drug distribution and the supply chain. The following is an example extracted from a newspaper that covers the recent hormone replacement therapy shortages in the United Kingdom:

"Women are getting desperate, they are left with no other option than to look

overseas," she told the Daily Mail. The shortages have prompted fears that

women are turning to buying potentially counterfeit HRT-drugs online.

[Telegraph.co.uk, August 24, 2019; article 19 in Appendix 1]

Another facilitator highlighted by the newspaper articles was the outbreak of pandemic viruses, such as COVID-19. Illegal web-based pharmacies took advantage of the high market demand for medicines and personal protection products as well as panic buying (i.e., purchasing prescription medicines on the Internet from any source during the COVID-19 pandemic due to fears over prescription medicines running out of stock) to make mass profits from the sale of (fake) medicines:

The Maharashtra Cyber Police have busted an online fraud of illegal sales of

fake Remdesivir and Tocilizumab drugs filled with plain water that targeted

gullible customers desperate for treatment of Covid-19 [IANS English, May 13,

2021; Article 94 in Appendix 1]

In addition, health services overburdened by COVID-19 meant that people struggled to get appointments with doctors and thus turned to the Internet for treatment, including prescription medicines. For example:

A Daily Express investigation found powerful prescription-only cancer drugs

readily available to UK citizens without a prescription through an online

pharmacy. The dangers are clear as millions of Britons, struggling to get NHS

appointments, turn to the Internet for cures, bypassing traditional and safer

medical routes for diagnosis and treatments […] Interpol believes crime cartels

are cashing in on the growing market because of the vast profits to be made

from exploiting people's fears while health services are under pressure from

covid. [Daily Express, August 20, 2021; article 86 in Appendix 1]

Social media platforms were pointed out by the newspaper articles as a facilitator for purchasing prescription medicines, as they offer marketplaces that allow for easy communication between consumers and illegal sellers of medicines. For example:

Cyber police issued an advisory on Friday warning citizens to not fall prey to

conmen posing as pharma firm representatives on social media and offering to

sell Remdesivir and Tocilizumab [...] "Con men are taking advantage to dupe

those in need of the injections. No individual, distributor or retailer can sell

these medicines to the public... beware of fraudsters... do not transfer funds and

inform the police. [The Times of India, May 1, 2021; article 87 in Appendix 1]

Search engines such as Google were also highlighted by the newspaper articles as facilitators of purchasing prescription medicines online. Search engines helped people find websites that offer prescription medicines without the need for prescriptions. For example:

Google is showing search results clearly marked as"sponsored" when certain

keywords are used to search for the drug. The tech-giant is profiting by

displaying these prominent shopping ads and, by extension, facilitating the

[sale] of this potentially lethal drug. [Mail on Sunday, July 26, 2020; article 74

in Appendix 1]

The accessibility to prescription medicines without a need for a prescription was highlighted as another facilitating factor. For example:

The "skinny jabs," which contain a prescription-only appetite suppressant

known as Saxenda, are meant only for people with a BMI of over 30 or those

with disorders such as diabetes. But many fake online pharmacies and

unregistered clinics are now selling the jabs to people who are not overweight

and do not have a prescription. [The Sun, February 23, 2020; article 2 in

Appendix 1]

Finally, consumers' low perception of the risks associated with purchasing medicines

online was discussed by the newspaper articles as another facilitating factor:

The survey findings demonstrate that American consumers believe they are more

knowledgeable regarding online pharmacies than they are in reality. Further,

most are unaware of the risks associated with their use or how to find legitimate

sources versus rogue outlets, exposing millions more US consumers to the risk of

potential fraud and criminality online. [PR Newswire, October 19, 2020; article

53 in Appendix 1]

2.5. Discussion

2.5.1. Principal results

As more people are turning to the Internet to purchase prescription medicines, newspaper

coverage of this problem has also increased. This is the first study that analysed newspaper

coverage of the problem of purchasing fake prescription medicines on the Internet. The

analysis of the included articles revealed four major themes relating to purchasing

prescription medicines on the Internet, which include (1) the risks associated with the

purchase, (2) the benefits that entice consumers to make the purchase, (3) the social

influencing factors, and (4) factors that facilitate the purchase. Many of the analysed articles

included more than 1 theme.

Although this study explored newspapers in several countries, which have different Healthcare systems as well as cultural differences among consumers, there was a consensus about the growing serious public risks and patient safety concerns associated with purchasing fake prescription medicines on the Internet. Of course, this analysis reports on what newspapers covered rather than the truth of their coverage. In that sense, the articles are treated as data and taken at face value.

The newspaper articles highlighted that consumers were enticed by the convenience, low prices, and privacy afforded by purchasing prescription medicines on the Internet. However, assurances of quality, efficacy, and safety cannot be guaranteed if the medicines are purchased online from an illegal source. Moreover, if any unpleasant consequences occur (eg, financial scams, purchasing fake medicines), there is no accountability from the illegal sites. These findings are in line with those of several other studies [Abanmy, 2017; Aiken *et al*., 2018; Almomani *et al*., 2023; Alwhaibi *et al*., 2021; Assi *et al*., 2016; Moureaud *et al*., 2021)

The newspapers also highlighted several external facilitating conditions that could affect consumer's decision to purchase prescription medicines from the Internet, such as medicine shortages. Shortages of medicines caused by a political event (e.g., Brexit) or supply chain issues can open the doors to sellers of prescription medicines on the Internet. When there are limited sources available to obtain much-needed prescription medicines, this is likely to lead people to use Internet sources, even if they are illegal and unsafe. Relating this to the previous literature, this finding is in line with that of a multinational study, which found that oncology medicines affected by shortages were available and accessible on the Internet without the need for a medical prescription (Fittler *et al*., 2018b). Furthermore, in an earlier study conducted in the United States that explored the Internet availability of vaccines in shortages, it was suggested that vaccine shortages may lead some patients to seek out

alternative sources (including the Internet) even if they are not safe (Liang and Mackey, 2012). In line with this, a multinational study, which explored consumer behaviour of purchasing lifestyle medicines from the Internet, found that some consumers were willing to accept safety risks and buy prescription medicines on the Internet during emergencies, such as medicine shortages (Assi *et al*., 2016).

Pandemics such as COVID-19 were highlighted by many newspaper articles as a facilitating condition that could trigger the panic buying of prescription medicines from any source available on the Internet, mostly caused by the fear of prescription medicines running out of stock and feelings of desperation due to an absence of effective COVID-19 cures. Additionally, newspaper articles described how COVID-19 limited access to Healthcare services due to overburdened hospitals and medical staff, which could drive some people to purchase prescription medicines on the Internet. Interestingly, this study found that many newspaper articles highlighted the impact of COVID-19 on the on-Internet purchases of prescription medicine; however, few studies have explored this issue (Almomani *et al*., 2023a; Fittler *et al*., 2021). Thus, further research might be needed to clarify the impact of COVID-19 on the purchasing of prescription medicines online.

Another important facilitator highlighted by the newspaper articles was the easy accessibility of prescription medicines offered by illegal sellers without the need for a prescription. This result is in line with a study conducted in 2012 (Cicero and Ellis, 2012), which found that 55% (41/75) of the study sample preferred to purchase tramadol (a controlled prescription medicine) on the Internet due to its easy access, especially when the doctor refused to prescribe this medication. Likewise, a recent study conducted in the United Kingdom (Almomani *et al*., 2023a) purported that the easy accessibility to prescription

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medicines on the Internet without the need for a prescription can lead people to purchase these types of medications from the Internet.

An interesting finding of this study was the ways in which the impact of social media on the purchase of prescription medicines online was described in newspapers. Relating this to research findings, a multinational study found that pregnant women were influenced by support groups available on social media, which provided advice on how to use the medicines or where to source these medicines (Little *et al*., 2020). Another study conducted in Sweden uncovered many Facebook groups that sold illegal substances, including prescription medicines. The results of this study provide lend further support to the idea highlighted by the newspapers that social media can be a facilitator of communication between buyers and sellers that encourages the purchasing of prescription medicines on the Internet (Demant *et al*., 2020).

This theory-based study also noted that purchasing fake prescription medicines on the Internet can have implications for practice in terms of patient safety. Policymakers should take note of the potent power of news media as an influencer of the public. Newspaper articles are not only reporting and covering the topic of fake medicines available on the Internet but can also influence people's decisions and might help protect consumers from the risks of this purchase. To develop a full picture of this problem, additional studies are needed that explore and interpret this consumer behaviour and provide behavioural change strategies that could deter people from purchasing prescription medicines on the Internet.

2.5.2. Limitations

The findings of this study are subject to some limitations. First, non-English language articles were excluded, which might affect the generalizability of the study findings and increase the risk of bias. Another limitation relates to the sample of news sources selected for

exploration. This study was limited to newspaper articles and Internet news websites and thus excludes perspectives from other news media such as social media, television, and magazines.

2.6. Conclusion

This study explored the news media coverage of the problem of purchasing prescription medicines on the Internet by highlighting the risks associated with this purchase, the potential benefits that entice consumers to make this purchase, social influencing factors, and the facilitators of the purchase. Policymakers must consider the power of news media as an influencer of the public, as the news media could influence peoples' decisions to purchase prescription medicines over the Internet. Future research conducted in this area is needed to identify the factors that lead people to buy prescription medicines online. This will aid the development of interventions to reduce the purchasing of prescription medicines from unsafe Internet sources, thus protecting people from the health and safety risks of taking fake medicines.

2.7. Acknowledgments

2.8. Data availability

The data sets generated during and/or analysed during this study are available from the corresponding author upon reasonable request.

2.9. Conflicts of interest

None declared.

CHAPTER 3

Study 2: Reasons that Lead People to End Up Buying Fake Medicines on the Internet: Interview study

The current study has been published on 16th February 2023, by the Journal of Medical Internet Research - Formative Research, under the title "Reasons that Lead People to End Up Buying Fake Medicines on the Internet: Interview study".

3.1. Abstract

Background: Many people in the United Kingdom are turning to the Internet to obtain prescription-only medicines (POMs). This introduces substantial concerns for patient safety, particularly owing to the risk of buying fake medicines. To help reduce the risks to patient safety, it is important to understand why people buy POMs on the web in the first place.

Objective: This study aimed to identify why people in the United Kingdom purchase medicines, specifically POMs, from the Internet, and their perceptions of risks posed by the availability of fake medicines on the web.

Methods: Semi-structured interviews were conducted with adults from the United Kingdom who had previously purchased medicines on the web. Purposive sampling was adopted using various methods to achieve diversity in participants' experiences and demographics. The recruitment was continued until data saturation was reached. Thematic analysis was employed, with the theory of planned behaviour acting as a framework to develop the coding of themes.

Results: A total of 20 participants were interviewed. Participants had bought various types of POMs or medicines with the potential to be misused or that required a higher level of medical oversight (e.g., antibiotics and controlled medicines). Participants demonstrated awareness of the presence and the risks of fake medicines available on the Internet. The factors that influence participants' decision to buy medicines on the web were grouped into themes, including the advantages (avoiding long waiting times, bypassing gatekeepers, availability of medicines, lower costs, convenient process, and privacy), disadvantages (medicine safety concerns, medicine quality concerns, higher costs, web-based payment risks, lack of accountability, and engaging in an illegal behaviour) of purchasing medicines on the web, social influencing factors (interactions with Healthcare providers, other consumers' reviews and experiences, word of mouth by friends, and influencers' endorsement), barriers (general barriers and website-specific barriers) and facilitators (facilitators offered by the illegal sellers of medicines, facilitators offered by Internet platforms, COVID-19 outbreak as a facilitating condition, and participants' personality) of the purchase, and factors that lead people to trust the web-based sellers of medicines (website features, product appearance, and past experience).

Conclusions: In-depth insights into what drives people in the United Kingdom to buy medicines on the web could enable the development of effective and evidence-based public awareness campaigns that warn consumers about the risks of buying fake medicines from the Internet. The findings enable researchers to design interventions to minimize the purchasing of POMs on the web. A limitation of this study is that although the interviews were in-depth and data saturation was reached, the findings may not be generalizable, as this was a qualitative study. However, the theory of planned behaviour, which informed the analysis, has well-established guidelines for developing a questionnaire for a future quantitative study.

3.2. Introduction

3.2.1. Background

Many people use the Internet to obtain their medicines, a practice that is attributed to the advantages offered by Internet pharmacies, such as convenience, low cost, and round-the-clock accessibility (Fittler *et al*., 2018a). Legitimate Internet pharmacies can supply both medicines that do not require a prescription (called over-the-counter medicines) and stronger medicines that require a prescription from an authorized prescriber before they can be legally supplied. In the United Kingdom, the latter are referred to as prescription-only medicines (POMs), a term used hereon for these medicines. Accordingly, consumers in the United Kingdom cannot legally obtain POMs on the web without a prescription from a registered prescriber. However, some people may try to buy POMs without a prescription being issued, and indeed some suppliers may offer POMs via illegal means.

This is because both legal and illegal web-based sellers of medicines operate on the Internet. In the United Kingdom, any website selling medicines must be registered with the General Pharmaceutical Council and the Medicines and Healthcare products Regulatory Agency before it can be considered a legal Internet pharmacy. Any Internet pharmacy that operates outside regulatory systems such as these is deemed illegal. It has been estimated that 96% of all global Internet pharmacies are operating illegally (LegitScript, 2016). There are serious patient safety concerns around illegal web-based sellers of medicines, who enable a wide range of medicines, including high-risk controlled medicines, to be obtained without a prescription and medical supervision (Mackey and Nayyar, 2016). Several researchers have explored the prevalence of illegal Internet pharmacies and the variety of the products they

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offer. For instance, UK researchers (Hockenhull *et al*., 2020) found that modafinil and methylphenidate (both classified as drugs of abuse with potential for addiction) were available on the web and accessible to UK-based consumers without the need for a prescription. Similarly, another study conducted in the United Kingdom explored the web-based availability of antibiotics, finding that 45% (9/20) of the websites offered antibiotics without the need for a prescription (Boyd *et al*., 2017).

Purchasing medicines from illegal sellers is associated with many risks, especially if the medicines bought are POMs or require a higher level of medical oversight during the purchase and subsequent use. The risks include the possibility of misuse or abuse of medicines and purchasing contraindicated medicines, which are medicines that should not be used by specific people (Mackey and Liang, 2013). Moreover, consuming antibiotics bought on the web without medical oversight could increase antimicrobial resistance (Boyd *et al*.,027). An additional serious problem associated with buying medicines on the web is the risk of buying fake medicines (Lee *et al*., 2017). According to an estimation by the World Health Organisation, half of the medicines sold on the web are fake (World Health Organisation, 2020). For example, a study conducted in Japan found that of the 45 samples of tadalafil purchased and tested, 23 (51%) were fake, only 9 (20%) were genuine, and the remaining 13 (29%) were either unregistered medicines or unconfirmed because of insufficient information (Sanada *et al*., 2020). Similarly, UAE researchers (Ashames *et al*., 2019) who bought furosemide tablets on the web and analysed their physical and chemical properties according to the British Pharmacopoeia (2018) found that they failed to pass the chemical assay test, which means that they were likely fake. In the United Kingdom, millions of fake medicines have been seized at the borders and thousands of websites that offered fake medicines have been shut down by Interpol through operation Pangea in the past few years (Medicines and Healthcare products Regulatory Agency, 2022). Among the medicines seized

were antidepressants, erectile dysfunction tablets, painkillers, and slimming pills. Nonetheless, the problem persists.

Several awareness campaigns have been conducted in the past by different civil societies and governmental, and international organisations to warn consumers about the dangers of fake medicines available on the web (Anderson *et al*., 2016). In the United Kingdom, the Medicines and Healthcare products Regulatory Agency has run awareness campaigns on different social media platforms (eg, #FAKEMEDS) that aim to encourage consumers who purchase medicines from the Internet to ensure that they are purchasing from legal sources. Despite these efforts, people in the United Kingdom still end up buying medicines from illegal web-based sources. According to an estimate, 10% of people in the United Kingdom bought a fake medical product from an illegal web-based source in 2020 (Medicines and Healthcare products Regulatory Agency, 2022a).

Most of the awareness campaigns have been focused on warning consumers about the risks and dangers of buying POMs on the web as well as educating people about how to safely purchase medicines on the web. However, little attention has been paid to examining the reasons that lead people to buy medicines on the web, with only a limited number of studies exploring this angle (Abanmy, 2017; Alwhaibi *et al*., 2021; Bowman *et al*., 2020; Cicero and Ellis, 2012; Fittler *et al*., 2013b; Little *et al*., 2020). None of the existing qualitative studies explains why people in the United Kingdom buy POMs on the web without involving their physicians. However, qualitative studies help the development of awareness campaigns that are relevant and fit for purpose by providing insights into why people behave in specific ways.

3.2.2. Goal of this study

This study aimed to provide an understanding of why people in the United Kingdom purchase medicines directly from the Internet. The focus was on POMs and medicines that have the potential to be misused or that require a higher level of medical oversight during the purchase. This includes some categories of medicines that should not be sold on the web without consultation with a prescriber or without adequate checks made when a prescriber is involved to ensure that they are clinically appropriate, for example, antimicrobials; opioids; sedatives; laxatives; gabapentin; lithium; warfarin; and medicines for diabetes, asthma, epilepsy, and mental health (General Pharmaceutical Council, 2022). In addition, this study aimed to explore UK consumers' perceptions of the web-based availability and risks of fake medicines. UK consumers who had actual experiences of purchasing medicines on the web were interviewed, and the theory of planned behaviour (TPB) was used to interpret their behaviour.

3.3. Methods

3.3.1. Overview

This interview study followed the Standards for Reporting Qualitative Research guidelines for the conduct of the research (Appendix 2) (O'Brien *et al*., 2014). Three researchers (HM, PD, and NP) met weekly to manage the project. HM is a PhD student and a novice qualitative researcher who undertook training courses in interviewing structures and techniques and qualitative data analysis. PD is an experienced qualitative researcher and a professor of pharmacy practice. NP is an experienced qualitative researcher and an associate professor of pharmacy practice.

3.3.2. The TPB

To explore why people purchase medicines directly from the Internet (i.e., without involving a professional Healthcare provider), the TPB was used as the underpinning theoretical framework. The TPB is one of the psychological theories introduced by Ajzen (Ajzen *et al*., 1991). It was used in this research to interpret consumers' behaviours based on their intentions. In this case, the behaviour of interest was "purchasing POMs or those medicines that have potential to be misused or that require a higher level of medical oversight during the purchase, through the Internet and without involving the doctor."

According to the TPB (Figure 1.9), consumers' actual behaviour is predicted by their behavioural intentions, which, in turn, are determined by their attitude toward the behaviour, subjective norms, and perceived behavioural control (Ajzen *et al*., 1991). Specific kinds of beliefs underlie each of these 3 predictors of intention: behavioural beliefs, normative beliefs, and control beliefs. These beliefs are indirect predictors of intention. Behavioural beliefs capture consumers' beliefs about the outcomes of the behaviour, including the perceived advantages and disadvantages of the behaviour, and determine the overall attitude toward this behaviour. Normative beliefs are consumers' beliefs about how other specific groups of people would like them to act in relation to the behaviour in question or the social pressure and determine subjective norms, which are the individual's overall perceived expectations from others. Control beliefs are consumers' specific beliefs about their ability to control the behaviour, for example, through access to the resources and opportunities required to facilitate the behaviour and determine the individual's overall perceived behavioural control over the behaviour. The logic behind using the TPB in this study is that it has well-established guidelines to enable the development of a questionnaire on the topic in a future study, allowing the factors identified in a qualitative study such as this to be formally verified and generalized at a later date (Francis *et al*., 2004). This investigation would identify the

specific elements that are most crucial in driving people's intentions to buy POMs or other high-risk medicines on the web so that future public awareness campaigns can be evidence-based and arguably more effective.

3.3.3. Trust and the TPB

Trust is an important element influencing consumer behaviour (Schurr and Ozanne, 1985) and has been proven to be relevant in uncertain environments, such as the context of e-commerce (Pavlou, 2002). Trust is a crucial predictor of consumers' web-based shopping intention and behaviour (Bourlakis *et al*., 2008; Pavlou 2002). Therefore, consumers' trust in Internet pharmacies can arguably play an important role in influencing their decision to purchase POMs from the Internet. In this study, consumers' trust in web-based sellers of medicines is defined as consumers' conviction that the web-based sellers will behave according to their expectations by properly delivering effective and safe medicines (Grazioli and Jarvenpaa, 2020; Pavlou and Fygenson, 2006).

Several researchers have modelled trust in web-based sellers to the TPB framework to explore various behaviours in e-commerce (Amro and Duarte, 2016; George, 2004; Little *et al.,* 2020; Pavlou, 2002; Pavlou and Chai, 2002). In this study, an extended model of the TPB framework proposed by Pavlou (2002) was adopted by adding consumers' trust in web-based sellers of medicines as an indirect predictor of consumers' intentions and a direct predictor of both their attitude (as a behavioural belief) and perceived behavioural control (as a control belief). Trust is proposed as a behavioural belief because it enables consumers' positive expectation that no harmful outcomes will happen to them, thus creating a favourable perception of the outcomes and, in turn, a positive attitude toward the web-based sellers of medicines (Pavlou and Fygenson, 2006). By contrast, trust is also proposed as a control belief, as it builds consumers' confidence to depend on the web-based sellers of medicines,

which helps consumers overcome psychological barriers to engaging in the behaviour. In other words, trust serves to absorb uncertainty and facilitate the behaviour (Pavlou, 2002). Figure 3.1 illustrates the adopted model.
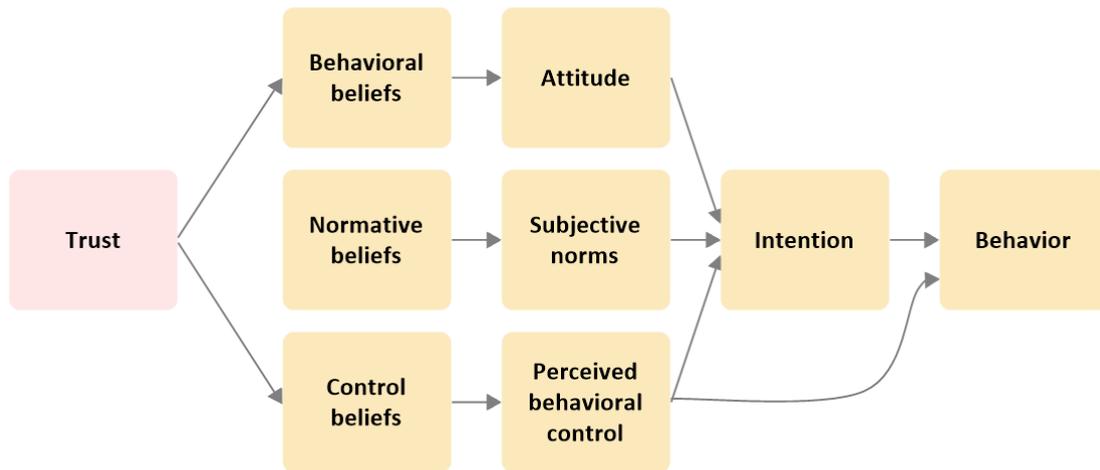
Figure 3.1. The theory of planned behaviour extended the model with the addition of trust.

3.3.4. Sampling and recruitment strategy

The study population was adults (aged ≥18 years) based in the United Kingdom who had experience of purchasing medicines on the web. Additional inclusion criteria were that the participants must be native English speakers and able to access Microsoft Teams (Microsoft Corp) because the interviews were to take place on Teams. The focus was on POMs or medicines that have the potential to be misused or require a higher level of medical oversight during the purchase and subsequent use. Purposive sampling was adopted to achieve diversity in participants' experiences and demography. Individuals who had purchased POMs before 2019 were excluded to ensure that the participants' recall of their experiences would not be hindered by a large time gap.

Regarding the recruitment process, the participants were recruited using 3 different procedures. First, emails that included a recruitment poster were circulated to the university staff and students. Second, the same recruitment poster was posted on different social media platforms, including Twitter, Reddit, Facebook, and Telegram. The recruitment poster is presented in Appendix 3. Third, a market research company (Panelbase) was employed to assist and boost the recruitment process. Panelbase has >350,000 UK-based adults on their database who agree to be contacted for recruitment to different types of research (Panelbase, 2020). The participants were recruited using this company in 3 phases. First, the prevalence of people who had purchased POMs on the web without input from a Healthcare professional was checked by a mini poll sent to 10,473 UK-based adults registered with Panelbase. This mini-poll consisted of a single question (i.e., Have you ever bought prescription medicines without involving the doctor?). The purpose of sending this mini-poll was to check the availability of eligible participants in advance via the Panelbase platform. Second, a web-based recruitment screener was developed and sent to those registered with Panelbase (Appendix 4). This was a prerecruitment questionnaire used to determine respondents' eligibility for the study based on the inclusion criteria. Noneligible respondents were excluded from the study at this stage. Moreover, the web-based recruitment screener included demographic questions. In the third phase, emails containing detailed information about the study and consent forms were sent to eligible participants with a schedule of potential interview dates (Appendix 5 and Appendix 6). Consent forms were signed by the participants and obtained at least 24 hours before the interviews.

The recruitment process began in April 2021 and ended in May 2022. Regarding the sample size for an interview study, Svend and Steinar (2018) recommended recruiting between 5 and 25 participants depending on the study purpose, whereas Kuzel (1992) recommended a sample size of 12 to 20 participants; therefore, we set an initial desired

sample size between 15 and 25 participants. Recruitment was continued until data saturation was reached, and that is when no more new codes were identified Braun and Clark, 2012). Each participant was reimbursed £20 (US $24.14) as a token of appreciation for their contribution to the study.

3.3.5. Data collection

Semi-structured interviews were conducted on the web using the Microsoft Teams app by an interviewer (HM). A semi-structured interview schedule comprising open-ended questions to explore the participants' experience of purchasing medicines on the web was developed (Appendix 7). This was developed by all the 3 researchers (HM, PD, and NP) based on the constructs of the model shown in Figure 3.1. The questions addressed the advantages and benefits of the purchase, the disadvantages and risks involved in the purchase, the facilitators of and barriers to the purchase, the social factors affecting decisions, and why they trusted the web-based supplier. Furthermore, some questions were asked to check the participants' perception of the web-based availability of and risks associated with fake medicines. A pilot interview was conducted by HM with a PhD student from the University of Reading to pre-test the interview schedule and identify questions that were unclear or too complex to understand.

The interviews were video, and audio recorded after written consent was received, and consent was verified again verbally at the beginning of each interview.

3.3.6. Analysis

Interview recordings were transcribed verbatim into an MS Word document by HM. Each transcript was assigned a unique code number for identification (P-1, P-2, P-3...P-20), rather than using any other identifying data (e.g., names or emails). Any personal information or

any research data obtained before, during, or after the interviews were kept confidential on a password-protected computer using a OneDrive (Microsoft Corp) account of HM.

A thematic analysis was performed according to Langdridge and Hagger-Johnson (2013). Then, the identified themes were categorized against the constructs of the framework shown in Figure 3.1. The transcripts were read and reread a minimum of 3 times, and line-by-line notes were made. The interview transcripts were analysed iteratively using the NVivo (version 12; QSR International) software to code and organize the data. Three coding levels were used. First-order coding was the first level of coding, which was descriptive with minimal interpretation of data. Then, second-order coding was conducted by linking related first-order codes to create the themes. The analysis was repeated for each transcript, and a summary document was produced for each participant. The summaries of themes for all the participants were subjected to third-order coding, whereby higher-level themes (i.e., superordinate themes) were identified. Then, the superordinate themes were categorised against the constructs of the framework shown in Figure 3.1. The coding process and analysis were carried out by HM and reviewed step by step by PD and NP.

3.3.7. Ethics approval

Ethics approval was obtained from the ethics committee of the University of Reading (reference number 21_07) (Appendix 8).

3.4. Results

3.4.1. Participants' characteristics

A total of 20 participants (n=12, 60% females, and n=8, 40% males) were recruited and interviewed. Of these 20 participants, 1 (5%) was recruited through the emails sent to the university staff and students, 4 (20%) were recruited using social media platforms, and 15 (75%) were recruited using Panelbase. Overall, 85% (17/20) of participants were White

British, 10% (2/20) of participants were Asian British, and 5% (1/20) of participants were Black British. The participant age groups were 18 to 29 (4/20, 20%), 30 to 39 (4/20, 20%), 40 to 49 (5/20, 25%), 50 to 59 (4/20, 20%), and ≥70 (3/20, 15%) years. In total, 60% (12/20) of participants were from England, 30% (6/20) were from Scotland, and 10% (2/20) were from Northern Ireland. The interviews lasted from 34 to 75 (average duration 48, SD 9.39) minutes.

3.4.2. Participants' experiences

To the mini poll of the 10,473 UK-based adults registered with Panelbase, 1321 (12.61%) responded, of whom 136 (10.3%) indicated they had bought POMs on the web without involving their physician. This reassured the team that eligible participants might be identified during recruitment.

The 20 participants interviewed had bought various types of POMs or medicines with the potential to be misused or that required a higher level of medical oversight (e.g., hormone replacement therapy, antibiotics, and high-risk controlled medicines). Table 3.1 shows each participant's purchasing experiences. All the participants were the end users of the medicines purchased, except for participant 9 (P-9), who had bought medicines on the web for both him and his mother.

Most of the participants did not report encountering problems with the medicines purchased or with the suppliers of these medicines. However, a limited number of participants (3/20, 15% participants) did report encountering problems, including failure in delivery, financial losses, and product quality issues, as stated in the following quotes:

> *"I'll give you an example for my case. Uhm, I ordered from a website in Russia*
>
> *which was shut down under a basic like they're rounding up online websites*

there, so I lost money on about six months' worth of HRT. You know, that was

pretty devastating for me." [P-2, line 194]

"I bought Tramadol once and they sent me these tiny little orange pills instead

that." [P-5, line 124]

"I found that the Valium felt stronger than the ones from the doctors." [P-19,

line 134]

Table 3.1. Participants experiences of purchasing POMs online

Code	Number of purchases	Last purchase date (interview date)	Problems with the purchase	Medicine(s) bought online
P-1	≥3	Not provided (2021)	No	Names were not provided
P-2	≥3	2021 (2021)	Yes	Estradiol, Spironolactone
P-3	≥3	2021 (2021)	No	Estradiol, Spironolactone
P-4	≥3	2021 (2021)	No	Estradiol, Spironolactone
P-5	≥3	2021 (2021)	Yes	Codeine Tramadol
P-6	≥3	2022 (2022)	No	Senna (100 Tablets)
P-7	1	2020 (2022)	No	Acetazolamide, Amitriptyline

P-8	≥3	2020 (2022)	No	Sildenafil
P-9	2	2022 (2022)	No	Paroxetine, Brimonidine ED, Timolol ED
P-10	2	2022 (2022)	No	Clonazepam, Sildenafil
P-11	2	2022 (2022)	No	Letrozole
P-12	≥3	2019 (2022	No	Varenicline
P-13	1	2020 (2022)	No	Tranexamic acid
P-14	2	2021 (2022)	No	Lymecycline, Metronidazole
P-15	≥3	2021 (2022)	No	Sildenafil
P-16	2	2021 (2022)	No	Norethisterone
P-17	≥3	2021 (2022)	No	Hydrocodone-paracetamol, Alosetron, Antibiotic
P-18	≥3	2021 (2022)	No	Sumatriptan
P-19	≥3	2020 (2022)	Yes	Tramadol, Diazepam, Promethazine
P-20	≥3	2021 (2022)	No	Naproxen, Clarithromycin

3.4.3. Participants' perception about the web-based availability and risks of fake medicines

All but one of the participants (i.e., 19/20, 95% of participants) were aware of the presence of fake medicines on the Internet and the associated risks. The following quotes show examples of responses given by the participants when they were asked about their knowledge of fake medicines available on the web and the potential danger of these medicines:

"You see a lot of them on different websites like oh brain force or actively encourage 60% better brain activity...I think the main risk of them is just you being conned out of your money. That's also fake medications that can actively lead to problems with your body. Uh, you could be taking a medication that makes you infertile." [P-4, line 396]

"I think these products are marketed as containing certain ingredients or having some health benefits and they are missing those key ingredients...they are available online...they don't have the right ingredients, or they don't have them in a high enough dosage or they just contain ingredients which are bad for any person to take." [P-11, line 329]

3.4.4. Factors that influence consumer's decision to purchase POMs on the web

Six superordinate themes were identified from the thematic analysis. These themes represent the range of factors that influence consumer's decision to make a web-based purchase, without involving the physician, of POMs or medicines that have the potential to be misused or require a higher level of medical oversight before the purchase. The 6 superordinate themes were advantages of purchasing medicines from the Internet (advantages), disadvantages of purchasing medicines from the Internet (disadvantages),

social factors that could influence the decision to make the purchase (social factors), factors that facilitate the web-based purchase (facilitators), factors that prevent or delay the web-based purchase (barriers), and factors that lead consumers to trust in the web-based supplier of medicines (trusting beliefs). Figure 3.2 illustrates the map resulting from the thematic analysis. All the superordinate themes identified through this analysis could be mapped deductively against the constructs of the extended TPB model, which included the construct of consumers' trust in web-based suppliers of medicines (trusting beliefs), as shown in Figure 3.3.
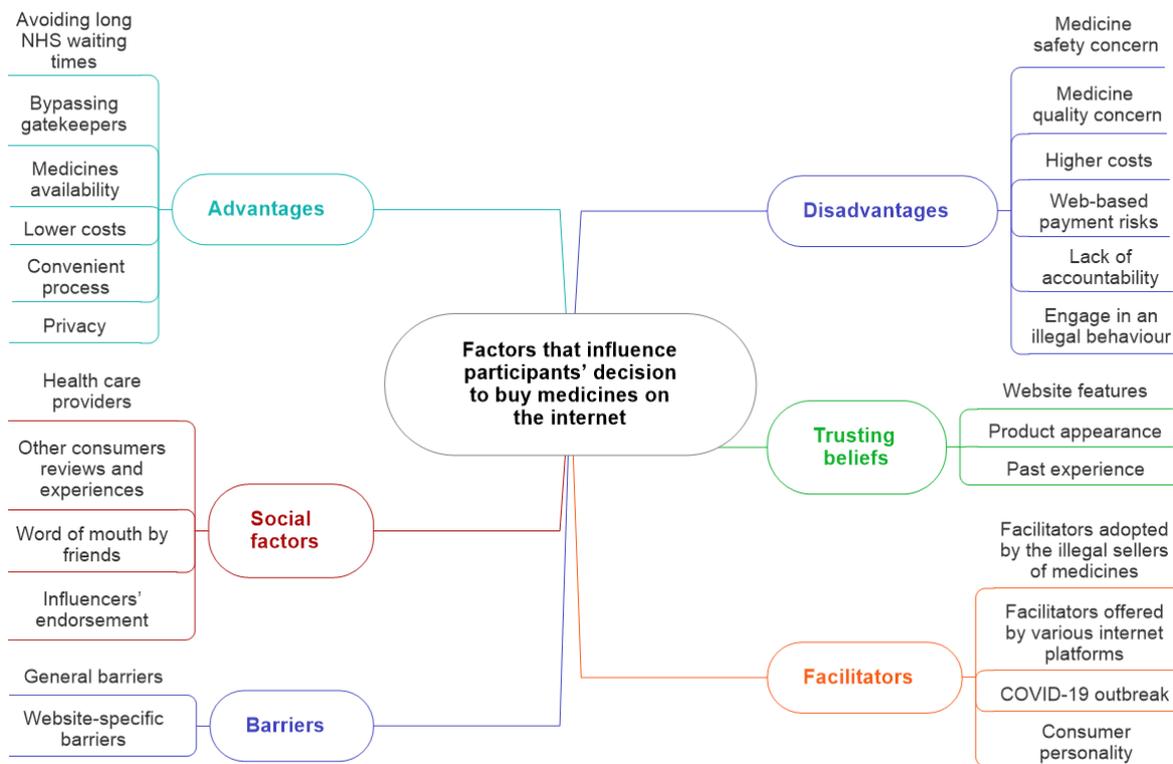
Figure 3.2. Analysis map.
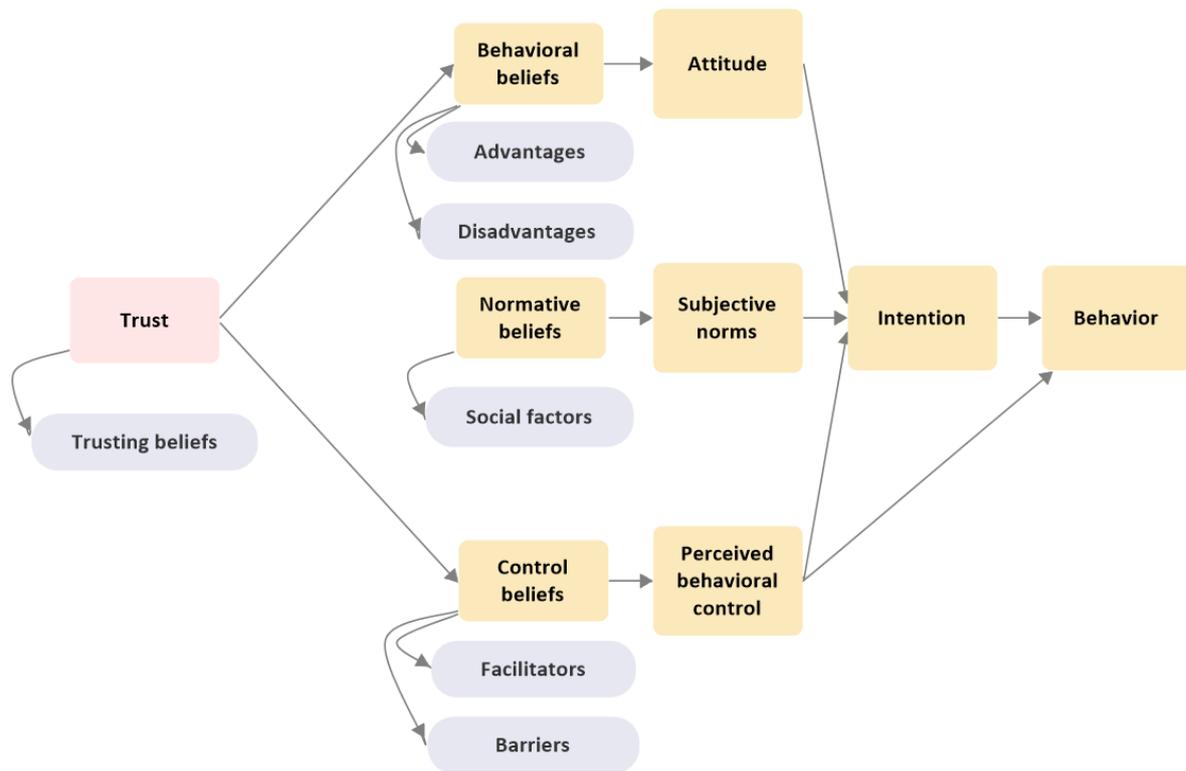
Figure 3.3. Superordinate themes mapped against the constructs of the theory of planned behaviour.

3.4.4.1. Advantages and Disadvantages: Behavioural Beliefs

One of the superordinate themes was the perceived advantages and positive outcomes that consumers might expect if they decide to buy medicines on the web without involving their physician (Table 3.2). For instance, some of the participants discussed how buying medicines on the web could help them avoid long National Health Services (NHS) waiting times (i.e., the time it takes for a patient to receive treatment after being referred for treatment) (National Health Services, 2019). The NHS Constitution states that patients should wait no longer than 18 weeks from the general practitioner's referral to treatment. By contrast, if they select the web-based source, they could obtain their medicines within days to weeks. The following example illustrates this point from the perspective of a transgender participant who would otherwise face a long wait for the hormonal medicine they wanted:

"I bought Spiro and Estrofem online...You're asking why I do this...I live in <name of large city>. <name of large city> has its own GIC (Gender Identity Clinic). Its target waiting time is 18 weeks...How long do you think the actual waiting time is in weeks? It's 166 weeks. You have to wait four years to maybe get a referral." [P-2, line 85]

" I kind of need to address with this is what led me to buy these medications online, and I don't think there's a single person who buys these medications online who wouldn't prefer to get these things done with the doctor under the doctor's supervision. And I regularly went to my doctor, and I was told I can't even be put on the waiting list for these medications. I can't even get a psychiatric evaluation because the waiting lists are ridiculous and long. So, I think it was when I was about 17. I kind of took it into my own hands. There was a friend that told me about this website that basically they used to obtain their medications. Everything went fine for them, so it was as simple as going to Amazon and buying something. I just went to the website. I saw what was in stock. I paid for it via a bank transfer and within two weeks I got the medication shipped in a small parcel to my house. It was very kind of quick and efficient. I didn't expect it to be like that originally." [P-4, line 123]

Another advantage discussed by some participants was that they could obtain POMs without the need for prescriptions in the first place and thus bypass any gatekeepers, that is, physicians who might refuse to prescribe the POMs, which is illustrated in the following quote:

"I looked online and that's how I came to buy online because they had an awkward GP who wouldn't give me another prescription for a couple of weeks. So, I went online and bought it and that was the reason." [P-18, line 156]

"I think the advantage that people get from buying these medications online is that they have access to these medications, which their doctor refuses to prescribe them." [P-4, line 196]

The web-based availability of medicines that are not licensed in the United Kingdom or not obtainable via the NHS for other reasons (e.g., out of stock or branded medicines not permitted to be prescribed by brand) motivated some participants to purchase POMs on the web instead of through a safe licensed route, as illustrated by the following quote:

"Some medicines from America are not available in the UK for various reasons because they are not licensed, I suppose, I don't know how this works. So, you can get access to medicines which are not normally available on the local market." [P-11, line 148]

"I have the example of my mother-in-law for example who moved over from another country. She has a lot of, UM, health issues. She's quite elderly and she used to get some medicine to control her arthritis, but she couldn't get them over here because they were just not available. That medicine didn't exist in the UK, and she knew that she took that medicine for years before and in her native country, and she wanted to continue taking that medicine, so, uh, we looked online and found a website just order it from there." [P-11, line 245]

Some participants frequently discussed the point that obtaining medicines on the web costs less, especially if they otherwise had to pay for their prescriptions either privately or via the

NHS prescription charge. The NHS prescription charge is set by the UK government as a levy, and in England, this is equal to £9.35 (US $11.34) per item (National Health Services, 2021). The following quote illustrates this point regarding costs:

> *"You can get about like 2 weeks to a month's worth of estrogen online for £10. It is very very cheap. This is basically what you'd pay in a prescription pharmacy for the same medication."* [P-4, line 224]

> *"You can go private in the UK and there is a number of private clinics which are recognized by the NHS but that comes with its drawbacks. Uhm, I can think of three. First of all, being there very expensive gender care, which is based in London. A lot of people that I love. The doctors are clear. Also, working with gender identity clinics the NHS. But it's expensive. You have to £350.00 for psych assessment. You need at least three of those, and I live in Northern Ireland which has no private system, so I need to get international flights. You know, to spend all that expense. There's another downside to the private system. You have to pay for your drugs. It isn't subsidized by the NHS."* [P-2, line 114]

> *"If they're if the price range is too high price, I'd say, is one of the major factors, because sometimes if the medicine is particularly expensive, you'll find the unlicensed website will send it, sell it for a significantly cheaper price."* [P-6, line 453]

Another advantage that also influenced most participants to buy POMs on the web was that the purchase was convenient and easy, that is, "with just one click," their medicines were delivered promptly to their homes, as indicated by the following quote:

"It's quick, simple and no need to leave the house, very little forms to fill in, very little intrusion of your privacy, easy to pay." [P-10, line 314]

"It's just the easiest. You know, it turns off at the door and then he got it and you don't have to jump through the hoops and do all the convincing or they get, and you can decide her own Healthcare needs and get it." [P-3, line 185]

"I think time is the main one because it's like it's not only about getting it quicker, but it's also about that if it's something like an antibiotic or something like that, it means that the quicker you take it, the quicker you're going to be better, and the quicker you're gonna feel better as well. So that's a big part of it. So it's about like your health and wellbeing, I guess. Also, if you move to a new area, or if you move to a different doctor that it could be quite useful in terms of. Like being able to get your access to your medicine quite quickly rather than having to wait to sign up for the doctor and everything else. So yeah, mostly time, but in a lot of different ways, yeah." [P-20, line 239]

The privacy of the purchase was also an advantage. Consumers could obtain their medicines without the need for face-to-face interactions or stating their illness in cases where the shame of admitting a condition acts as a barrier to seeking care. For example, disclosing sexual dysfunction, addiction to psychoactive medicines, or using slimming pills for weight loss. The following quote illustrates this:

"I think the main benefit is not having to see a doctor. You know if you got a male problem, you know if your doctor is only a young female. Probably wouldn't want to perhaps discuss certain things with a female doctor." [P-10, line 219]

"also if it's a certain type of drug, you go into the you go into the pharmacy to buy it and there's other people around, some people based on what condition they suffer from. If it can be deemed as embarrassing, they might not necessarily want to go in the pharmacy and fill that script right there, so it feels like it is more privacy than just getting the medicine online." [P-9, line 297]

"Some people might feel shy or embarrassed to go in person so I can give an example. It can be quite embarrassing for some people for some men to go into a pharmacy to buy Viagra because I've seen that happen, they feel embarrassed. So, for some people having access to something like this online. They don't have to have that embarrassment of going into a pharmacy. Speaking to a Healthcare professional who sometimes might be a female, so even more that added anxiety." [P-1, line 170]

The second superordinate theme was the disadvantages of the purchase. The participants pointed out concerns regarding purchasing POMs on the web without involving the physician. For instance, some participants highlighted the use of POMs without the physician's supervision as a risky process, as medicines could be misused or contraindicated. In addition, some participants expressed concern regarding the safety of medicines purchased on the web, as they could end up receiving and using fake medicines. The following quotes illustrate these:

"If you're not having a doctor's supervision with these things, you can't tell everything is going alright. Let's say HRT medication. Are you getting a blood test? and then it could be that your liver enzymes are unstable rates, crazy rates that they aren't supposed to be, and you're putting yourself at risk of more liver

disease. As a result, you're putting yourself at risk of blood clots." [P-4, line 182]

"I guess another danger is if people are just pressing the pills themselves instead of sending actual pills, then they could have anything in them. They could be poisoned, or they could be too strong, or they could be anything." [P-5, line 158]

" ... that can cause problems later down the line, because say for instance, the doctor's unaware that you're taking a particular medication, he might prescribe you another medication that might have an interaction with that medicine, you could end up very sickly, could end up in a hospital or in terms of potency, can end up overdosing because, say, they take prescribe you medicine that you already take and you already taken the same type of medicine online. You could overdose quite easily." [P-5, line 158]

Concerning the quality of medicines purchased on the web, most participants were aware that medicines purchased from the Internet could be ineffective, stored in poor conditions, or expired, as illustrated by the subsequent quote:

"Obviously you might get something that is just like a placebo. You know it's absolutely no use at all." [P-8, line 140]

"They don't do anything. I've also got pills before, there's a network of fake websites. They'll send you some pills. They don't do anything, or they aren't what you want, like I bought Tramadol once and they sent me these tiny little orange pills instead that. I spent a long time trying to figure out what they were like. I cut them in half, and I tried to taste what was in them and eventually just took

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some to see what happened, but they clearly weren't tramadol. There wasn't

anything I'd ever have before. They were some kind of sleeping pills. I still don't

know what they were. And I've got a ton of that and nothing to do with them."

[P-5, line 124]

The participants also had different beliefs regarding the cost of purchasing medicines on the web, mainly based on where they lived. Whereas some said it was cheaper to buy medicines on the web, others stated that buying medicines on the web costs higher. Some participants, specifically those based in Scotland, Wales, and Northern Ireland, attributed this to the fact that they were obtaining medicines through the NHS free of charge. This is because although people in England pay for prescription fees, prescriptions are free of charge in Scotland, Wales, and Northern Ireland. The following quote illustrates this:

"In Scotland most of our prescriptions are free, you know so. If I'm buying

online, then I'm paying a lot more." [P-7, line 301]

In addition, there was a view that there are high shipment costs for medicines purchased on the web, especially if the medicines are purchased from a website based outside the United Kingdom (shipment costs could reach 3 times the cost of the medicine according to some).

Web-based payment risk was highlighted as another drawback associated with purchasing medicines on the web. One of the participants described how she incurred a "devastating" financial loss after the website that she purchased medicines from was shut down and the owner of the website disappeared:

"I ordered from a website in Russia which was shut down under a basic like

they're rounding up online websites there, so I lost money on about six months'

worth of HRT. You know, that was pretty devastating for me." [P-2, line 194]

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Other participants mentioned additional web-based payment risks, including identity thieves who could illegally access personal information (such as credit card details).

The absence of accountability, where no one can be held accountable if any problems happened with the purchase, was also mentioned, as exemplified by the following quote:

"No one accountable because you're not sure who you bought from, you could pay a lot of money for it, and then getting paracetamol or something like this."
[P-18, line 228]

In addition, some participants talked about the fear of buying POMs (especially controlled medicines) on the web without involving their physician because this kind of purchase is illegal and engaging in such behaviour could lead to imprisonment. In this regard, one of the participants said the following:

"I guess that's the fear and the risk that what you're doing is wrong, and if it's in medication that's particularly controlled, then there's the big risk of you might be gotten, and you know you've been found doing something illegal like if trans men were off buying testosterone without a prescription, they could do jail time for that." [P-3, line 220]

One of the participants talked about their worry that medicines bought on the web could come from unknown sources or even be stolen medicines:

"It could be that they're a faulty batch that the provider should have disposed of, and they just handed them to their friends. It could be stolen medicines." [P-9, line 273]

Table 3.2. Advantages and disadvantages; behavioural beliefs

Superordinate theme 1: Perceived advantages of buying POMs online		
Themes	**Composition**	**Mentioned by participant**
Avoiding long NHS waiting times	- Consumers wanted to avoid long NHS waiting times for various reasons (e.g., save time, or because they need the medicine urgently as they cannot tolerate the pain)	2, 4, 5, 10, 11, 14, 17
Bypassing gatekeepers	Can obtain POMs online when doctors or pharmacists refuse to dispense the medicine	1, 3, 4, 5, 6, 7, 8, 9, 11, 15, 18, 19
Medicines availability	Availability of medicines that are not licensed in the UK but licensed in other countries	9, 11, 13
	Availability of medicines that are not available in the NHS (out of stock)	3, 5, 6
	Availability of extra quantities and bulk purchasing	2, 6, 7, 9, 15, 18
	Branded medicine availability (for those who prefer branded medicines)	9, 14
Lower costs	Lower costs than the NHS prescription charge	1, 2, 4, 6, 8, 10, 16, 17, 18
Convenient process	Quick purchase and saves the effort of visiting doctor and pharmacy as	1, 3, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20

	the medicine is delivered to the consumer	
Privacy	Avoids embarrassment (no need to admit to their illness or need)	1, 3, 5, 6, 9, 10, 12, 14, 19

Superordinate theme 2: Perceived disadvantages of buying POMs online		
Theme	**Composition**	**Mentioned by participant**
Medicines safety concerns	Lack of medical oversight and its consequences (e.g., drug-drug interactions, medicines misuse)	1, 4, 6, 7, 9, 10, 12, 13, 15, 17
	Could be fake medicines	1, 2, 4, 5, 9, 11, 12, 14, 18, 19, 20
Medicines quality concerns	Potential to receive ineffective medicines, expired medicines, poor storage conditions	3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 18
Higher costs	More expensive compared to the medicines obtained through the NHS (especially in Scotland and Wales, and NI), or high delivery costs	3, 7, 11, 12, 13, 14, 18, 19, 20
Online payment risks	Financial losses because the medicine is not useful, risk of a financial scam, or the risk of identity theft	1, 2, 3, 5, 7, 8, 9, 11, 13, 14, 15, 17, 18
Lack of accountability	No accountability exists to ensure the safety of purchased products	6, 7, 18

Engage in an illegal behaviour	Fear of being caught in possession of a controlled drug	3, 6, 7, 8, 13, 18, 19, 20
	End up buying stolen medicines	9

3.4.4.2. Social Factors: Normative Beliefs

This superordinate theme represents the participants' beliefs about the extent to which other people influence their decision to either purchase or not purchase medicines on the web (Table 3.3). Some participants believed that one of the key actors who (inadvertently) influenced their decision to make web-based purchases of medicines was Healthcare providers (e.g., physicians). For instance, this occurred when a physician refused to dispense a specific medicine to the patient that they thought would be useful to them. In addition, some participants discussed how dissatisfaction with their Healthcare providers drove them to buy medicines on the web. The following quote illustrates this point from the perspective of a participant who experienced amenorrhea (stopped periods) after being infected by the SARS-CoV-2 virus. The hospital lost her blood test results, and the physician asked her to wait until the results were found. She waited for months without a response from the physician, so she chose to buy medicines on the web:

> *"When I did my blood test, they lost my blood test results. Then, they told me it takes a long time to find it. Do you know I live in <name of large city>, but I did the test in <name of large city> and <name of hospital> Hospital because there was no appointment available here, the doctor told me to wait for your blood test to decide what to do with you. I waited for 2-3 months, and I didn't get any answer from the doctor. So, I was feeling very bad, and do you know I searched*

online for medicine what I can do to help to start my period and they suggested

me the progesterone." [P-16/ Line 89]

"I felt I wasn't getting treated as seriously as I would want to be by the doctor in

the sense of. I felt like they weren't necessarily believing that it was something

that needed. I felt like wasn't getting listened to, so I thought I go and do it

myself and just cut out the middleman if you like. So yeah, that was my main

motivating factor." [P-20/ Line 139]

Positive or negative customer reviews on different forums also influenced some
participants to buy medicines on the web, as illustrated by the subsequent quote:

"There are probably review sites that you can refer to. So, there's a review on

the website that could help in everyone or there could be another review site that

you could be used that are not attached to the website. But people say, yeah, this

is good, this is bad." [P-8/ Line 101]

Some participants' purchasing decisions were also influenced by a trusted friend who had
a positive past purchase experience, as exemplified by the following quotes:

"it was actually a friend that had already done it. And, uh, you know advise me

to do it because like I said I was in so much pain. […] Umm so yeah, my friend

suggested it and then I researched on Google and uh. Yeah, I decided to do

that." [P-19/ Line 166]

"There was a friend that told me about this website that basically they used to

obtain their medications. Everything went fine for them so it was as simple as

going to Amazon and buying something. I just went to the website. I saw what

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was in stock. I paid for it via a bank transfer and within two weeks I got the

medication shipped in a small parcel to my house." [P-4/ Line 128]

Other participants discussed how influencers and public figures who have a large number of followers could influence their decision to turn to the Internet to buy a POM (which they would otherwise be unable to obtain from a physician) by shaping their perceptions and prompting them to buy impulsively:

"It could be that you get some politicians like Donald Trump saying that

hydroxychloroquine is a very good thing, and you get social media celebrities or

politicians telling you it's good to buy them and then it's not good. So, you might

be tricked if you buy them." [P-9/ Line 258]

Table 3.3. Social factors; Normative beliefs

Superordinate themes 3: Social factors		
Theme	**Composition**	**Mentioned by participant**
Healthcare providers	If the doctor refused to dispense a specific medicine to the patient. Patient dissatisfaction with the healthcare provider	1, 2, 5, 6, 7, 9, 16, 18, 20
Other consumers' reviews and experiences	Other consumer reviews are shown on the medicine supplier websites.	1, 8, 10, 11, 14, 17, 18

Words of mouth by friends	Advice from a friend who purchased the medicine online	4, 6, 19
Influencers endorsement	Medicines endorsed by influencers and public figures	9, 11

3.4.4.3. Facilitators and Barriers: Control Beliefs

Another superordinate theme was participants' beliefs about the factors that facilitate the process of purchasing medicines on the web. Several facilitators were identified across the participants (Table 3.4). Some of these facilitators were features of the websites where medicines were sold; for example, web-based accessibility of POMs without the need for a prescription was one of these facilitators for some participants:

"So, I think the advantages are the access issues that you can get it. Yeah, and there that you can get it without a prescription." [P-3, line 172]

"So I'm going to be short and because I have anxiety it is very stupid to get all anxious because I can't get them, so I'd buy them online and I wouldn't worry too much where I got them from. As long as I could get them. There's also a lot of inflexibility from GPs, I've got a friend again on a prescription of controlled pills, the controlled medicines, the really high ones like pregabalin and higher ones. They only allowed to have like a week supply at a time and I have a friend who has anxiety very badly and can't go out so she has to go out every week to the pharmacy to get them. And she's very tempted to buy a pack online." [P-9, line 441]

Another facilitator offered by the web-based sellers was the availability of a wide range of medicines, including branded medicines, medicines that are not licensed in the United Kingdom, and medicines that are not available on the NHS. The following quote illustrates this:

"Some medicines from America are not available in the UK for various reason because they are not licensed, I suppose, I don't know how this works. So, you can get access to medicines which are not normally available on the local market." [P-11, line 148]

Another facilitator was that the web-based sellers provided multiple payment methods and thus made the checkout easy, as the buyers can select the payment gateway that best suits them. In addition, the participants discussed how the payment process was easy and secure as they could choose to pay using different web-based payment systems that offer refund and purchase protection if the consumers were to come across scammers (enabling consumers to receive partial or full reimbursement, including any shipping costs), as indicated by the following quote:

"With PayPal, you don't have to worry about paying to like a foreign account or anything, because it's easy to get refunds as well with PayPal, so that's why it's easy. It's so easy to get refund." [P-17, line 334]

"Payment method would be easy. They're just gonna have a standard payment method that's used in most countries, so the transaction will be seamless. Basically, everything has been set up so it can be conducted quickly and efficiently and the payment method that suits that used in most countries." [P-9, line 442]

"I think it's a really easy process. I mean, the payment methods are often very simple. Just putting your card details, or sometimes they leave it off for things like PayPal or things like that to be able to pay it through. The process is fairly simple, I think if you're used to any form of online shopping, it's not difficult, especially if you know exactly what you're looking for. You can just type in the medicine name and see the options. Just add to basket and go. Especially if it's a website that does not ask you for details of your prescription that makes it even easier because you're not having it. If you used to online shopping, that's exactly it's just the same, it's just no different, same thing I guess." [P-20, line 297]

Other facilitators highlighted by the participants as offered by the web-based sellers included marketing tactics adopted by Internet pharmacies such as paid advertising (eg, pop-up advertisements) and direct links that can connect the consumer directly to the pharmacy website in one click. The following quote illustrates this:

"There are a lot of pop-up ads that appear, you can find these on Google just with like a simple search isn't even kind of hard to find medicines." [P-4, line 90]

Maybe for medicines like sleeping pills or diet pills to make you slimmer or to make you look better which, you know you see other these days. If you go online and you go on social media, you can see all sorts of ads for all sorts of substances or medicine which promised to make you look better or make you sleep, so I suppose that these people could be influenced by these ads." [P-4, line 90]

Customer support services offered by the medicine seller's website were mentioned by one of the participants as another facilitator of web-based purchasing of POMs in relation to medicines with complex use instructions:

> *"There are a customer support people who can help you if your delivery is late or something or if you if you want to ask how I take this."* [P-17, line 416]

Internet platforms also played a more general role as a facilitator of the web-based purchase of medicines. Some participants discussed how online support communities available on different Internet platforms facilitate the web-based purchase of medicines by offering advice to others on how to purchase POMs on the web or how to use medicines that require complex instructions of use, as illustrated by the following quote:

> *"There's a very kind of strong community that exists even within the UK, where people will help people who are wanting to obtain these medications. Obtain them in the safest way possible. It actually benefited me quite a bit because I was looking at how to obtain these medications, and it was platforms, like Twitter and Reddit that actually had groups there who gave me full comprehensive guides on how to obtain these medications."* [P-4, line 370]

Web-based support communities are Internet-based social spaces, such as social media groups or forums, where people come together to obtain and provide information or support (Preece, 2010).

The participants also mentioned different search engines (Google, Yahoo, etc) that helped them find Internet pharmacies that offer POMs without the need for prescriptions. Finally, the participants mentioned social media platforms, which allow for easy communication between consumers and illegal web-based sellers of medicines:

"When you scroll through a sort of social media platforms, you see things, I mean we all see it pop ups come, adverts come up and I guess we're conditioned now not click on the links and to come off it and to go on and go into the website directly" [P-14, line 292]

The outbreak of the COVID-19 pandemic was also mentioned by some participants as a facilitating condition for the purchase of medicines on the web. Anxiety and fear resulting from the thought of getting infected by the SARS-CoV-2 virus triggered one of the participants to make a panic web-based purchase of hydroxychloroquine:

"It was at the start of the COVID...I was really scared, and I was reading all this thing, all this stuff online about how to protect yourself and everything like that. I have bought hydroxychloroquine; I have bought it online. Believe it or not, I've not opened it. Believe it or not, but this was bought out of a fear to do the Covid." [P-7, line 90]

"I'm on something called paroxetine, which is a family of the Prozac family for anti-anxiety and depression, and my medication during the pandemic was very hard to get to the doctor and the doctor wanted me to see them before they could prescribe them and I was a week short of pills. But they didn't give me enough on the standard level, so again, I knew what I wanted, and I knew that there were different providers, Dr. Renney, or something. There was another one that different makers of it. And again, I looked online for the ones that I've actually bought before." [P-9, line 193]

"I think COVID had a huge influence on people being able to do that because they wouldn't have been able to go out. They might have been self-isolating and

they might have been trying to keep themselves away from things. I think if

people started doing it during that time where they were like, oh, it's quite

convenient. It's quite easy." [P-20, line 314]

"It could be that you get some politicians like Donald Trump saying that

hydroxychloroquine is a very good thing and you get social media celebrities or

politicians telling you it's good to buy them and then it's not good. So you might

be tricked if you buy them." [P-9, line 258]

Other factors included restrictions on people's movements owing to lockdowns or self-isolation, a sense that medical staff were overburdened during the COVID-19 outbreak, and the spread of misinformation on social media. These factors were discussed by some participants as leading to the web-based purchase of medicines.

A small number of participants discussed their opinions about the personal attributes of consumers who decide to purchase medicines on the web, which they related to risk-taking:

"My personality type doesn't really like to follow rules. I know it's not good to

be that way, but I'm more the type of person that I just like to make my own

decisions like making informed choice rather than being formed what to do, or

watch what somebody else is doing. I'm an independent free thinker and I'm

more of a person that will take risks more easily." [P-6, line 638]

By contrast, the participants also pointed out several barriers that they encountered during the purchase. These barriers could either prevent people from buying medicines from a specific website (website-specific barriers) or from the Internet in general regardless of which website they select (general barriers). Several website-specific barriers were discussed by some participants; for example, the absence of suitable payment options on a specific website

could prevent people from making the purchase. Although some described payment and checkout as an easy and secure process, others stated that the absence of suitable payment options on a website would hinder the purchase. The following quote illustrates this:

"A lot of the websites only take payment in Bitcoin and a lot of people don't really understand Bitcoin, so that's that kind of makes it a bit more complicated." [P-5, line 119]

Another website-specific barrier was the language barrier, which was mentioned by one of the participants in the context of web-based purchases from a non-English website:

"Sometimes there's language barrier because some they're like Chinese websites or like Russian or like some other websites which have different language." [P-17, line 369]

Another barrier highlighted by some participants was that some websites do not have the option of delivering medicines to the United Kingdom:

"Sometimes some websites do not deliver to certain countries. I don't know why. They have lists or lists of countries which they don't deliver to, so you think you found your medicine and try to buy it. And then when you put your address in, you get the message. Sorry we can't deliver to that country." [P-11, line 294]

In addition, customs and police were mentioned by some participants, as they can hinder supply by closing the websites of unlicensed sellers of medicines. Purchasers would then need to search for a suitable alternative Internet pharmacy, which might be difficult to find:

"The website that I mentioned first <name removed> which is the one that I used; it was shut down. It was brought up in a newspaper in one of those anti-

trans articles, a week or two it had been shut down and gone, and that happened

a couple of times with similar websites for that." [P-3, line 369]

General barriers could restrain consumers from purchasing medicines on the web in general regardless of which website they select; for example, the complexity of medication instructions was pointed out by some participants as barriers that could prevent the purchase. Despite some participants' view that web-based support communities provide information on how to use medicines with complex instructions, other participants felt that the prospect of using some medicines or some formulations without the input of a professional Healthcare provider was a barrier to them purchasing medicines on the web because they would not know how to use the products without this input (e.g., inhalers or injections)The financial capability was also mentioned by a few participants as a barrier that could prevent the purchase of medicines on the web. The following quotes exemplified these points:

"The nature of the medication. If it's a pill, it would be merely easier to buy

online than buying something that involved injecting like needles. Because you

also need to buy the equipment and know how to do it." [P-3, line 376]

"Money has an influence here; I mean having the money to do it. I know quite a

few friends who would have loved to be able to do this and buy medication

online for themselves, but they did not have the funds to do it." [P-3, line 373]

Table 3.4. Facilitators and barriers; Control Beliefs

Superordinate themes 4: Facilitators		
Theme	**Composition**	**Mentioned by participant**
Facilitators offered by the illegal sellers of medicines.	POMs accessibility (accessibility to POMs without the need for a prescription)	3, 4, 7, 9, 18
	Medicines availability (provide a wide range of medicines including branded medicines, medicines that are not licensed in the UK, and medicines that are not available in the NHS)	5, 6, 9, 11, 13, 14
	Providing a variety of easy and secure payment options as well as the availability of online payment systems that offer refund and protection (e.g., PayPal's Purchase Protection)	6, 7, 9, 17, 20, 8, 17
	The customer support offered by the illegal seller website	17
	Illegal sellers' marketing (Pop-up ads, direct links)	4, 11, 13
	Enable consumers to make bulk purchasing without limits.	2, 6, 7, 9, 15, 18
Facilitators offered by various	Social media platforms (easy communication)	5, 9, 11, 14
	Review websites	1, 8, 10, 11, 14, 17, 18

Internet platforms	Search engines (e.g., Google), which facilitate the search process	4, 9
	Signposting by support communities available on different Internet platforms	4, 5
COVID-19 outbreak (facilitating conditions)	Anxiety and fear from COVID-19	7
	Mobility restrictions due to lockdown or self-isolation	5, 14, 18, 20
	Overburdened medical staff during COVID-19 outbreak	4, 9, 10, 14, 16, 17, 18, 20
	Spreading of misinformation on social media and other platforms	7, 9
Consumer personality	Willingness to take risks	6, 19

Superordinate themes 5: Barriers		
Theme	**Composition**	**Mentioned by participant**
General barriers	Complexities of medication instructions: POMs that require complex instructions for use (e.g., injections)	3, 18
	Financial capabilities: can't afford to pay for medicines available online	3, 4
	Absence of suitable payment options	5, 9, 11, 12, 13, 17

Website-specific barriers	Language barrier if the website is in a non-English language	17
	Delivery problems such as websites that do not deliver to the UK	5, 11, 19
	Illegal website closures or seizure of the parcels at the UK borders by organisations stopping buying POMs online (e.g., customs, the INTERPOL)	2, 3, 5, 7, 11

3.4.4.4. Trusting Beliefs

Several factors that increase peoples' trust in Internet pharmacies were also highlighted by the participants (Table 3.5). Half of the participants discussed how specific website features led them to trust Internet pharmacies. These include the availability of detailed and accurate product information on the website. Website appearance (e.g., high-quality photography, language used, and spelling accuracy) was also discussed by some participants as a factor that increases their trust level. In addition, the presence of contact information on the seller's website, such as address and phone number, was highlighted as a factor increasing consumers' trust in the web-based sellers of medicines. Finally, websites that collect a thorough medical history of consumers before the purchase was believed to be more trustworthy. The following quotes exemplify this theme (i.e., website features):

"I think what made me trust the website was that it looked professional. It didn't look like, for example, there weren't any spelling errors." [P-14, line 637]

"Yeah, so it's a number one from my perspective is just the design of the website. You can pretty much always tell it a glance whether it's had actual professional

effort put into it, whether it's you know up to standard for a business that's operating and reporting taxes and all of that versus ones are actually just out there to get your money. Like that website that I used back when from what I remember it was basically a yellow background with a bunch of hyperlinks and text on it. Versus you know, the clear chemist website where you've got all the medications and search powers and information and all sorts." [P-3, line 126]

"I prefer sites that do actually have an address and also a telephone number. If you want to make contact, you know there's a number" [P-18, line 139]

"There is enough information about the medicine, the way they work, maybe some reviews from clients, then, I think they tend to look up genuine and trustworthy." [P-11, line 69]

"There was no face-to-face consultation with a doctor. The sites appeared to be genuine, they don't just take your order and package the product and send it out to you, a proper questionnaire which you need to complete, and I have to list the medication that I'm currently taking for. Then, they review the order with that list of medication and then decide whether or not they're going to sell me the prescription. So, this gives me a degree of trust that." [P-15, line 43]

Other participants thought that if the medicine obtained looked identical or similar to the drug they wanted to buy, this influenced their trust in the purchase:

"It was quite a long process because I didn't just go to a site and just buy it. I was careful, I mean, you probably shouldn't buy prescription medicines online, but I was very careful. Yes. And when it arrived, it looked just the same packet as the one I would have got from my GP." [P-18, line 184]

"I think for me I was just really in annoyed at being ill again and it was very very painful. I'm just going to do it and I think in the back of my mind I thought. I would be as well taking this like making this purchase and if I have any doubts when I see the packaging and everything else, I can make a judgment call then, and say, right, I'm not going to wasted £10 or whatever. But it looked for me personally identical to what I had before. Like the packaging, the instructions, you know the fold out paper sheet you get with them and all of that looked absolutely identical." [P-20, line 329]

Positive previous purchase experience was also indicated by some participants as a factor that increased their trust in Internet pharmacies. Some participants discussed how they trusted websites from which they have had a safe and secure previous purchase:

"I think it's habit forming, if you have a positive experience with that, you're more likely to repeat that experience. And every time you get a positive experience, you're just gonna back yourself or back your own thinking up on it and go. It's absolutely fine. It'll be totally OK. Obviously, it's almost that way of life. I think it's dependent on personal experience." [P-20, line 465]

Other participants trusted websites suggested to them by trusted friends or judged whether a website was trustworthy by relying on other customers' reviews. The following quotes illustrate these points:

"No, it was actually a friend that had already done it. And, uh, you know advise me to do it because like I said I was in so much pain." [P-19, line 166]

"I think customer reviews or so seem to play a really large part in the honesty and integrity of a company selling goods online." [P-14, line 114]

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Table 3.5. Trusting beliefs

Superordinate themes 6: Factors that affect consumer trust in the online seller		
Theme	**Composition**	**Mentioned by participant**
Website features	Product information availability and accuracy	11, 18
	Website appearance	3, 5, 6, 14, 18
	Websites that display their contact information	1, 18
	Websites asking for medical history before the sale	3, 12, 13, 15, 18
Product appearance	Medicines offered by the online pharmacy look similar to genuine medicine	11, 16, 18, 20
Positive previous purchase experience	Had a safe and secure previous purchasing experience	6, 18, 20
	Words of mouth from friends (advice from a friend who had purchased medicines from the website)	4, 6, 19
	Other customers' positive experiences (Positive customer reviews)	1, 8, 11, 14, 17, 18, 20

3.5. Discussion

3.5.1. Principal findings

This in-depth, theory-based qualitative study of consumers' actual experiences identified a breadth of factors that influence people's decisions to purchase POMs on the web. Participants in this study purchased various types of POMs using the Internet despite their understanding of the potential risks associated with this kind of purchase, including falling prey to receiving fake medicines. The 6 major themes identified covered the perceived advantages and disadvantages of purchasing medicines on the web, social influencing factors, facilitators, barriers, and factors that lead consumers to trust the web-based seller.

One unanticipated key finding of this study, as mentioned earlier, was that the participants did seem to know about the potential risks associated with purchasing POMs on the web, including awareness of the widespread availability of fake medicines on the Internet, yet they made the purchase from unregulated web-based markets and put themselves at risk of buying fake medicines. This finding is contrary to a previous study that suggested that people are purchasing medicines on the web because they were unaware of the risk of the purchase (Fittler *et al*., 2013b). Therefore, there are other factors that influence UK consumers to either buy or not to buy medicines on the web. One of these factors was the advantages of the purchase. These UK-based participants were driven by what they perceived as positive outcomes of the web-based purchase, such as convenience and medicine availability. These 2 advantages are in line with the findings of several other research studies conducted in different countries, including the Middle East, Europe, the United Kingdom, and the United States (Ashames *et al*., 2019; Abanmy, 2017; Demant *et al*., 2020; Fittler *et al*., 2013b; Koenraadt and van de Ven, 2017; Little *et al*, 2020; Moyle *et al*., 2017). An interesting finding is that in some situations, the long NHS waiting time (i.e., the long-time for patients to be treated) could drive people to end up buying prescription medicines on the web,

including potentially fake medicines. Some participants believed that avoiding the long NHS waiting time was a potential advantage of the web-based purchase. Therefore, those participants were driven to access an unregulated web-based market (a potential source of fake medicines) to self-medicate and receive their purchase expediently.

Another novel finding of this study is the influence of cost on consumer's decision to purchase POMs on the web. The beliefs of some of this UK-based study's participants regarding the costs of web-based purchases were contradictory to previous non-UK studies reporting that people might be motivated to purchase on the web because it is cheaper (Fittler *et al*., 2013b; Alwhaibi *et al*., 2021; Cicero and Ellis, 2012; Liang and Mackey, 2009). Some considered purchasing medicines on the web to come at a lower cost, especially if the price was cheaper than the NHS prescription charge. For others who were exempt from prescription charges, purchasing medicine on the web was not preferable because of the higher cost compared with obtaining their medicines for free through the NHS.

Although the participants in this study highlighted the advantages of purchasing POMs on the web and how these advantages influenced their decision to make the purchase, they also discussed how purchasing POMs on the web was associated with many disadvantages, as the efficacy and safety of medicines cannot be guaranteed if they are purchased on the web. They also mentioned payment risks and that if any unpleasant consequences occurred (e.g., unexpected side effects, failure in delivery, or a financial scam), no one could be held accountable, except for the consumers themselves. Therefore, in the United Kingdom, policymakers could address this absence of accountability by holding the Internet search engines and social media platforms responsible if they permit illegal web-based sales of medicines to happen through them. Therefore, this study supports what Liang and Mackey (2009) suggest about the importance of addressing accountability to ensure the safety of the

people who look to purchase medicines on the web, which also reduces the chance of fake medicines being purchased.

Another important finding was that Healthcare providers (e.g., physicians and pharmacists) can (inadvertently) lead people to purchase medicines, and thus potentially fake medicines, from the Internet. For example, if a physician refuses to prescribe a specific medicine to a patient that the patient thinks would be useful to them, then the patient might start searching for alternative web-based sources, whose safety cannot be assured. This finding is in line with a study conducted in the United States that found that people who use tramadol were motivated to use unregulated web-based markets of medicines as a source of tramadol when they could not find a physician who would prescribe it (Cicero and Ellis, 2012). However, Healthcare providers could also play a beneficial role. In a Maltese study, Healthcare providers played a crucial role in determining the source of medicines purchased by consumers, which could decrease the possibility of purchasing medicines from unregulated web-based sources (Bowman *et al*., 2020). In addition, pharmacists can play a crucial role in preventing consumers from purchasing medicines on the web by increasing their awareness of the dangers of this type of activity (Fittler *et al*., 2018a).

Various facilitators of and barriers to the process of purchasing POMs from the Internet were also identified in this study. Although consumers could encounter many barriers that might delay or prevent the web-based purchase, some facilitators offered by the web-based sellers of medicines or the different Internet platforms could actually assist consumers in overcoming these barriers. For example, some people believed that web-based payment comes with many risks and is considered difficult in the absence of suitable payment methods; some websites, for example, only accept payment with Bitcoin, which many people are unfamiliar with. However, some web-based sellers have helped consumers overcome this

by offering an easy and secure payment option via their website, meaning that a suitable payment gateway will be there waiting for them. In addition, web-based payment systems that offer refunds and protection in case of a financial scam (e.g., PayPal [PayPal Holdings, Inc]) could facilitate the process by reassuring consumers that compensation is available for any financial losses incurred. Another example is the facilitating role played by web-based support communities that are accessible via different Internet platforms. These support communities help consumers who do not know how to use complex medicines, especially in the absence of medical oversight, to overcome this barrier by providing them with information on how to use them. There is a shortage of literature exploring the key issues identified in this study.

The web-based accessibility of POMs without the need for prescriptions was one of the facilitators that were frequently discussed by participants in this study. What is surprising is the wide range of POMs available and accessible on the web to UK consumers, including hormone replacement therapy, antibiotics, or even high-risk controlled medicines, which in the United Kingdom normally require additional checks before being dispensed in a brick-and-mortar pharmacy. This finding broadly supports the work of other studies (Hockenhull *et al*., 2020; Boyd *et al*., 2017), which also indicate that a range of POMs are available on the web to UK consumers without the need for a prescription and without medical supervision. This is despite the fact that purchasing such medicines on the web and consuming them in the absence of medical supervision can expose consumers to many serious risks, such as medicine abuse, medicine misuse, and the possibility of receiving fake medicines that are ineffective or harmful.

An interview study conducted in Nigeria found that social media platforms, including Facebook, Twitter, Instagram, and WhatsApp, were used by illegal web-based sellers of

medicines as a place to easily sell and market their products (Adejoh *et al*., 2020). This study's findings are in line with this, as the participants reported that social media platforms facilitated their purchasing of POMs on the web by providing an easy and direct communication channel between them and the illegal sellers of medicines. Similarly, an international study that explored the factors that motivate pregnant women to purchase medicines on the web found that a Facebook group page influenced pregnant women's intentions to purchase medicines on the web by recommending the purchase (Little *et al*., 2020). The findings of this study support this notion, as web-based support groups found on the Internet (including on social media platforms) were said to facilitate the web-based purchase of medicines by helping consumers use medicines with complex instructions.

During the outbreak of the COVID-19 pandemic, misinformation about COVID-19 cures and medications spread globally, which was described as an "infodemic," causing desperation and panic among many people, which, in turn, created an opportunity for illegal web-based sellers to produce and sell fake medicines (Fittler *et al*., 2021; Pyzik 2021). This study is in line with what has been reported about this, as this study found that the spread of misinformation on social media during the outbreak of the COVID-19 pandemic as well as the anxiety and fear resulting from the thought of getting infected by the SARS-CoV-2 virus were triggers for the participants to purchase medicines on the web.

Trust was found to play a crucial role in shaping consumers' attitudes toward the web-based sellers of medicines. In such a dubious environment, the consequences of trusting the illegal web-based sellers of medicines include the possibility of ending up with fake medicines that might be ineffective or, worse still, toxic, or even life-threatening when consumed. Some participants trusted the websites they had previously purchased from if they did not encounter any problems regarding the safety and quality of the medicines purchased.

This finding was also reported by Koenraadt and Van de Ven (2017). Others judged whether the medicines purchased were genuine based on the appearance of the medicines and packaging; if the medicine looked similar to a previous genuine medicine that they had obtained, then it was genuine as far as they were concerned. Medicines are not a commodity but highly controlled and manufactured complex substance that requires specific storage conditions and whose integrity, safety, and effectiveness cannot be guaranteed if purchased from an illegal web-based seller (Chauhan *et al*., 2021).

3.5.2. Strengths, limitations, and future Research

The strength of this study is that it is the first in-depth qualitative study that focuses on consumers' actual experiences (i.e., experiences of purchasing medicines on the web without input from a qualified Healthcare professional) and explores their behaviours by highlighting the complexity of personal beliefs and motivations toward buying POMs or other high-risk medicines on the web in the United Kingdom. It also explores perceptions about the web-based availability and risks of fake medicines, which could guide authorities in fighting the web-based trading of fake medicines to increase the efficacy of their public awareness campaigns.

A limitation of this study is that the participants may have felt reluctant to fully disclose their web-based medicine-buying behaviour if it was illegal or to talk openly about buying medicines on the web without consulting a prescriber, based on the notion that it might be judged harshly by the researcher. Another limitation is that although the interviews provided detailed answers to the study questions because they were continued until data saturation was reached, the findings might not necessarily be generalizable, as the study was conducted on a small sample. However, the theory used in this study (i.e., the TPB) has well-established guidelines for developing a questionnaire, allowing the factors identified in a qualitative

study such as the current one to be formally verified and generalized at a later date (Francis et al., 2004).

3.6. Conclusions

Despite the efforts made by public awareness campaigns in the United Kingdom to educate consumers on how to purchase medicines from the Internet safely, people in the United Kingdom are still purchasing POMs on the web without input from a qualified Healthcare professional, although they are aware of the risks associated with this activity, including the risk of purchasing fake medicines.

This study provides an in-depth understanding of the reasons why people take risks and buy POMs from web-based sellers, who are potential sources of fake medicines. Identifying these reasons provides the basis for awareness campaigns that are relevant and fit for purpose. The current findings can be used to design interventions and behaviour change strategies for minimizing and preventing people from buying POMs from the Internet, thereby preventing the purchase of fake medicines. The next step is to develop a questionnaire based on the themes generated in this study to verify and generalize the findings by collecting views about this phenomenon from a wide and representative sample of participants in the United Kingdom.

3.7. Acknowledgments

3.8. Data availability

Data are available upon request.

3.9. Conflicts of interest

None declared.

CHAPTER 4

Study 3: Reasons That Lead People to Buy Prescription Medicines on the Internet: Systematic Review

The current study has been submitted on the 13th of June 2023, to the *Frontiers in Pharmacology* journal, under the title "Reasons That Lead People to Buy Prescription Medicines on the Internet: Systematic Review".

4.1. Abstract

Aim: This systematic review explores the factors that could influence consumer's decision of purchasing prescription medicines using the Internet.

Methodology: Relevant databases were searched to retrieve studies published from 2012 to 2021. The studies selected for inclusion were those focused on the consumer's perspective and the purchase of prescription medicines. A narrative synthesis was employed. The Capability Opportunity Motivation-Behaviour (COM-B) and the Theoretical Domains Framework (TDF) were employed as conceptual lenses that guided the analysis.

Results: Seventeen studies were included. These studies have adopted various methodologies: qualitative method (n = 4), quantitative method (n = 12), and mixed methods (n = 1). The studies were based in Europe (n = 8), North America (n = 3), Middle East (n = 4), and 2 studies were conducted in several countries (multinational). The analysis of these studies revealed 7 themes that represent the reasons that lead people to buy prescription medicines online. These themes were the consumers' beliefs about the outcomes of the purchase (perceived benefits and risks of the purchase), consumer's emotions that could

influence the purchasing decision, the factors that increase or decrease consumer's level of behavioural control over the purchase (facilitators and barriers of the purchase), consumers knowledge about the purchase, the trusting beliefs that lead consumers to trust the online sellers of medicines, the social influencing factors, and the external environmental factors that could encourage the purchase.

Conclusion: This study provides a comprehensive review of the breadth of reasons that drive people to buy prescription medicines online. Identifying those reasons could provide the basis for regulators to design evidence-based awareness campaigns to minimise the purchase of prescription medicines online. Furthermore, future research directions have been provided in this review to build upon the existing knowledge and address the research gaps in this area.

Keywords: prescription medicines; online pharmacy; TDF; COM-B model; narrative synthesis; a systematic review, Internet.

4.2. Introduction

Online sales of medicines have shown tremendous growth in recent years (Fittler et al., 2018a). Evidently, studies conducted in various countries (including the United States, Europe, and the Middle East) have found that the number of people purchasing medicines on the Internet has increased in recent years (Bowman et al., 2020; Alwhaibi et al., 2021; Jairoun et al., 2021; Moureaud et al., 2021; Fittler et al., 2022). One of these studies, conducted in Hungary, revealed a surprising tenfold increase in online medicine purchases from 2018 to 2020 (Fittler et al., 2022). People can purchase a wide range of medicines from the internet ranging from over-the-counter medicines (not needing a prescription) to medicines that are prescribed by an authorised prescriber (i.e., prescription medicines). Some consumers turn to the internet today to self-medicate and buy prescription medicines without having a valid

prescription and without any input from healthcare providers. This is possible if consumers decided to purchase medicines from the illegal sellers of medicines operating on the internet.

The internet provides a platform that hosts both legal and illegal sellers of medicines. Legal online sellers of medicines are those who comply with safe pharmacy practices, and the laws and regulations of the country where the online seller operates (Mackey and Nayyar, 2016). Conversely, illegal online sellers of medicines are those who violate pharmacy regulations and laws.

A common practice of illegal sellers of medicines is offering the purchase of prescription medicines without any input from a healthcare provider, which includes not having a valid prescription (Mackey and Nayyar, 2016). Several studies have provided evidence of the availability of different types of prescription medicines on the internet and the easy accessibility to those medicines without the need for prescriptions (Boyd et al., 2017; Hockenhull et al., 2020; Whitfield et al., 2021). For example, researchers from Europe have explored the online availability of several active ingredients (including controlled medicines). They found that controlled medicines (such as tramadol) are widely available on the Internet and easily accessible to people without the need for a prescription (Fittler et al., 2013a). Likewise, a recent study conducted in the United States explored the online availability and accessibility of imatinib (anticancer medication) and found that those medicines are widely available online and could be obtained without any involvement of healthcare providers (Sun et al., 2021).

Laws regulating the sales of medicines over the Internet vary from one country to another. For example, in the United Kingdom, any legal sellers of medicines should be registered with the General Pharmaceutical Council (GPhC) and the Medicines and Healthcare products Regulatory Agency (MHRA) (GPC, 2022), while in the European Union (EU), licensed

online pharmacies must be registered with the national competent authorities in the EU

Member States (European Medicines Agency, 2019). Internationally, there are shortages of

effective global regulations and laws that control and regulate online pharmacies (Fittler.,

2013b; Gabay, 2015). Moreover, around two-thirds (66%) of countries worldwide do not

have regulations that regulate the online trading of medicine (Hock et al., 2019). Thus,

prescription medicines can be sold on the Internet by anyone in those countries (Hock et al.,

2019). These shortages in international laws as well as the rapid development of technology

have facilitated the expansion of illegal online pharmacies (Mackey and Nayyar, 2016).

According to the Alliance for Safe Online Pharmacy (ASOP), over 95% of the 35,000 active

online pharmacies worldwide operate illegally (ASOP, 2022). This uncontrolled proliferation

of illegal online pharmacies may bring a lot of risks to people (e.g., risks of misusing the

medicines as the healthcare provider is not involved in the purchase, or the risks of fake

medicines which are widely available on the internet, and some of which may contain drugs

of abuse or new psychoactive substances (NPS), which poses serious health risks to the

consumers) and to the whole country (e.g., economic loss to the healthcare system due to

utilizing ineffective treatments) (Fittler et al., 2013b).

The supply chain of prescription medicines over the Internet is complex and hard to track,

which makes it impossible to keep the Internet free of illegal websites selling medicines

(Fittler et al., 2013a; Lee et al., 2017). From another angle, one possible solution could come

from focusing on the potential consumers themselves (Fittler et al., 2013a; Lee et al., 2017),

as the consumers play a crucial role in the buying process of medicines from the Internet

because they are the ones who ultimately make the decision to purchase medicines.

Illegal online sellers of medicines are exploiting rising consumers' demand for

convenience, lower cost, all day everyday accessibility, and the availability of different types

of medications to sell various types of prescription medicines and fake medicines which are very profitable to online sellers, but potentially risky and life-threatening to people (Mackey and Nayyar, 2016; ASOP, 2022). Several public awareness campaigns have warned people about the danger of purchasing prescription medicines from the internet and about how to safely purchase medicines online (e.g., Fight the Fake, #FakeMeds), however, many people are still buying prescription medicines online without any input from a professional healthcare provider. According to a recent study, out of a sample size of 1,321 individuals, 136 (10.3%) have purchased prescription medicines online through online platforms without involving their doctors (Almomani et al., 2023a). Furthermore, according to an estimate by the United Kingdom government, 1 in 10 people bought fake medical products online in 2020 (MHRA, 2022). The reasons behind this behaviour are not well understood and need further investigation.

Previous systematic review studies in this field have explored the characteristics of the websites that sell medicines, the quality of pharmaceutical products purchased online, and the number of consumers who are purchasing medicines on the internet and their characteristics (Orizio et al., 2011; Long et al., 2022). However, none of these systematic reviews investigated the available evidence on the reasons that drive people to purchase prescription medicines online.

In light of the above, this systematic review aims to explore the prevalence of people purchasing prescription medicines from the Internet and to provide an overarching understanding of the reasons that could drive people to make this purchase. Additionally, this review provides directions for future research. To achieve the research objective, a narrative synthesis approach was undertaken. The Capability, Opportunity, Motivation- Behaviour model and the Theoretical Domains Framework were used to develop the coding of themes.

To date, this is the first theory-based systematic review that focuses on the factors that could influence consumers' decision of purchasing prescription medicines over the Internet.

4.3. Methods

This systematic review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021).

4.3.1. Approach

The main aim of this study was to determine the breadth of reasons why people buy prescription medicines on the Internet. A narrative synthesis was employed because of the heterogenicity of methodologies between the included studies (Harden et al., 2004), as we included quantitative, qualitative, and mixed-methods studies. A narrative synthesis is an approach in which different types of studies (quantitative, qualitative, and mix-methods) were arranged into more homogenous groups (Barnett-Page and Thomas, 2009). In this type of synthesis, structured summaries are developed by comparing the similarities and differences between studies' characteristics, context, quality, and findings (Harden et al., 2004; Barnett-Page and Thomas, 2009).

The current study employed the Capability, Opportunity, Motivation- Behaviour (COM-B) model and the Theoretical Domains Framework (TDF) as a conceptual lens through which the analysis was conducted.

The COM-B model is one of the behavioural theories introduced by Michie et al. (2011). This model helps researchers to understand why people behave in a specific way. According to the COM-B model (Figure 4.1), a particular behaviour will occur only when an individual concerned has the capability (psychological or physical capability) and the opportunity (physical and social environment) to engage in the behaviour and is more motivated

(reflective and automatic mechanisms) to enact that behaviour than any other behaviours (Michie et al., 2011). Capability is an attribute of the consumer that together with the opportunity facilitates the behaviour. It could be physical capability which represents the consumer's body and physiques, or psychological capability which represent the consumer's mental functioning (e.g., knowledge). Motivation is a sum of mental processes that energised consumers to make a specific behaviour. It could be reflective which represents the conscious thought processes (e.g., evaluations of the consequences), or automotive motivation which represents the affective processes (desires and emotions). Finally, the opportunity is an external environmental and social factor that together with capability facilitates the behaviour. It could be a physical opportunity which represents the external environmental circumstances, and the social opportunity which represents other people's influence (social norms) (West and Michie, 2020).
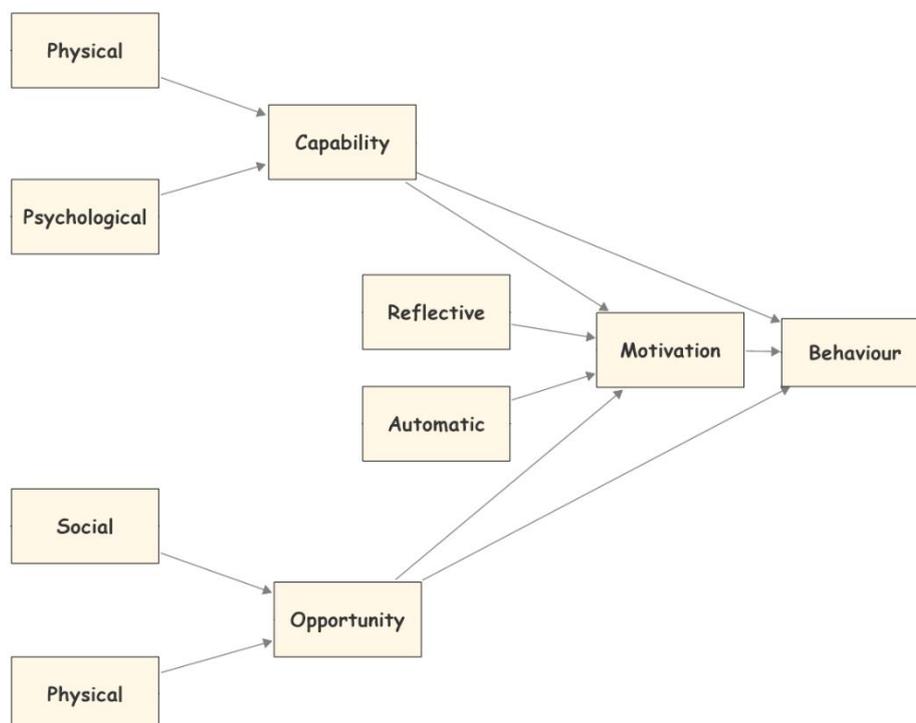
Figure 4.1 The COM-B model

The TDF is a theoretical framework synthesised from 33 behavioural theories and grouping the 128 constructs from these theories into domains (Michie et al., 2005; Cane et al., 2012). The TDF provided a comprehensive and theory-informed approach to identifying the predictors of behaviour (Atkins et al., 2017). Moreover, the TDF provides a theoretical lens through which to view the cognitive, affective (emotional), environmental and social influences on behaviour (Atkins et al., 2017). Table (1.12) illustrates the TDF domains and their definitions.

The TDF constructs, in previous studies, were mapped against the COM-B model as shown in Figure 4.2 in order to unpack the COM-B model and to give a more detailed insight into the target behaviour (Zou et al., 2017; Alhusein et al., 2021; Timlin et al., 2021). Our study adopted the model shown in Figure 4.2 as a conceptual lens to analyse the previous studies' findings to find the factors that could influence consumers' decision to purchase prescription medicines from the Internet.
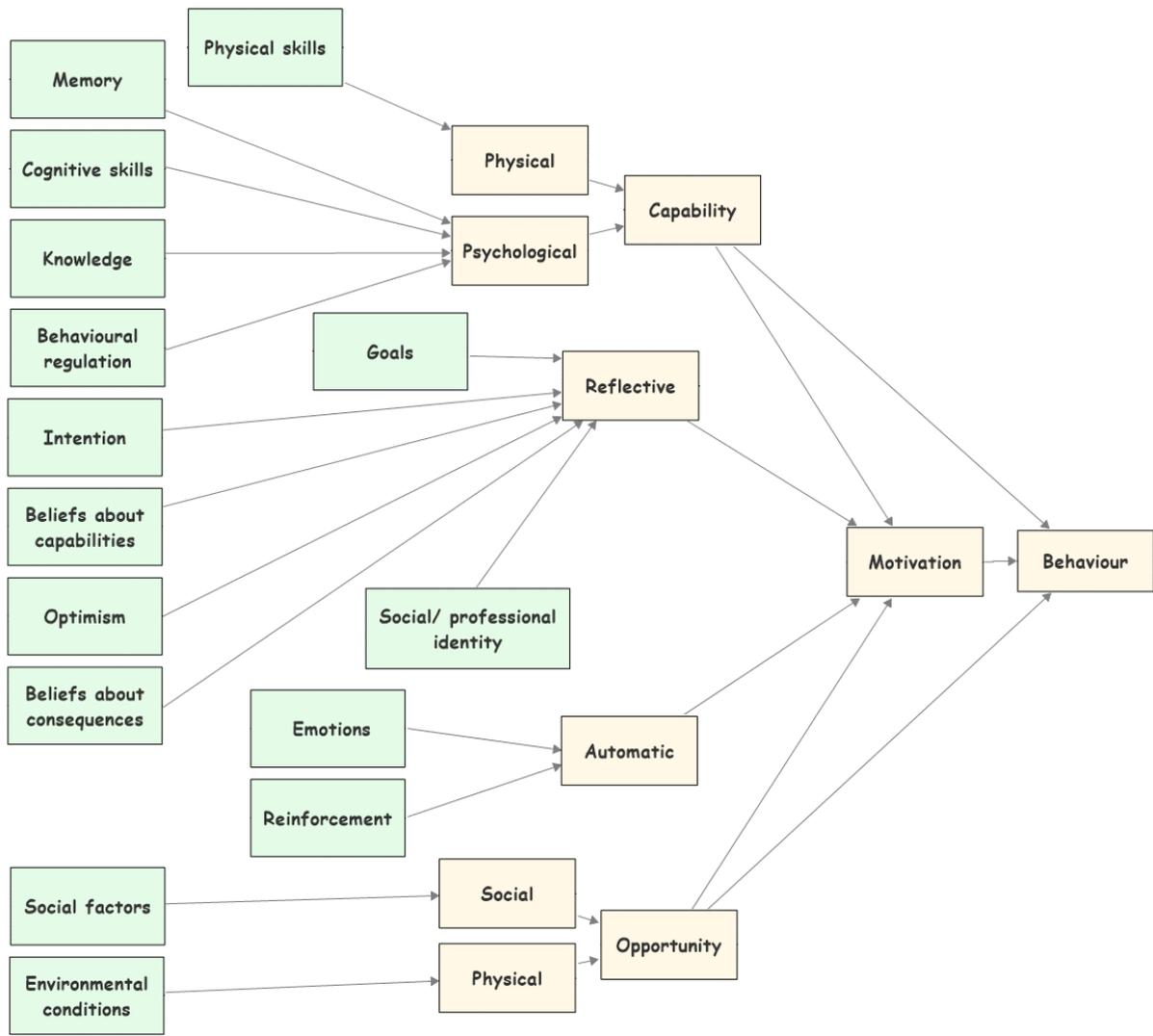
Figure 4.2. The TDF domains are mapped against the COM-B model.

4.3.2. Review team

This study was conducted by four researchers (HM, PD, NP, AR). HM and AR are PhD researchers in the field of Pharmacy. Both PD and NP are experienced research-active academics.

4.3.3. Search strategy

The search was carried out using multiple relevant databases (i.e., Scopus, Web of Science, PubMed, and PsycINFO) to identify qualitative and quantitative published studies

on the topic of 'using the internet to purchase medicines requiring a prescription'. Database selection and the search strategy were conducted by HM and verified by PD and NP, in collaboration with the academic department's librarian at the University.

The search was carried out using search terms related to the research topic (i.e., buying prescription medicines online). Search terms were developed by HA, PD, and NP.

4.3.4. Inclusion and exclusion criteria

The search was limited to articles published from the beginning of January 2012 to the end of December 2021. Studies were included if they were primary research articles (qualitative, quantitative, and mixed methods studies), published in the English language, focused on the consumer perspective, and focused on prescription medicines. Studies that focused on illegal drugs (e.g., marijuana, heroin, or cocaine) were excluded.

4.3.5. Study selection process

The selection process was conducted using the PRISMA Flow Diagram (Page et al., 2021). First, HM imported all records into the EndNote referencing management software to exclude any duplicates. Then, HM screened the titles to double-check and exclude any duplicates that EndNote may have missed. HM and AR then independently screened titles and abstracts before full-text screening to exclude any irrelevant studies using the inclusion/exclusion criteria. Additionally, the references and citations of the included articles were screened in order to retrieve articles that might have been missed in the database searches. Any inter-rater disagreement in the screening process was resolved through discussion. Each step in the selection process was verified by PD and NP.

4.3.6. Quality assessment

As the included articles used qualitative, quantitative, or mixed methods approaches, three methodological quality assessment tools were employed. The qualitative studies were assessed using the Critical Appraisal Skills Programme (CASP) qualitative studies checklist (CASP, 2018). The CASP qualitative checklist aims to assess various elements of qualitative research studies, including research aims, appropriate methodology, research design and strategy, methods of data collection and communication between researchers and participants, ethical considerations, the rigor of data analysis, and the clarity and value of study findings. The tool consists of a 10-point checklist that requires a yes, no, or do not know. The following guidelines were adopted: each item scored as one if the item received a rating of 'yes', zero if the item received a rating of 'no' or 'do not know' (Hafsteinsdóttir et al., 2017). Scores indicating high quality (≥8), medium quality (5–7), and low quality (≤4).

The quantitative studies were assessed using the Appraisal tool for Cross-Sectional Studies (AXIS) (Downes et al., 2016). The AXIS tool has been designed to assess the quality of observational cross-sectional studies. The components of the AXIS tool are based on a combination of evidence (systematic review of previous literature related to critical appraisal tools) and researchers' opinions from a Delphi process. The tool consists of a 20-point checklist that requires a yes, no, or do not know (Yes = 1, No and Don't know = 0). The following guidelines were adopted: Scores indicating high quality = 15–20, medium quality = 8–14, and low quality = 1–7 (Moor and Anderson, 2019).

The mixed methods studies were assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). The MMAT allows the appraisal of the methodological quality of empirical studies including mixed methods studies. Seventeen points were assessed that require a yes, no, or do not know (Yes = 1, No, and Cannot tell = 0). The following

guidelines were adopted: Scores indicating high quality (90%–100%), medium quality (60%–89%), moderate-to-low quality (40%–59%); scores (≤39%) indicated a low quality (Dobersek et al., 2021).

Quality assessment checklists selection was done by HM, PD, and NP, in collaboration with the academic department's librarian at the University. The quality assessment process was carried out by HM, NP, and AR. HM assessed all the articles (qualitative, quantitative, and mixed methods studies) whilst NP independently assessed the qualitative and mixed methods studies, and AR independently assessed the quantitative studies. Any inter-rater disagreement was resolved through discussion.

4.3.7. Data extraction and narrative synthesis

Each study was given a unique code number for identification as follows: the qualitative studies (1QL, 2QL, 3QL…), the quantitative studies (1QN, 2QN, 3QN …), and the mixed methods study (1MX, 2MX, 3MX …). Relevant data were extracted from the selected studies which included: general information (i.e., authors, date, country of origin), study design, data collection method, number of participants, sex, and age.

The synthesis was carried out by HM and reviewed step by step by PD and NP. For the qualitative studies and the qualitative part of the mixed methods studies, the thematic meta-synthesis proposed by Thomas and Harden (2008) was employed. The process started by reading and rereading the included studies' results section in detail. Then all participant quotes provided within the original studies were analysed and coded. For each article, the codes were organised and categorised to form initial themes (i.e., descriptive themes). Then the summaries of the descriptive themes of all articles were analysed iteratively and categorised to develop higher-level themes (i.e., the analytical themes). The TDF was acting as a framework to develop the coding of themes.

For the quantitative studies and the quantitative part of the mixed methods studies, meta-analysis was not undertaken as the included studies were not sufficiently homogeneous in terms of the participants involved and the outcomes (Haidich, 2010). Instead, findings relevant to the current study aims have been extracted and summarised.

To integrate the findings from the analysis of all the studies (qualitative and quantitative findings), all the findings have been combined in an overarching conceptual model which has been developed using the frameworks of the COM-B model and the TDF. This model represents the reasons that could drive people to buy prescription medicines online.

4.4. Results

4.4.1. Search results

The initial search yielded 753 articles, of which 175 were identified as duplicates. The titles and abstracts of the remaining 578 papers were reviewed, of which 536 were excluded because they did not meet the inclusion criteria. The full texts of the remaining 42 articles were reviewed, from which 29 articles were excluded. Hand-searching the citations and references of the remaining 13 articles yielded 4 more articles that met the current study inclusion criteria. In total, a sum of 17 articles was included in this study for the narrative synthesis (Figure 4.3).
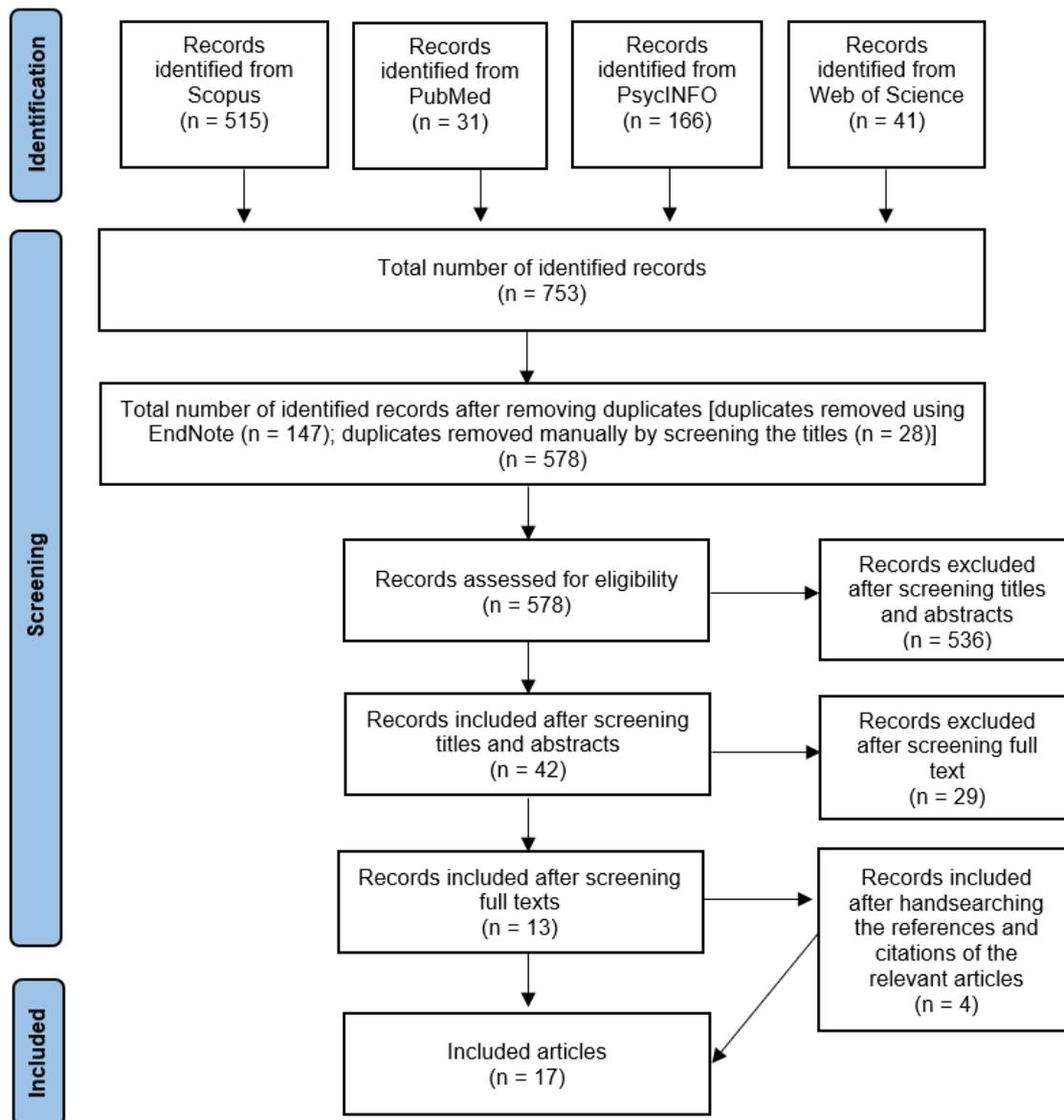
Figure 4.3. Flow diagram of the selection process

4.4.2. Methodological quality assessment

The quality assessment showed that the qualitative studies and the mixed method study were all high quality. Of the 12 quantitative studies, 4 were scored as high quality, while 8 scored as medium quality. One-third of the quantitative studies only used descriptive statistics (4QN, 7QN, 8QN, 10QN) by summarising and describing the data obtained from a sample of respondents. However, none of these 4 studies have used inferential statistics to

determine statistical significance and/or precision estimates. Appendices 9, 10, and 11 illustrate the detailed quality appraisal process. None of the articles were excluded based on the quality assessment stage.

4.4.3. Study characteristics

Table 4.1 illustrates the characteristics of the included studies. These studies have adopted various methodologies: qualitative method (n = 4), quantitative method (n = 12), and mixed methods (n = 1). The studies were based in Europe (n = 8), North America (n = 3), Middle East (n = 4), and two studies were conducted in several countries (multi-national).

Table 4.1. Studies characteristics

Qualitative articles				
Code	*Citation*	*Location (population)*	*Design and data collection*	*Participants' number and characteristics*
1QL	Demant *et al.*, 2020	Sweden (Internet users)	Online ethnography + interviews	N= 25 (5 buyers, 20 sellers) Sex (M= 16, F= 4, Unknown= 5) Age (18-37)
2QL	Little *et al.*, 2020	Multinational (pregnant women)	Online focus groups	N= 23 Sex (M= 0, F= 23) Age (25-45)
3QL	Lundin and Liu, 2019	Sweden (Internet users)	Qualitative survey (Pilot study)	N= 155 Sex (Not provided) Age (Not provided)
4QL	Aiken *et al.*, 2018	United States (pregnant women)	Interviews	N= 32 Sex (M= 2, F=30) Age (18-44)

		Quantitative articles		
Code	*Citation*	*Location (population)*	*Design and data collection method*	*Participants' number and characteristics*
1QN	Alwhaibi *et al.*, 2021	Saudi Arabia (Internet users)	Web-based survey	N= 643 Sex (M= 51, F=596) Age (≥ 18)
2QN	Jairoun *et al.*, 2021	United Arab Emirates (Internet users)	Web-based survey	N= 420 Sex (M= 225, F= 195) Age (≥ 18)
3QN	Moureaud *et al.*, 2021	United States (Internet users)	Web-based survey	N= 730 Sex (M= 465, F= 265) Age (≥ 18)
4QN	Ashames *et al.*, 2019	United Arab Emirates (Internet users)	Survey	N= 528 Sex (M= 397, F= 131) Age (18–25)
5QN	Fittler *et al.*, 2018a	Hungarian (citizens using outpatient health services)	Survey	N= 1055 Sex (M= 516, F= 539) Age (≥ 16)

6QN	Koenraadt & Katinka, 2018	Netherlands (Internet users)	2 surveys: prevalence survey [*S-1*] and In-depth survey [*S-2*]	*S-1*: N= 50,848 Sex (M= 23,899, F= 26,949) Age (≥ 18) *S-2*: 447 N= 50,848 Sex and age (Not provided)
7QN	Abanmy, 2017	Saudi Arabia (Internet users)	Cross-sectional study (Web-based survey)	N= 633 Sex (M= 196, F= 437) Age (≥ 18)
8QN	Assi *et al.*, 2016	Multinational (community pharmacy patients)	Cross-sectional study (Web-based survey)	N= 320 Sex (M= 227, F= 91, unknown= 2) Age (≥ 18)
9QN	Szekely *et al.*, 2015	Romania (patients and customers of community pharmacies)	Survey	N= 253 Sex (M= 75, F= 178) Age (≥ 14)
10QN	Cicero & Ellis, 2012	United States (tramadol users)	Web-based survey	N= 445 Sex (M= 156, F= 289) Age (≥ 18)
11QN	Fittler *et al.*, 2013b	Hungarian (hospital patients)	Survey	N= 422 Sex (M= 170, F= 252) Age (≥ 18)
12QN	Svorc, 2012	Czech Republic (Internet users	Web-based survey	N= 82 Sex (M= 43, F= 39) Age (≥ 20)

Mixed Methods articles			
Code	Citation	Location (population)	Design and data collection method	Participants' number and characteristics
1MX	Bowman *et al*., 2020	Malta (Internet users)	Survey + interviews	N= 444 Sex (M= 172, F= 264) Age (≥ 18)

4.4.4. Synthesis of qualitative findings

The thematic analysis of the qualitative studies and the qualitative part of the mixed methods study revealed seven high-construct analytical themes (Figure 4.4). These themes cover consumers beliefs about the consequences of the purchase (perceived benefits and perceived risks), consumer's emotions, factors that could increase or decrease consumer's behavioural regulation and level of behavioural control (facilitators and barriers), consumer's knowledge about the purchase, the antecedents that lead the consumer to trust the online sellers of medicines (trusting beliefs), social influencing factors, and the environmental factors. The TDF were used as conceptual lenses that guided the formation of the analytical themes. By applying this framework, we systematically identified and linked the factors to specific analytical themes, enabling a deeper understanding of the complex interplay between individual, social, and environmental factors driving consumers to purchase medicines on the internet.
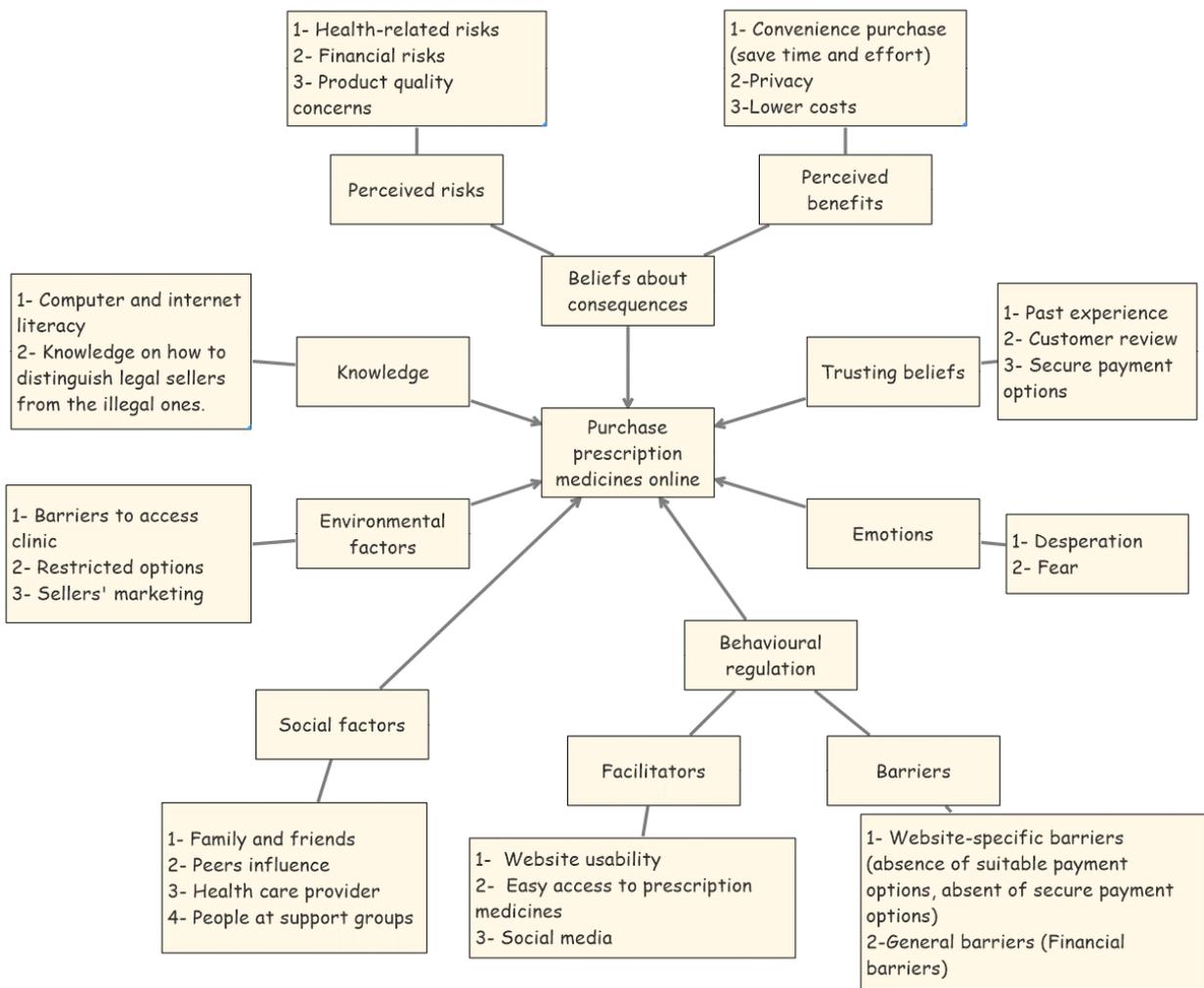
Figure 4.4. Thematic map of the qualitative findings

4.4.4.1. Benefits that entice consumers to purchase medicines on the Internet.

One of the analytical themes was the perceived benefits that consumers might expect if they select to purchase prescription medicines online. For example, a US-based, 38-year-old woman with three children discussed how the purchase was convenient and comfortable:

> *"I wanted to stay at home with my children, and I read online there were pills*
>
> *now available that you can take at home if you're quite early on. It would have*
>
> *been a much easier process, doing it at home, in the comfort of my own home. If*

they could have mailed me those pills, I could have done the abortion safely at

home." (4QL)

Some participants discussed how people could save time when they select sourcing medicines from the internet by avoiding long waiting times to obtain appointments to see a doctor, as exemplified in the following quote:

"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" (2QL)

For one participant who has purchased abortion medicines, the privacy of the online purchase was mentioned as a factor influencing their decision:

"I just wanted something private, convenient, and personal. For sure, it would

definitely be the way to go if it was an option." (4QL)

Finally, low prices of medicines available online were seen as a big advantage as illustrated in the following quote:

"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" (2QL)

4.4.4.2. Perceived risks of purchasing prescription medicines on the Internet

Regarding the risks of purchasing medicines online, participants pointed out several safety concerns. Some participants mentioned the possibility of purchasing and consuming fake medicines. For example:

"Most participants expressed concerns that online pharmacy sites were scams that would take their money and send either fake pill" (4QL)

Another health-related risk perceived by the participants was the risks associated with the absence of healthcare professional oversight. One of the participants discussed how pregnant women could struggle with selecting a suitable and safe medicine if they decided to buy medicines online without involving the healthcare professional:

"If women bypass the doctor and pharmacy it may lead to them taking medications that are unsafe in pregnancy" (2QL)

Another risk perceived by some participants was the risk of financial scams and fraud when purchasing medicines using the Internet, as illustrated in the following quote:

"I had to really look for the good ones. They all want to make a profit, too. What if they're not really the drugs you need? What if it's a scam, and they just take your money?" (4QL)

Additionally, there was a view that medicines available online could be of inferior quality. This quote illustrates this risk:

"...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." (2QL)

4.4.4.3. Emotions influence

Emotions also could play a role in influencing a consumer's decision to buy prescription medicines online. People who are desperately struggling with the treatment of their illness could attempt to obtain prescription medicines online, as exemplified in the following quote:

"I had to really look for the good ones. They all want to make a profit, too. What if they're not really the drugs you need? What if it's a scam, and they just take your money? And it's such an easy market to do that in because I'm just so desperate." (4QL)

The fear could also play a role. Participants in one of the included studies have expressed their fear of purchasing medicines from the internet without involving their doctors, as illustrated in the following quote:

"I would be very 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" (2QL)

4.4.4.4. Facilitators of purchasing prescription medicines on the Internet

The next analytical theme revealed was the facilitators of the purchasing of prescription medicines from the Internet. For example, the ease of use of the website (Websites usability) where consumers could purchase prescription medicines with just a few steps and would remember passwords and payment card details for the next purchases:

"...I can buy in three clicks. If there is difficult signing in, remembering passwords, looking for payment cards etc. I can be put off" (2QL)

Another facilitator that was offered by the online sellers was online access to prescription medicines. The following example illustrates this point from the perspective of a pregnant woman based in the United States who has chosen to purchase abortion pills (prescription medicine that requires a prescription and medical supervision) from the internet because of the accessibility to these medicines without a prescription:

"You can buy anything online, so my second thought was basically to order an

abortion kit online" (4QL)

Social media platforms were discussed by participants in some of the studies as a factor that could facilitate the online purchase of prescription medicines. For example, Instagram was found to facilitate communication and connection between buyers and sellers as shown in this example:

"Instagram was perfect to establish contacts. One of the people that I came into

contact with at that time is now a very good friend of mine and I make the

majority of my purchases with him" (1QL)

Furthermore, social media platforms hosted different support groups which could provide advice on what medication was helpful:

"Mostly, the posts are "does anybody sell […] amphetamine, etc." [..]In some

of these groups, there have also been posts like, "Where in [a location] in the

city can one buy this and that drug?" and like, asking about where it's safest to

sell, and people ask for advice and stuff like that." (1QL)

4.4.4.5. Barriers of purchasing prescription medicines on the Internet

The barriers to purchasing medicines online have been classified into barriers that either prevent people from buying medicines from a specific website (Website-specific barrier) or barriers from the internet in general regardless of which website they could select (General barrier) (Almomani *et al.*, 2023a). Website-specific barriers include the payment method suitability and security. Absent of a suitable payment option could delay the purchase, as exemplified here:

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"There was a handful of websites and a couple I tried to order from, but they had overseas banks, and my bank wouldn't work to give them money. So, I just started thinking they were sketchy as hell." (4QL)

Another website-specific barrier was website security. For example, the absence of a secure payment method was highlighted as a factor that could hinder the online purchase:

"...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." (2QL)

General barriers included the financial capability of the consumer, as shown in the following example:

"The costs (around \$250– 300 for a mifepristone-misoprostol combination pack) out of reach." (4QL)

4.4.4.6. Knowledge about the purchase

This superordinate theme represents consumers' knowledge about the procedure of purchasing prescription medicines online as a factor that could influence a consumer's decision to make the purchase. One of the studies found that more internet-confident consumers who had the knowledge and experience (computer and internet literacy) were more likely to purchase prescription medication online:

"...the younger population would be more accepting ...mostly because they are more likely to have done online purchasing before but with other products."
(2QL)

Some participants discussed the difficulties in recognising legal online sellers from illegal ones. The following example illustrates this point from the perspective of one participant who express scepticism against the logo used to distinguish legal sellers from illegal ones:

"It feels too easy to plagiarize and misuse logos on the Internet." (3QL)

4.4.4.7. Trusting beliefs

This superordinate theme includes the factors that influence consumers' trust in online sellers of medicines. For example, some consumers trust websites they are already familiar with. Therefore, consumer's past experience could play a role in the decision to purchase prescription medicines online, as shown in the following example:

"...I would probably only use a company that I am already familiar with."
(2QL)

Other customer's feedback and evaluation (whether negative or positive) of medicines they have purchased and used or had experience with (i.e., customer review) were highlighted as a factor that could lead people to trust the online seller of medicines:

"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." (2QL)

The availability of secure payment options such as PayPal at online seller's websites could also influence trust, as this kind of payment system offers protection for consumers against fraud by offering a refund in case a scam happened. The following example illustrates this point:

"…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." (2QL)

4.4.4.8. Social influencing factors

Social factors were found to play a role in influencing a consumer's decision to purchase medicines online. These factors were family and friends, peers with similar experiences, and healthcare providers (doctors or pharmacists). The following quotes illustrate these factors:

"…Family and friends probably would advise against if the purchase would be made without doctor's approval or consent" (2QL)

"Some of the women in the group felt they would be judged by their peers for purchasing medication online during pregnancy […] '…I don't 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 wary of it." (2QL)

"This in turn gives the basis for building a relationship with the care providers and subsequently trusting them with knowledge about medicines. This trust is important in determining the source of purchase of medicines making online purchase from unknown sources less likely. Participants expressed the trust they have in their doctor or pharmacist "No I ask a lot but don't forget I (.) have a health background and I have an enormous respect towards the pharmacists I understand that their course is as long as that of a doctor and is more focused on medicines and so I take their opinion…" (1MX)

In one of the studies, people at support groups available on social media were also pointed out as a factor that plays a role in influencing consumer's decision to buy prescription medicines online:

> *"Most pregnant and new moms are in social media groups where they have access to multiple opinions and suggestions regarding symptoms of pregnancy and new-borns... in a situation of discomfort they may be induced to buy online without doctor / pharmacist opinion."* (2QL)

4.4.4.9. Environmental factors

This theme includes any environmental condition that discourages or encourages the behaviour of purchasing prescription medicines online.

One of the environmental conditions that could trigger people to buy medicines online is the difficulty to access the clinics which could be financial or logistical difficulties. The following quote is the perspective of a 35-year-old woman who turned to obtain abortion pills online because she could not afford the abortion clinic fees.

> *"After I'd made my decision to end the pregnancy, I didn't know where the money could come from. It was going to have to come out of my rent money. So, for me, it was a matter of having to decide: Pay my rent or pay for the abortion.... So, I just typed in 'abortion pills' online, and then I looked on social media"* (4QL)

Another condition that could encourage people to buy prescription medicines online is the restricted options available in local market sectors where few alternatives are available. For example, the public Healthcare system in Malta procures medicines on the 'cheapest

compliant with specifications' principle (Bowman *et al*, 2020), and consequently, only a few options could be available for the patient:

> *"I needed Oxis but they don't bring Oxis. They bring a lesser quality"* (1MX)

One more encouraging condition was the marketing used by the online sellers of medicines. Online sellers of medicines were trying to persuade consumers to purchase by providing an environment and services that make the purchase easier for consumers such as advertising or influencers marketing as exemplified here:

> *"Recommendations and advertising play 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"* (2QL)

4.4.5. Synthesis of quantitative findings

The findings of the quantitative studies that are relevant to the current study aim were extracted and summarised in Appendix 12. Twelve cross-sectional survey studies in addition to the quantitative part of the mixed-method study were explored. These studies included data from a total of 6,422 participants living in different countries. These studies included views from people who have purchased medicines online in the past (including prescription medicines) and/or people who did not purchase medicines online previously but have views and opinions about this kind of purchase. Several types of prescription medicines were purchased (e.g., antibiotics, controlled medicines, and COVID-19 vaccines).

Appendix 12 summarised the types of medicines purchased and the factors that could influence a consumer's decision of purchasing prescription medicines online.

4.4.6. Integration of the findings

To integrate the findings from the qualitative and quantitative studies, the findings have been categorised against the COM-B model. Relying on this theory, our study proposes an overarching conceptual framework that represents the factors that could influence consumer's decision to purchase prescription medicines using the Internet (Figure 4.5).
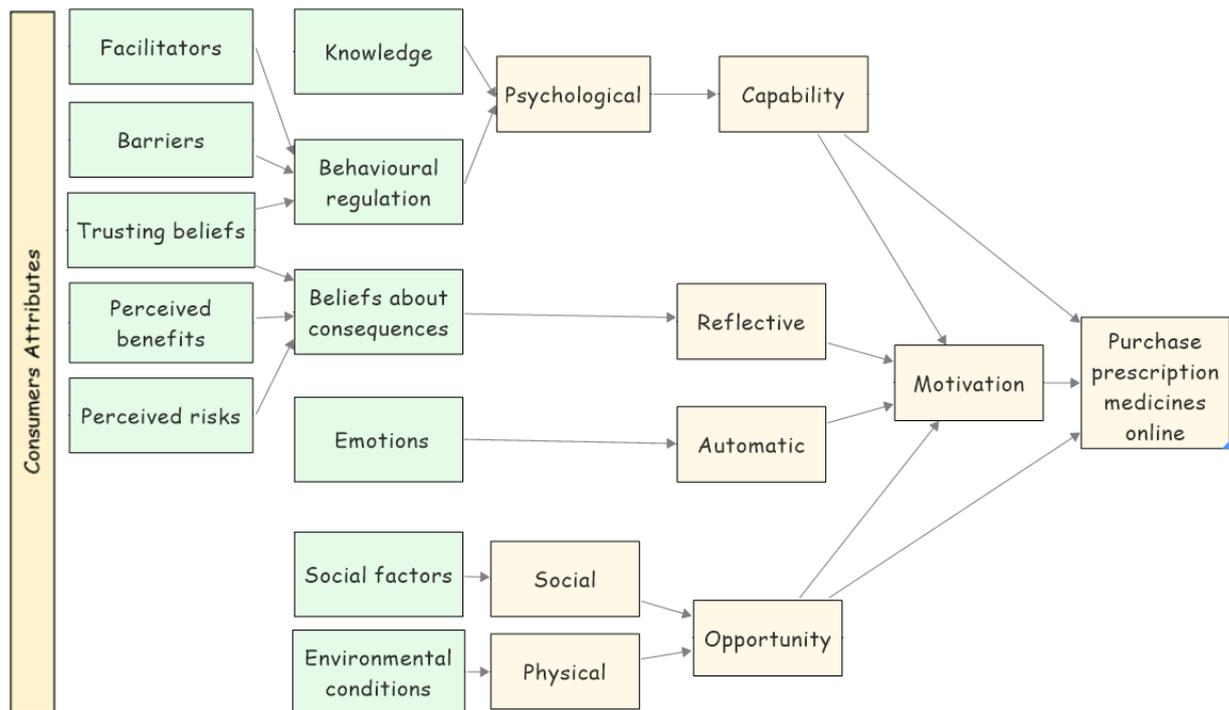
Figure 4.5. Factors that could influence consumer's decision of buying prescription medicines online are mapped against the COM-B model and the TDF.

Using Figure 4.2, six of the analytical themes (knowledge, emotions, behavioural regulations, beliefs about consequences, social factors, and environmental factors) were mapped directly against the COM-B model. The last analytical theme (i.e., trusting beliefs) holds a unique position as it inherently intersects with both domains, the belief about consequences and the behavioural regulation domains. Trust has been placed as 'a belief about consequences' as it enables consumers' positive expectation that no negative consequences will happen to them, thus creating a favourable perception of the outcomes

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(Pavlou and Fygenson, 2006; Almomani et al., 2023a). Concurrently, trust has been also proposed as a behavioural regulation factor, as it builds consumers' confidence to depend on the online sellers of medicines, which helps consumers overcome psychological barriers to engaging in the behaviour (Pavlou, 2002; Almomani et al., 2023a). Thus, increasing consumers control over the behaviour. This dual placement offering a comprehensive understanding of how trust influences cognitive appraisal and self-regulation, thus shaping the behaviour."

Figure 4.5 highlights the superordinate themes revealed from the analysis, however, within these themes, a breadth of specific details has also been produced. Table 4.2 illustrates these superordinate themes and their compositions, as well as the source in which each of these themes was cited.

Table 4.2. Themes identified and their compositions.

Reasons why people purchase prescription medicines on the Internet. [sources]

✦ **Perceived benefits:** Positive consequences and outcomes that consumers expect to receive from purchasing prescription medicines on the Internet.

- Convenience purchase: Save effort, avoid long waiting times, helpful when the patient is in a bed rest period, fast deliveries, and 24/7 accessibility. [2QL, 3QL, 4QL, 1QN, 5QN, 6QN, 7QN, 8QN, 1MX]

- Privacy. [2QL, 4QL, 1QN, 7QN, 10QN]

- Lower cost. [2QL, 3QL, 4QL, 1QN, 3QN, 4QN, 5QN, 6QN, 8QN, 9QN, 10QN, 11QN, 12MX]

- Bypassing gatekeepers: Bypass doctors who refuse to prescribe prescription medicines. [10QN]

- Medicines availability:

    - Availability of extra quantities. [3QN]

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- Availability of medicines that are not available locally. [1QN, 4QN, 5QN, 6QN, 8QN, 1MX]

- Being able to purchase unlicensed medicines. [3QN, 8QN]

- Wide products choices. [1QN, 4QN, 8QN]

- Brand medicines availability. [3QN, 1MX]

- Better product quality. [1QN, 4QN, 5QN, 6QN, 8QN, 9QN]

- Avoid withdrawal symptoms for patients using controlled medicines. [10QN]

Perceived risks: Negative outcomes associated with purchasing prescription medicines using the Internet.

- Health risks:

  - Possibility of purchasing fake medicines. [4QL, 5QN, 1MX]

  - Absence of medical oversight complications, for example, the possibility of misusing medicines. [2QL, 3QN, 5QN, 9QN]

- Financial risks. [4QL]

- Inferior product quality. [2QL, 4QN, 5QN, 7QN, 9QN, 1MX]

- Engaging in illegal behaviour (buying from Unlicensed websites or buying unlicensed medicines). [4QN, 7QN]

- No privacy and confidentiality. [7QN]

- Delayed deliveries. [5QN]

Emotions: Complex reactions, feelings, and affective states that motivate consumers to purchase prescription medicines from the Internet

- Desperation caused by medication unavailability. [4QL]

- Fear of the purchase risks. [2QL]

- Hate going to the doctor. [10QN]

Facilitators: Factors that increase consumer's ability to control the behaviour of purchasing prescription medicines using the web, thus, facilitating the purchase.

- Facilitators offered by the online sellers of medicines that make it easier for customers to purchase their product:

  - Websites usability. [2QL]

  - Easy accessibility as prescription medicines without requiring a prescription. [4QL, 1QN, 3QN, 4QN, 6QN, 8QN, 9QN]

  - Fast shipping option. [7QN]

  - Refill reminders by email. [7QN]

  - Products can be compared faster. [5QN]

  - Product information and providing instruction on how to use prescription medicines. [1QN, 5N, 7QN, 8QN, 11QN]

  - Online sellers marketing such as promotion and discounts which make the purchase affordable to consumers. [1QL, 2QL, 11QN, 12QN, 1MX]

- Facilitators offered by social media:

  - Easy and private communication. [1QL, 3QN]

  - Act as a source of medical information offered by the support groups available on the different social media platforms. [1QL, 2QL]

Barriers: Factors that decrease consumer's ability to control the behaviour of purchasing prescription medicines using the web, thus, impeding the purchase.

- Website-specific barriers (barriers that delay the purchase until consumers can find an alternative)

  - Absent of suitable payment option. [4QL]

  - Payment method security. [2QL]

  - Website language and instructions are in an unknown foreign language. [3QN]

- General barriers (barriers that prevent the purchase)

  - Financial capabilities. [4QL]

  - Consumers do not know how to use the medicine. [3QN, 5QN]

- **Knowledge:** Consumer's knowledge about the purchase (procedural knowledge and the knowledge about the risks of the purchase).

  - Computer and Internet literacy. [2QL]

  - Knowledge about the risks of the purchase. [2QL, 3QL, 3QN, 11QN, 12QN]

  - The difficulty in distinguishing between legal and illegal online pharmacies. [3QL, 3QN]

- **Trusting beliefs:** Factors that lead consumers to trust the online sellers of medicines.

  - Past purchase experience (either positive or negative experience). [3QN, 6QN, 7QN, 12QN, 1MX]

  - Customer review (either positive or negative review and feedback). [2QL, 4QL, 6QN, 12QN, 1MX]

  - Availability of secure payment option. [2QL]

  - Clear information about the product and vendors. [6QN, 7QN]

- **Social influencing factors: Social factors that could encourage or discourage consumer's decision to purchase prescription medicines using the Internet.**

  - Family and friends. [2QL, 3QN, 6QN, 12QN, 1MX]

  - Peer influence: People who are in the same situation. [2QL]

  - Healthcare provider: Doctors or pharmacists. [2QL, 3QN, 1MX]

  - People at online support groups. [2QL]

- **Environmental factors:** Any external environmental condition that encourages or discourages the purchase.

  - Barriers to accessing the clinic (logistical difficulties, financial difficulties). [4QL]

  - Restricted options (few alternatives are available in local market sectors). [1MX]

  - Sellers' marketing (advertising and pop-up ads). [2QL]

  - Medicines shortages. [8QN]

  - Unsatisfied with the quality of clinical services provided in clinics or local community pharmacies. [1QN, 1MX]

- ▪ The Coronavirus pandemic (COVID-19). [2QN]

- ✚ **Consumer attributes:** Demographic, socioeconomics, health information, and the Internet using habits characteristics that could affect the purchasing decision.

  - ▪ Age. [1QN, 2 QN, 4 QN, 5QN, 6QN, 7QN, 10QN, 1 MX]

  - ▪ Sex. [1QN, 2QN, QN, 7QN]

  - ▪ Marital status. [2QN]

  - ▪ Income level. [1QN, 7QN]

  - ▪ Educational level. [1QN, 2QN, 3QN, 4QN, 5QN, 7QN, 1MX]

  - ▪ Employment. [1QN, 3QN]

  - ▪ Health insurance availability. [10QN]

  - ▪ Time spent on the Internet. [5QN, 11QN]

  - ▪ Social media affinity. [3QN]

  - ▪ Internet purchase frequency in general. [5QN]

4.5. Discussion

4.5.1. Principal findings

4.5.1.1. Prevalence of people purchasing medicines online

Despite the abundance of public awareness campaigns that warn consumers about purchasing prescription medicines on the Internet (ASOP, 2020), the evidence explored in the current study found that people are buying medicines from the Internet and put themselves at risks associated with this purchase.

According to the quantitative studies' findings which are shown in Table 4.3, the percentage of people purchasing medicines using the Internet varies as explored data differs, due to the type of product purchased and study location. Of the 12 quantitative studies

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explored, 11 studies provided the number of consumers who purchased medicines using the Internet. Of the 5,896 participants explored in these 11 studies, 1,123 (19%) have purchased medicines (either over-the-counter medicines or prescription medicines) from the Internet.

Table 4.3. Prevalence of people purchasing medicines online (N*: number of participants)

Citation	N*	Prevalence of people who purchase medicines online	Medicines purchased
Alwhaibi *et al.*, 2021	643	235 (36.5%) participants bought medicines over the Internet.	Viagra, birth control bills, antibiotics, narcotics, refill medication for chronic conditions, herbal medicines, supplements, and cosmetics.
Jairoun *et al.*, 2021	420	131 (31.2%) participants bought medicines over the Internet.	Analgesics, Antihistamines, Anti-cough medicine, dietary supplements.
Moureaud *et al.,* 2021	730	131 (17.9%) participants bought medicines over the Internet.	Sedatives (Xanax®, Valium®, Ativan®, etc.), stimulants (Adderall®, Ritalin®, etc.), narcotics (Vicodin®, Percocet®, Oxycontin®, fentanyl, etc.), and COVID-19 medicines or vaccines.
Ashames *et al.,* 2019	528	53 (10%) participants bought medicines over the Internet.	Prescription medicines + over the counter medicines
Fittler *et al.,* 2018a	1055	44 (4.17%) participants bought medicines over the Internet.	Prescription medicines + over the counter medicines
Koenraadt & Katinka, 2018	447	153 (34.3%) participants bought medicines over the Internet.	Prescription medicines

Abanmy, 2017	633	17 (2.7%) participants bought medicines over the Internet.	Prescription medicines + over the counter medicines
Assi *et al.,* 2016	320	208 (65%) participants bought medicines over the Internet.	Prescription medicines + over the counter medicines
Szekely *et al.,* 2015	253	21 (8.3%) bought medicines over the Internet.	Prescription medicines + over the counter medicines
Cicero & Ellis, 2012	445	96 (21.6%) bought tramadol online without prescription	Tramadol
Fittler *et al.,* 2013b	422	34 (8.1%) bought medicines or dietary supplements over the Internet.	Prescription medicines + over the counter medicines
Svorc, 2012	82	Not provided	Prescription medicines + over the counter medicines

4.5.1.2. Antecedents of purchasing prescription medicines on the Internet

This systematic review provides a comprehensive overview of the factors that could influence people's decisions to purchase prescription medicines from the Internet. These factors include the perceived benefits that entice consumers to make the purchase, perceived risks associated with the purchase, consumer's emotions, facilitators that can make it easier for the consumer to regulate and control their behaviour, barriers that can decrease consumer's level of control over their behaviour, trusting beliefs that help make the consumers trust the online sellers of medicines, social influencing factors, external environmental factors that could trigger consumers to involve in the purchase, and consumers knowledge of the purchase.

4.5.1.2.1. Evaluating the benefits and risks of the purchase

The current review study summarised what consumers perceived about the benefits and the risks associated with purchasing prescription medicines from the Internet. Consumers might be enticed by several benefits of the purchase (e.g., lower prices, privacy, saving time and effort, and bypassing gatekeepers). However, many risks were also associated with the purchase (e.g., health-related risks and financial risks) which could affect the purchasing decision and discourage consumers from making the purchase.

Before making the purchase, consumers try to evaluate what they perceive about the consequences of the purchase. This evaluation process is a complex cognitive process in which consumers take into consideration what they perceive about the positive and negative outcomes of the purchase, so if the positive outcomes (benefits) outweigh the negative ones (risks), then there might be a preference to make the purchase. Additionally, the probability of making the purchase could be increased when consumers have inadequate knowledge about the risks associated with the purchase.

4.5.1.2.2. Emotions influence

The cognitive process discussed above (i.e., evaluating the risks and benefits of the purchase) focuses on the rational part of the decision-making by assuming that consumers are rational in thinking. However, consumers' emotional status could play a role and bias consumers' judgments and choices (Ajzen, 2020), which could make them behave irrationally even in the case they perceive that the risks of the purchase outweigh the benefits. The evidence explored in this review found that desperation could drive consumers to behave without conscious thought, meaning that when desperate buyers, who are struggling with obtaining prescription medicines for a serious medical condition, find the medicines available

online, then the purchase could be more likely to occur even if the buyers were aware of the risks of the purchase.

4.5.1.2.3. Healthcare provider role

The current review found that healthcare providers can play a harmful or beneficial role in influencing consumer's decision to purchase prescription medicines from the Internet. So, when the healthcare provider refuses to prescribe a specific medication to the patient who think that this medication is useful to them, then patients might seek for alternatives including the internet (Cicero and Ellis, 2012), thus, putting the patient at risk of end up buying fake medicines which are widely available on the internet (Almomani et al., 2023a). On the other hand, healthcare providers could play a beneficial role by educating patients to about the risks of purchasing prescription medicines from the internet and how to purchase medicines safely (Bowman et al., 2020). This finding supports a finding from a survey conducted in the United States by ASOP which found that healthcare providers could influence a consumer's decision about purchasing medicines online by educating consumers about how to buy medicines online safely (ASOP, 2020).

4.5.1.2.4. The facilitating role of social media platforms and encrypted messaging apps

The current study also summarised the facilitators and barriers to purchasing prescription medicines online. Consumers could face barriers that might delay or prevent purchasing medicines from the internet such as the complex instruction for using some prescription medicines, however, social media platforms could facilitate the purchase and help consumers overcome this barrier as these platforms host different support groups which could provide assist consumers by providing them with the information about how to use these prescription medicines. As a result, consumers' self-efficacy and control over their behaviour will

increase, which in turn could drive consumers to purchase prescription medicines without involving the healthcare providers and without any medical supervision.

Additionally, the social media platforms (such as Facebook, Twitter, and Instagram) and encrypted messaging applications (such as WhatsApp or Telegram) can play a role as a private communication channel between the buyers and sellers of prescription medicines. The messaging applications could offer the option of end-to-end encryption to protect user privacy. End-to-end encryption is a type of encryption that is adopted by some messaging applications to ensures that only both parties (the sender and the receiver of a message) can read the message contents (Kulshrestha and Mayer, 2021). Thus, these applications offer a private and secure means of communication between buyers and sellers, which could help alleviate concerns about the potential risks of engaging in this illegal behaviour.

4.5.1.2.5. *Easy access to prescription medicines without requiring a prescription*

Another facilitator offered by the online sellers of medicines highlighted in this review was the accessibility to prescription medicines without the need for a prescription. Several previous studies have found that many prescription medicines available on the internet and easily accessible for anyone without requiring a prescription include high-risk controlled medicines and antibiotics (Boyd et al., 2017; Monteith and Glenn, 2018; Hockenhull et al., 2020). The current study findings are in line with these studies, as this practice (offering prescription medicines requiring a prescription) have facilitated the purchase and made it easier for consumer to control the purchase, thus, consumers can purchase different types of prescription medicines (including controlled medicines and antibiotics) easily and without limits. This is problematic as the easy access to controlled medicines could increase the possibility of abusing the medicines. Moreover, buying antibiotics online without medical oversight could increase antimicrobial resistance (Boyd et al., 2017).

4.5.1.2.6. *Medicine shortages and purchasing prescription medicines on the Internet*

One important environmental condition highlighted in this review is the impact of the medicine shortages on purchasing prescription medicines from the Internet. Medicine shortages can be caused by many reasons including the sudden increase in demand for a specific medication, supply side problems (manufacturing obstacles such as the shortages of the raw material), pandemics such as the Coronavirus disease (COVID-19), political events (such as the Brexit), or government policies such as the price controls which make it unprofitable for pharmaceutical companies to manufacture certain products (Iyengar et al., 2016; Musazzi et al., 2020; Badreldin and Atallah, 2021). Medicines shortages can frustrate consumers as they might struggle to obtain the medicines they need, which could create a sense of desperation for consumers, which in turn could encourage them to seek alternative sources including the Internet to obtain their needs. This is problematic as previous studies have shown that medicines in shortage are widely available online without requiring a prescription or healthcare provider involvement. For example, a study conducted in Europe found that anticancer drugs affected by shortages were available and accessible online without medical prescription. While another study conducted in the United States found that vaccines in shortage are widely available and easily accessible on the Internet (Liang and Mackey, 2012; Fittler et al., 2018b). Thus, this availability and easy accessibility of prescription medicines on the internet could encourage desperate consumers to make the purchase. Moreover, this finding is in line with a recent study that analysed the news media coverage of the problem of purchasing prescription medicines on the internet (Almomani et al., 2023b), in which the medicine shortages were highlighted as a condition that encourages people to people to purchase prescription medicines online.

4.5.1.2.7. Customer review impact on the purchase

Another factor found that can influence a consumer's decision to purchase prescription medicines online is consumer trust in online sellers. Trust was found to be an important determinant of consumers' purchasing behaviour in the e-commerce context (Pavlou, 2002; Bourlakis et al., 2008). Some of the participants in the studies included in this review trusted websites they had previously purchased from without facing any problems, while others judged whether a website was trustable or not by relying on other customer reviews. This is in line with the findings from a review study that found that pregnant women were influenced by customer reviews (Little et al., 2018). Customer review represents other consumers' feedback on a specific product or purchase and is found to be one of the relevant sources of information that could affect consumer's decision of purchasing products online (Yaylı and Bayram, 2012). Thus, these reviews could have a substantial effect on consumer's decision of purchasing prescription medicines on the Internet This is worrying because the illegal sellers of medicines could use this tool (i.e., customer review) by creating fake positive reviews that increase the reputation and rating of their website, thus make the illegal seller's websites more trustable and credible.

4.5.1.3. Problem complexity

We found that consumer behaviour of purchasing prescription medicines from the internet is a complex and multi-dimensional phenomenon that is influenced by a range of internal and external factors. This complexity arises from the multiple factors that interfere with the purchasing decision including the cognitive process, affective process, social influencing factors, external environmental factors, and economic factors. Consumer's decisions about purchasing prescription medicines from the Internet could be influenced by cognitive processes such as perception and knowledge. However, other factors including emotions could bias consumer judgments and behaviour, which in turn increases the complexity of

understanding the decision. Moreover, several external factors such as the social influencing factors and the environmental factors that are out of the consumer's control could also influence the consumer's decision. What added further complexity to consumer's decision is the difference between consumers in terms of their cultures and countries which could have different healthcare systems and different regulations and legislations.

The overarching interpretation of the consumers behaviour of purchasing prescription medicines from the internet provided by the current theory-based systematic review enables a deeper understanding of this complex behaviour and decision-making process, thus, this review provides the basis for policymakers and regulators to take effective actions that can protect consumers from the risks of such purchase.

4.5.2. Strength and limitations

This study is the first systematic review that looks solely at the consumers behaviour of purchasing prescription medicines online. This review provided an overarching view of the breadth of reasons that lead people to buy prescription medicines from the internet. This review provides diversified views about the research topic as the included studies were conducted in different countries and the participants were from diverse cultures, sex, and age groups. Furthermore, the studies included in this review used different methodologies (qualitative, quantitative, and mixed methods), thus, providing stronger evidence and more confidence in the review findings. In addition, this review was guided by the COM-B model and the TDF theories, and these behavioural theories were validated by research in different contexts, thus, increasing the validity and credibility of the research findings.

One limitation of this study is that the non-English language articles were excluded which might affect the generalisability of the study. Another limitation is that the heterogeneity among the quantitative studies precluded a meta-analysis, therefore, the method we employed

to synthesize their findings could not generate effect size estimates, thus, it cannot assess the magnitude of the purported relationship between the independent variables (factors that influence buying behaviour) on the dependent variable (buying prescription medicines online). However, a questionnaire could be developed, in the future, based on the study findings to measure the weight of the factors that influence consumers' decisions of purchasing medicines online to evaluate their relevance. Finally, the sample population of half of the included qualitative studies focused only on pregnant women's point of view which could limit the generalisability of the qualitative findings.

4.5.3. Implications for regulators and policymakers

4.5.3.1. Evidence-based consumer education is needed

Several awareness campaigns have been run to warn consumers about the risks of purchasing prescription medicines from the Internet (ASOP, 2020). However, our systematic review founds that people still obtain their medicines from the internet and put themselves at risk associated with this purchase.

To improve those awareness campaigns' effectiveness, we recommend the development of evidence-based campaigns relying on scientific knowledge (such as the current systematic review) in order to improve the effectiveness, outcomes, and cost-effectiveness of these campaigns. For example, tailored messages focusing on the high costs incurred if failure of treatment occurs, due to the use of ineffective medicines, can be developed to target consumers seeking cost saving options, while other messages focusing on the health risks (caused by possible drug-drug interactions or the risks of fake medicines) can be developed to target individuals with chronic medical conditions. Additionally, as this review found that the healthcare providers could influence consumer's decision of purchasing medicines online,

then the active engagement with healthcare professionals (doctors and pharmacists) in the awareness campaign could be beneficial by encouraging safer medication practices.

4.5.3.2. Long waiting times to receive the treatment

Based on our findings, one of the factors that could play a role in increasing the purchase of prescription medicines from the Internet is the long waiting times that patients have to wait in order to receive their treatment. The long waiting times can be frustrating and can negatively impact patients' health and outcomes (Reichert and Jacobs, 2018). This is a long-standing problem and difficult to solve. As patients continue to face long waiting times for medical consultations, their tendency to resort to medicine purchases through the internet may further escalate. Thus, a holistic approach is needed to effectively resolve this problem by involving healthcare system improvements, policy interventions, technology, and innovative solutions to ensure timely access to quality healthcare for all people.

To address this problem, healthcare process improvement is needed by assessing and evaluating the processes to identify any areas that may be causing delays in order to eliminate unnecessary stages and increase the efficiency of the process. For example, regulators in healthcare sectors could check if the healthcare providers and administrators handle the high workload efficiently, if not, then provide suitable training. In the case that staff shortages are the problem, then increasing the capacity could be the solution by hiring more medical staff, and in case this is not applicable, then regulators and policymakers could increase the number of authorised prescribers (people authorised to prescribe the prescription medicines) by authorising pharmacists to prescribe prescription medicines for certain conditions or in certain situations.

4.5.3.3. Accountability problem

The current study found that different Internet platforms including social media, search engines, encrypted messaging applications, and customer review websites have facilitated the purchase of prescription medicines from the internet. As a result, consumer's life might be at risk due to the misuse of medicines or consuming fake medicines that are widely available online, while the government might incur more costs to combat this kind of sale. Moreover, the pharmaceutical companies could also incur financial losses caused by the drop in sales.

The only gainers of this purchase are the illegal online sellers of medicines who could obtain a profit margin of more than 7,000% from selling the high profit fake medicines (OECD/EUIPO, 2020), and the internet platforms which host those sellers, as these platforms (social media, search engines, customer review websites) could gain from driving traffic and user engagement to their platforms, as the illegal sellers of medicines can drive traffic these platforms by offering prescription medicines that are not easily available through legitimate channels. Therefore, given the serious patient safety concerns associated with this purchase, policymakers and regulators must hold a higher level of accountability and responsibility to these platforms to prevent such activity.

4.5.4. Research gaps and future Research Agenda

4.5.4.1. Context gaps

Regarding the geographical coverage, the majority of the research was conducted in Europe (47%, n = 8), these studies were conducted in Romania, the Czech Republic, Hungarian, Malta, the Netherlands, and Sweden. However, to the end of 2021, there are shortages in studies conducted in several countries in Europe such as Germany, Spain, France and the United Kingdom. Whereas in Asia, only 4 studies (23.5%) were conducted, and all of these studies were based in the Middle East.

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Given the limited research that analyse the consumer behaviour of purchasing prescription medicines from the internet in several countries, such as Australia, Canada, United Kingdom, China, South America, Africa, and several other countries. Future studies are needed to address this gap and provide a more comprehensive understanding of this phenomenon from a global perspective.

Regarding the included studies' populations. The population of half of the qualitative studies included in this review was pregnant women, which in turn, could limit the generalisability of the findings. Thus, further qualitative studies that explore populations other than pregnant women could help in covering this gap.

4.5.4.2. Intervention studies are needed

This systematic review has identified the breadth of reasons that drive people to purchase prescription medicines online, meaning that the current study identified what needs to be changed in order to design interventions to minimise the purchase of prescription medicines from the internet. Thus, the current study findings could provide the basis for future researchers to conduct intervention studies that aim to promote positive changes in behaviour and develop behavioural intervention techniques in order to minimise the purchase of prescription medicines from the internet, thus protecting consumers from the risks of the purchase including the risks fake medicines.

4.5.4.3. The use of behavioural theories

The behaviour of purchasing prescription medicines from the internet is complex and not straightforward to understand. However, underpinning the research using validated behavioural theories could help in understanding complex human behaviour as theories enable researchers to look at data from different angles within which to conduct the analysis and defined which key variables influence a phenomenon of interest (Reeves et al., 2008).

Growing evidence supports the use of theory when understanding behaviour as theories could provide tentative explanations for why and under what circumstances behaviours occur (Alhusein et al., 2021).

The majority of the studies explored in this review did not adopt any particular theoretical frameworks. Only 2 articles (11.77%) in the included studies explored the phenomenon using behavioural theories (i.e., the theory of planned behaviour, and the technology acceptance model) to underpin the research (Svorc, 2012; Little et al., 2020). Thus, further studies, which use behavioural theories to interpret the consumer behaviour of purchasing prescription medicines from the Internet, will need to be undertaken.

4.5.4.4. Methodological gaps

Most of the included articles that explored consumer behaviour of purchasing prescription medicines from the Internet adopted a quantitative approach by using surveys (%70, n = 12) to collect data. While surveys are widely used for data collection, researchers should be cautious about the limitations of this method as it may lead to an inaccurate understanding of participants' experiences, as it lacks the depth provided by more qualitative approaches like interviews (Taherdoost, 2022). Meantime, the limited response options in surveys may not capture the full range of possible answers of participants' opinions, leading to oversimplification of complex issues.

As shown in Table 4.1, only a few studies to date employed qualitative methods including individual interviews, focus groups, ethnography, and qualitative questionnaires. Qualitative research generates rich data and enables a deeper understanding of this phenomenon (Bell et al., 2022). Future studies which use qualitative research methods on the current phenomenon in different research contexts are therefore recommended.

4.6. Conclusion

This systematic review of qualitative and quantitative studies explored the existing knowledge about consumers behaviour of purchasing prescription medicines online. The prevalence of people purchasing prescription medicines from the Internet, as well as the factors that could influence consumers' decisions to make this purchase, was highlighted in this review. Implications to policymakers were provided. Furthermore, research gaps were identified, and future research opportunities were discussed.

The behaviour of purchasing prescription medicines from the internet is complex as many factors could affect consumers decision to make the online purchase of prescription medicines. The current theory-based study helps resolve this complexity as this study explored those factors and provided an overarching understanding of the reasons that could encourage consumers to purchase medicines from the internet. Identifying those factors could enable the development of evidence-based public awareness campaigns to protect consumers from these purchase risks.

4.7. Acknowledgments

4.8. Data availability

The data used in the study are available from the corresponding author upon request.

4.9. Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

CHAPTER 5

General Discussion, Strengths & Limitations

The overall aim of this thesis is to explore the reasons that lead people to purchase prescription medicines online, which may pose a risk of being fake. In other words, this research aims to investigate the factors influencing consumers' decisions to purchase prescription-only medicines (POMs) from the Internet, a context where authenticity can be uncertain. This chapter provides a summary of the thesis by discussing the principal findings of the research, providing relevant recommendations, and discussing the strengths and limitations of the research. Futhermore, this chapter considers future research that may complement or expand upon the current work.

5.1. Principal findings

5.1.1. *Participants' perception about the online availability and risks of fake medicines*

A surprising finding of this thesis is that some consumers have purchased POMs from the Internet while they were aware about the widespread availability of fake medicines on the Internet and the potential risks associated with using this kind of product. Evidently, almost all the consumers who participated in the interview study were aware of the online availability and the risks of fake medicines, however, they all purchased medicines from the Internet without healthcare providers' involvement. This finding is contrary to previous studies that propose that consumers are purchasing medicines online because they were unaware of the risk of the purchase (Fittler *et al*., 2013b). Thus, educating consumers about the risks of fake medicines available on the Internet is likely not enough as other reasons

could drive people to make this purchase. This finding thus contradicts the way public awareness campaigns operate, as most of the public awareness campaigns aim to educate consumers about the risks of fake medicines available on the Internet and how to purchase medicines safely, which would reasonably not be enough of a deterrent if people are already aware of this risk. Clearly then, other factors play a role in motivating people to purchase POMs from the Internet. Without addressing these causes, the problem may persist or even worsen. The next section illustrates this thesis's findings about the causes and reasons that might drive people to purchase POMs from the Internet, created after interpreting and analysing consumers' behaviour using the three different data sources.

5.1.2. Factors that influence consumer's decision to purchase POMs online

This in-depth, theory-based thesis identified the breadth of reasons that drive people to buy POMs from the Internet by shedding light on the cognitive, social, environmental, and affective influences on people's decision to purchase POMs online. Multiple data sources (media, consumers, and literature) (Shih, 1998) have been explored in order to achieve valid and reliable results. Moreover, relying on one source of data could inadvertently introduce bias into the research, whereas exploring multiple sources enables the comparison of the data to reduce the impact of any biases (Shih, 1998).

The major themes identified in this thesis covered consumers' evaluation of the purchase including the risks and benefits of purchasing medicines on the Internet, social influencing factors, factors that affect consumers' control over the behaviour (facilitators and barriers), environmental factors, affective influence (emotions), trust, and the consumer knowledge about the purchase. Figure 5.1 illustrates a novel, integrated evidence-based model which was developed from the triangulation of the three data sources (media, consumers, and literature).

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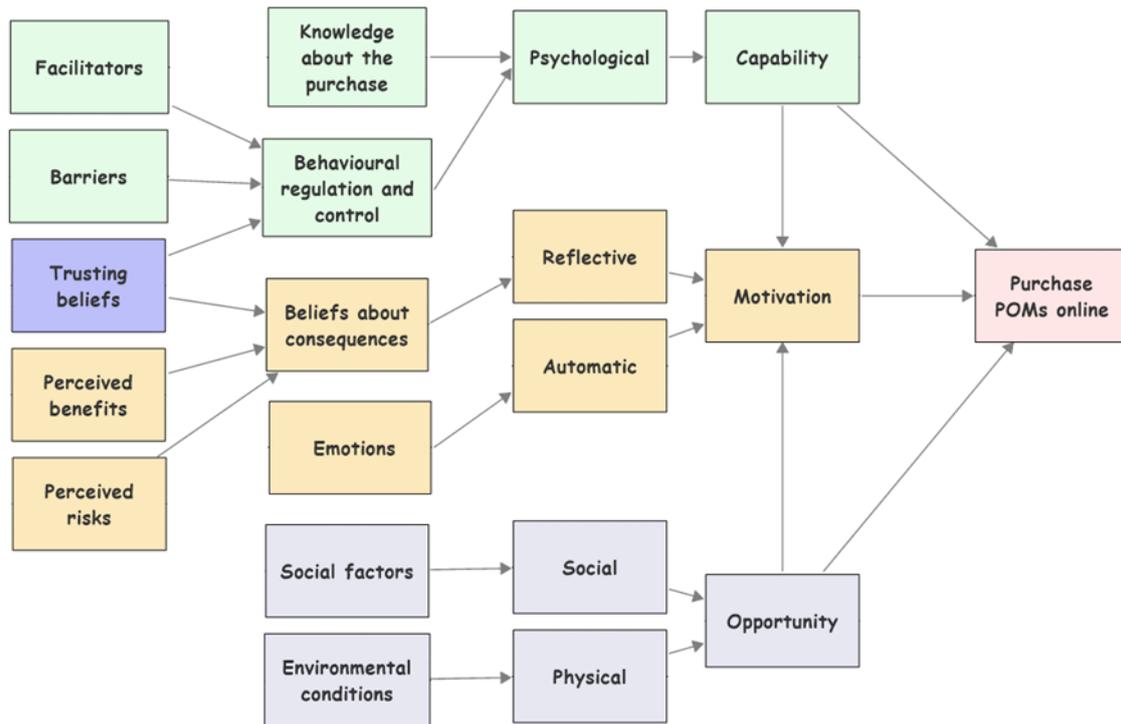
Figure 5.1. An integrated model of the factors that could influence consumer's decision to buy POMs online.

5.1.2.1. Consumers' evaluation of purchasing POMs on the Internet (perceived benefits and risks)

This thesis found that consumers' beliefs about the consequences of the purchase could influence their behaviour. Table 5.1 provides a comparison of the results revealed from the 3 explored sources of data which are related to the benefits and risks associated with purchasing POMS online.

When consumers think about purchasing prescription medicines online, they take into consideration what they perceive about the risks and benefits of the purchase, so if the perceived benefits outweigh the perceived risks, then there might be a preference to make the purchase. In other words, if consumers believed that purchasing medicines from the Internet comes with more positive consequences, then they will be more likely to engage in the

purchase, whereas a negative consequence may discourage them from engaging in the behaviour.

The Internet provides a wide range of products that might be not available through the normal legal routes, and purchasing prescription medicines from the Internet would then offer many advantages (such as saving effort and time, lower prices, and privacy). However, the quality and safety of the medicines purchased online cannot be guaranteed as medicines have complex ingredients that required specific storage conditions and complex manufacturing processes (Chauhan *et al*., 2021), and if any unpleasant consequences occurred (e.g., overdoses, toxicities, side effects, failure in treatment, or a financial scams), no one could be easily held accountable, except for the consumers themselves.

An unanticipated finding which was revealed in the systematic review study (Study 3) is some consumers' belief that medicines available online are of superior quality compared to medicines obtained through normal legal off-line routes (such as the in-store community pharmacies). This finding could inform public awareness campaigns which focus only on fighting the problem of purchasing fake medicines online. These campaigns should illustrate in their educational content the uniqueness of the medicinal products, which are highly controlled and manufactured complex substance that requires specific storage conditions and whose integrity, safety, and effectiveness cannot be guaranteed if purchased from an illegal web-based seller (Chauhan *et al*., 2021).

One of the findings that appeared exclusively in Study 2 (the interviews study), is that participants showed contradicting views about the costs of the purchase. Study 1 and Study 3 in this thesis revealed that people were motivated to purchase medicines online because medicines there were cheaper. While in Study 2 which is conducted in the UK, participants showed a contradicting view, as some of them believed that medicines available online costs

more especially when the participants were based in Scotland and Northern Ireland, while participants from England believed that medicines available online were less expensive. This might be attributed to the prescription charges which applied to people in England whereas people in Scotland, Northern Ireland, and Wales are exempt from paying prescription charges.

Table 5.1. Benefits and risks of purchasing POMs from the Internet.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Perceived benefits	Convenient process	Save effort, fast delivery, saves time by avoiding long waiting lists, helpful when the patient is in a bed rest period, and 24/7 accessibility.	✔	✔	✔
	Lower costs	Cheaper prices, more affordable for medicines that are not covered by insurance or that require a high surcharge	✔	✔	✔
	Privacy	Avoids embarrassment caused by admitting illness or health condition	✔	✔	✔
	Bypassing gatekeepers	Bypass healthcare providers who refuse to prescribe prescription medicines.		✔	✔
	Medicines availability	Online availability of unlicensed medicines, and illegal medicines from different brands without any limits on the quantity or doses.		✔	✔
	Better quality products	Availability of superior quality products			✔
	Prevent withdrawal symptoms	Preventing withdrawal symptoms for patients using controlled medicines.			✔

Perceived risks					
Perceived risks	Medicines safety concerns	Patient safety concerns as the purchase occurs without proper healthcare provider-patient interaction. Additionally, the medicines could be fake toxic medicines.	✓	✓	✓
	Medicines quality concerns	Problems with the effectiveness of the medicines because they could be manufactured or stored under inappropriate conditions.	✓	✓	✓
	Higher cost	Purchasing medicines online could cost more in the case of medicines prices on the Internet being less than the prescription charges.		✓	
	Online Payment risks	Incurring financial losses because the medication is not effective or due to scams or fraud.	✓	✓	✓
	Lack of accountability	No accountability exists to ensure the safety of the purchased products	✓	✓	
	Engage in an illegal behaviour	Fear of being caught in possession of a controlled drug, or ending up buying stolen medicines	✓	✓	✓
	No confidentiality	The possibility that the consumer's information being disclosed to unauthorized individuals or parties		✓	✓
	Delayed deliveries	The medicines were not delivered within the expected timeframe			✓

5.1.2.2. Emotions' impact (Affective process)

Emotion is a feeling that arises in response to a stimulus event (Biscaia *et al*., 2010; Scherer 2005). Emotions have an important influence on decision making and consumer

behaviour and are considered sometimes beneficial and sometimes harmful motives of judgments and choices (Achar *et al.*, 2016; Lerner *et al.*, 2015). Various emotions that motivate or demotivate consumers to purchase POMs on the Internet were identified in this thesis. One of these emotions is the fear which arises from different reasons such as the fear of punishment due to engagement in illegal behaviour, such as the fear of paying fines or getting arrested due to the purchase of controlled medicines. Another cause of fear is the harmful consequences of the purchase due to the absence of healthcare provider oversight, such as the fear of side effects or the fear of toxicity caused by misusing medicines. Recently, the outbreak of the COVID-19 pandemic and the misinformation about cures has also caused fear and desperation for many people due to the fear of POMs running out of stock and feelings of desperation due to an absence of effective COVID-19 cures. Other emotions that could influence consumers decision to purchase POMs online are illustrated in Table 5.2.

Table 5.2. Emotions impact.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Emotions	Desperation	In the absence of a suitable cure		✔	✔
	Hate	Hate going to the doctor			✔
	Fear	Fear of engaging in illegal behaviour		✔	✔
		Fear of harm from side effects due to the absence of medical oversight		✔	✔
		Fear from COVID-19		✔	
	Ashamed	Ashamed of engaging in illegal behaviour		✔	

5.1.2.3. Facilitators and barriers of the purchase

According to behavioural theories (Ajzen, 1991; Michie *et al.*, 2011), consumers'

behavioural regulation and control is a substantial predictor of their behaviour, so when

consumers have a high level of behavioural control, they will have the confidence that they

are able to regulate and manage their behaviours, thus, they are more likely to purchase

prescription medicines from the Internet. In contrast, low levels of behavioural control can

lead to difficulty initiating the purchase.

This thesis identified various facilitators (i.e., factors that make it easier for consumers to

regulate and control their behaviour) and barriers (i.e., factors that make it difficult for

consumers to regulate and control their behaviour) that can affect the consumer's level of

behavioural control. Table 5.3 illustrates these facilitators and barriers which were revealed

from the analysis of the 3 data sources that were explored in this thesis. The facilitators

identified could provide consumers with a sense of confidence, control, and empowerment,

thus, making it easier for them to make the purchase, whereas the barriers could hinder and

impede consumers from making the purchase leading to a sense of frustration which reduced

the level of behavioural control.

Unanimously, all the 3 studies (Study 1, Study 2, and Study 3) found that Internet search

engines help people find rogue online pharmacies, and social media platforms enable illegal

web-based sellers of medicines to communicate directly and easily with consumers.

Furthermore, Study 2 found that the review websites could facilitate the purchase, as these

websites could be misused by the illegal sellers of medicines by creating fake positive

reviews that increase the reputation and rating of their website, thus making the illegal sellers'

websites more trustable. Also, another key finding is how the availability of online payment

systems such as PayPal facilitate purchase and help consumers to overcome the barrier of

online payment insecurities, as these payment systems offer refunds and protection in case of

a financial scam, thus, reassuring consumers that compensation is available for any financial losses incurred. The facilitating role played by the different Internet platforms including search engines, social media platforms, review websites and online payment systems should lead to a wake-up call for the authorities and regulators to increase the accountability on these platforms.

Another relevant finding is how online support communities help consumers to overcome barriers such as the complexities of medication instructions. Some of the online support communities provide information to people on how to use prescription medicines that require complex instructions for use and a high level of medical monitoring and supervision. Other online support groups could act as a platform in which the illegal sellers of medicines post links that direct consumers to their websites.

Table 5.3. Facilitators and barriers.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Facilitators	POMs accessibility	Easy accessibility to POMs without the need for prescription	✔	✔	✔
	Search engines	Enable consumers to find the illegal sellers of medicines. In addition, it enables consumers to obtain health-related information	✔	✔	
	Social media	Provides an easy communication and connection channel between consumers and the illegal sellers of medicines	✔	✔	✔

	The customer support offered by the sellers	Customer support offered by the illegal sellers' websites could facilitate the purchase as well as provide information about how to use the medicines	✔	
	Signposting by online support communities	These online groups provide information to people on how to use POMs and where to obtain these medicines from.	✔	✔
	Easy and secure payment options	Providing a variety of easy and secure payment options as well as the availability of online payment systems that provide refunds (e.g., PayPal)	✔	✔
	Website usability	The ease and efficiency with which consumers can navigate and interact with the seller's website		✔
	Review websites	Reviews websites include reviews from other customers, these reviews might be perceived by the consumers as genuine and unbiased information, which can elevate consumers sense of control when making the purchase.	✔	✔
	Consumer personality	Willingness to take risks	✔	
Barriers	Complexities of medication instructions	POMs that require complex instructions for use and a high level of medical supervision and monitoring	✔	
	Financial capabilities	Consumers cannot afford to pay for medicines available on the Internet	✔	✔

	Absence of suitable payment options	Absent of a suitable payment option such as a website that only accepts payment with Bitcoin which many people are unfamiliar with	✔	✔
	Payment insecurity	Lack of protection for sensitive information such as credit card numbers and bank account details,	✔	✔
	Delivery problems	Delayed delivery or absence of delivery options (i.e., the websites that do not deliver to the specific countries); parcels confiscation by customs and police	✔	✔
	Language of the websites	Language barrier if the website provides instructions in an unknown foreign language	✔	✔

5.1.2.4. Consumer's knowledge about the purchase

Behavioural knowledge refers to the necessary information that an individual has to perform a specific behaviour (Cane *et al*., 2012) and the level of knowledge that consumers have can play a crucial role in influencing behaviour. Consumers' level of knowledge about the purchase can affect behaviour in several ways, for instance, the absence of procedural knowledge (knowledge on how to find medicines and make the purchase) could act as a barrier that could prevent the purchase as the consumer may not know how to perform the behaviour or task correctly or efficiently. Likewise, if consumers do not know how to use the POMs due to complex instructions for use, then this also will hinder the purchase. Second, knowledge can increase an individual's understanding of the risks of the purchase, thus, demotivating them from making the purchase. Table 5.4 summarise the behavioural knowledge associated with purchasing POMs from the Internet.

Table 5.4. Consumer's knowledge about the purchase.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Knowledge	Procedural knowledge (Computer and Internet literacy)	The knowledge and ability to use computers and the Internet efficiently		✔	✔
	Knowledge about the consequences of the purchase	The level of knowledge that consumers have about the risks and benefits of the purchase	✔	✔	✔
	Medicines instructions for use	Knowledge on how to use POMs and medications with complex instructions of use		✔	
	Knowledge about website legality	Knowledge of how to distinguish legal sellers from the illegal ones			✔

5.1.2.5. Trusting beliefs (what makes people trust the online sellers of medicines)

One unique finding of this thesis is the impact of trust on consumers behaviour of purchasing POMs over the Internet. This thesis found that trust could be a substantial factor that affect consumers decision in two ways. First, trust could affect consumer's expectations about the outcomes of the purchase (Pavlou, 2002), thus, when consumers trust the online sellers of medicines, they are more likely to believe that it will have positive consequences and be more motivated to make the purchase. In contrast, the absence of trust could lead consumers to believe that the purchase will have negative consequences and be less motivated to engage in it. Second, trust could affect consumers' level of behavioural control (Pavlou, 2002). Trust could absorb the uncertainty associated with the purchase and provide

consumers with a sense of confidence and control over their behaviour by helping consumers to overcome psychological barriers associated with the purchase.

This thesis identified various factors that could lead people to trust online sellers of medicines (Table 5.5). One of the key findings of Study 2 in this thesis is that consumers trust suppliers based on their website features such as the website appearance and the availability of accreditation seals, the display of seller's contact information on the website, and if the website requires collection of medical history before purchase. This is worrying because the illegal sellers of medicines used deception techniques to make their websites look professional (such as fake accreditation seals, fake contact details, or fake customer testimonials and fake reviews).

One more key finding is how the product appearance influences consumers to trust in the online sellers of medicines, meaning that some consumers made their judgements based on whether the medicines purchased online look similar or identical to the genuine product they have used before. However, fake medicines in many cases are designed and packaged to closely resemble the appearance of genuine medicines, in order to deceive consumers into believing that they are buying the genuine one.

Table 5.5. Trust beliefs.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Trust	Website features	Easy navigation; availability of secure payment option; product information availability and accuracy; display of the seller's contact information; collection of medical history before purchase		✔	

Product appearance	Medicines offered by online sellers of medicines look like genuine medicine	✓	
Previous purchase experience	If consumers have a positive experience, they are more likely to trust the sellers of medicines and make future purchases	✓	✓

5.1.2.6. Social influencing factors

Social influencing factors play a substantial role in influencing consumers behaviour (Ajzen, 1991; Michie *et al*., 2011). These factors referred to the social pressure and influence that other people or groups have on consumers behaviour. These social factors can have both positive and negative effects on behaviour, as some people might approve or encourage the behaviour, thus increasing the opportunity for the consumer to engage in the behaviour, while others could discourage the behaviour, thus reducing the possibility of the consumer engaging in the behaviour.

In this thesis, several social influencing factors have been identified (Table 5.6). One of the key social factors identified was the influence of healthcare providers on the purchase. Healthcare providers could play both beneficial and harmful roles. If the doctor refused to dispense a specific medicine to the patient without proper clarifications of the reasons for this action, then patients could seek alternatives including the Internet to bypass this barrier and obtain the medicines which think would be useful to them. This could reflect the importance of the quality of the relationship between the healthcare provider and the patients.

Table 5.6. Social influencing factors.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Social influencing factors	Healthcare providers	If the doctor reject to dispense a specific prescription drug to the patient.		✔	✔
	Other consumers reviews and experiences	Other consumer reviews and experiences are shown on the medicine customer review websites		✔	✔
	Trusted friends or family member	Advice from a family member or a trusted friend who purchased the medicine on the web		✔	✔
	Influencers endorsement	Medicines endorsed by influencers and public figures	✔	✔	✔
	Peer influence	People with the same experience			✔
	People at support groups	People at online support groups post advice about how to use medicines with complex instructions for use.		✔	✔

5.1.2.7. Environmental factors

The environmental factors that could affect consumer's decision to purchase POMs online have been identified in this thesis (Table 5.7). These environmental factors refer to the external factors that affect the behaviour by making it more or less likely to occur. One important finding of this thesis is how the medicine shortages influence people to use the Internet to obtain their POMs. Medicines shortages are temporary or long-term interruptions

in the supply chains which could happen due to many reasons such as errors in the manufacturing process, distribution problems, political events (e.g., Brexit), disasters and pandemics (Donyai *et al*., 2022; Musazzi, *et al*., 2020). Medicines shortages can have negative influences and consequences on people using these medicines, especially for patients who are using POMs for a chronic condition. This consequence includes delays in treatment as medicines are not available, and turning to medication substitutions which might not be the preferable choice for some patients, thus, those patients might search for any alternatives, even if it is not the safe choice, to obtain their POMs. These alternative sources include the Internet, the place where people can find a wide range of branded and generic 'medicines' with different doses and unlimited quantities.

One more relevant finding of this thesis is how pandemics (such as COVID-19) affect consumer's decision to purchase POMs from the Internet. These global health emergencies, such as pandemics could induce the purchase of POMs from the Internet in different ways: first, the pandemic could cause problems in the supply chain, thus leading people to purchase their POMs from the Internet. Second, the healthcare systems have been overburdened during the COVID-19 outbreak, causing increased demand for healthcare services associated with COVID-19 (such as testing or treatment). As a result, problems with appointment systems have increased, causing many appointments to be delayed or cancelled, prompting people to look for quick alternatives to get their medication such as the Internet. Third, during the COVID-19 pandemic, misinformation about COVID-19 treatments has spread globally, causing despair and panic among many people, which in turn has led to panic buying medicines from the Internet.

Table 5.7. Environmental factors.

Influencing factor	Dimension	Composition	Media	Interviews	Literature
Environmental factors	Medicine shortages	Short or long-term interruptions in the supply chains caused by halting the production of some POMs or the increase in demand for specific POMs.	✔		✔
	Pandemic diseases (e.g., COVID-19)	Overburdened healthcare systems during the COVID-19 outbreak; COVID-19 induced medicines shortages; Spread of misinformation related to COVID-19 cures; Anxiety and desperations due to COVID-19	✔	✔	✔
	Illegal suppliers marketing	Creating awareness about the availability of medicines; Persuading consumers by providing an environment and services that make the purchase easier for consumers such as direct links and offering product information or delivery services; Creating interest through different marketing tactics including influencer marketing, especially for slimming pills or weight loss treatment.	✔	✔	✔
	Barriers to accessing clinics and pharmacies	Logistical difficulties, financial difficulties, long waiting lists	✔	✔	✔

Availability of a wide range of medicines	Availability of different branded and generic medicines with different doses and unlimited quantities		✓	✓
Prescription charges	High prescription chargers or insurance surcharges	✓	✓	✓

5.1.3. Problem complexity

Fake medicines available online are hazardous products and could threaten people's lives. These medicines pose destructive and negative effects on different levels. Consumers might suffer from fake medicines due to the side effects and the possible toxicities associated with this kind of medicine. At governmental levels, financial losses could be incurred to compensate for the failure of treatments and other consequences including the potential adverse effects. Pharmaceutical companies could also be affected by the fake medicines, as companies could incur losses due to the decrease in sales, furthermore, pharmaceutical companies' reputation and image could be damaged as fake medicines could have a genuine look and packaging however, they do not meet expectations and could harm consumers. At the healthcare providers' level, treatment failure caused by fake medicines can damage the credibility of the healthcare system and could lead consumers to lose trust in healthcare providers (Blackstone *et al.*, 2014; OECD/EUIPO, 2020; World Health Organisation, 2018). In conclusion, the only one getting benefits from fake medicines is the illegal sellers as they can obtain profits which could reach more than 7,000% of the actual costs to them of obtaining the products (OECD/EUIPO, 2020).

Previous studies have shown the complexities of tackling the supply side (the illegal sellers of medicines), as those sellers use hiding and deception techniques to be undetectable by the authorities and regulatory bodies (Hall and Antonopoulos, 2015). Moreover, those

sellers take advantage of the absence of effective international laws and regulations to sell and market their products internationally. This problem was described as "a losing Battle" (Lee *et al*., 2017), while others described it as "impossible" to solve, meaning that it is impossible to make the Internet free from the illegal sellers of medicines (Fittler *et al*., 2013a).

On the other hand, the current thesis found that the demand side is also complex. This complexity arises from the multiple factors (such as beliefs, social norms, environmental, and economic factors) that affect the decisions of consumers when they think about buying medicines from the Internet. Consumer's decision about purchasing POMs from the Internet could be influenced by cognitive processes such as perception and knowledge. However, other factors including emotions can also bias consumer judgments and behaviour, which in turn increase the complexity of the problem.

What makes the demand side more problematic and complex is that the factors that could affect consumers decision to buy POMs online, which have been identified in this thesis, are not only from an internal origin (internal attribution of blame), they could be also attributed to external factors that are out of consumers' control such as the shortages of the medicines, or the role that search engines, social media, and review websites play as these Internet platforms facilitate the negative marketing used by the illegal sellers of medicines which in turn shape consumers' perception about the purchase. In other words, these Internet platforms are used by the illegal sellers of medicines as a tool through which they can manipulate and deceive consumers, such as the review websites which are used to increase the reputations and ratings of the illegal sellers' websites.

In light of the above, the overarching interpretation of the consumers' behaviour provided by the current thesis could provide the basis for policymakers and regulators to address the

problem of fake medicines available on the Internet by focusing on the consumers themselves, alongside the effort made to fight the supply side. The next section provides recommendations to the organisations that fight the availability of fake medicines available on the Internet.

5.2. Recommendations

5.2.1. Consumer Education Needed (Enhance awareness campaigns effectivity)

Despite the availability of public awareness campaigns that educate people about the risks of fake medicines available online and how to purchase medicines safely from the Internet, people still purchase POMs from the Internet. Study 2 in the thesis checked the prevalence of people who had purchased POMs online without healthcare provider supervision by a mini poll which was collected from 1321 UK-based adults registered with Panelbase (A market research company that was hired to help in recruiting the study participants) and found that 136 (10.3%) bought POMs from the Internet without involving their physician. Previous studies conducted in different contexts have also provided evidence of the high prevalence of people purchasing POMs without medical supervision (Alwhaibi *et al*., 2021; Fittler *et al*., 2018a; Moureaud *et al*., 2021). This evidence raises questions about the effectiveness of existing public awareness campaigns. Therefore, greater efforts are needed to ensure patient safety when purchasing medicines from the Internet. In this regard, this thesis offers the following evidence-based recommendations:

1- Broaden the scope of the campaign to include the originality and complexity of the drug manufacturing process. This thesis found that consumers trust medicines based on their appearance (i.e., medicines obtained 'look' genuine). Moreover, this thesis found that potentially the public also believes that medicines available online come

with superior quality. Therefore, this thesis recommends public awareness campaigns to not only focus on the risks of fake medicines, but also to focus on the fact that medicines are highly controlled and manufactured complex substances that require specific storage conditions and whose integrity, safety, and effectiveness cannot be guaranteed if purchased from the Internet.

2- The timing of conducting the awareness campaigns is important. This thesis found that people are more likely to purchase POMs from the Internet in specific circumstances and situations such as medicine shortages or pandemics outbreaks. Therefore, this thesis recommends conducting more public awareness campaigns during specific circumstances that cause medicines shortages or work overload in healthcare systems such as the recent outbreak of the COVID-19 pandemic.

3- This thesis provided evidence that influencers and public figures could influence consumer's decision to purchase POMs from the Internet. Influencers and public figures could play a harmful role in terms of patient safety. An example of this is the US ex-president Donald Trump's announcement on Twitter (Figure 5.2) in which he endorsed hydroxychloroquine and azithromycin as a treatment that could be useful for COVID-19 patients. This announcement surged the public interest and demand for hydroxychloroquine (Englund *et al*., 2020). After that, the United States FDA announced that these medicines showed no benefit in decreasing the likelihood of death or speeding recovery caused by COVID-19 (United States Food and Drug Administration, 2020b). However, influencers could play a beneficial role too as they could be used to deliver messages that align with public heath campaign's objectives. Influencers could be a powerful tool, as they can reach mass audiences, to raise public awareness about the health risks associated with the purchase. Furthermore, they could be motivated to combat misinformation such as misinformation about COVID-

19 and medications. Thus, this thesis recommends exploring the use of influencers to deliver the content of public awareness campaigns.
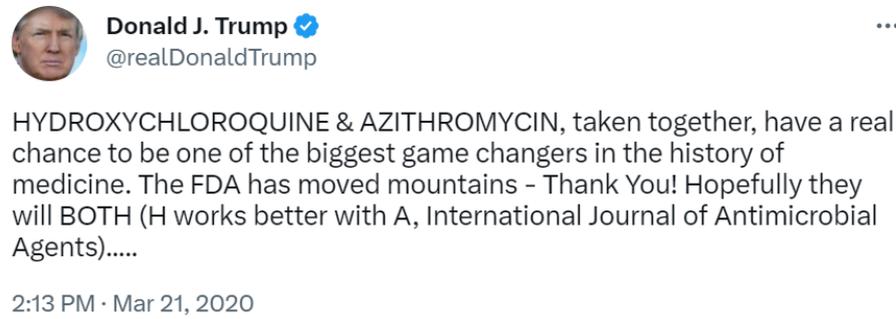
Figure 5.2. Donald Trump's announcement on Twitter in which the endorsed hydroxychloroquine and azithromycin

5.2.2. Prescription charge reduction (In England)

One interesting finding of this research is how the prescription charge could drive people to end up buying fake medicines. Prescriptions in Wales, Northern Ireland, and Scotland are for free, however, in England only certain categories such as young people (under 18 years) or people over 60 years old (National Health Services, 2020) are entitled to free prescription charges, whereas other people in England should £9.65 per item (as of June 2023). This prescription charge might be not affordable for some people as shown in the findings (Study 2), which could lead them to search for other more affordable alternative sources of medicines including the Internet, which is a potential source of fake medicines.

This thesis found that the prescription charge could therefore lead some people to end up buying fake medicines. Moreover, there was a previous call to abolish the prescription charge in England as it financially burdens people (Donyai., 2014). In contrast, the CAIS drug and alcohol rehabilitation centre in the UK has argued that removing the prescription charges could increase mortality rates caused by addiction (Donyai., 2014). Moreover, Donyai (2014)

argued that free prescription charges could increase medicines wastes which already cost the NHS hundreds of millions of GBP.

In order to address this contradiction, this thesis recommends exploring a reduction in the prescription charge as a way of minimising the purchase of medicines from the Internet, thus, protecting consumers from purchasing fake medicines.

This recommendation could be applied to other countries that have healthcare systems that require high health insurance surcharges.

5.2.3. Long waiting times

Based on the thesis findings, one of the factors that could play a role in increasing the purchase of prescription medicines from the Internet is the long waiting times that patients have to wait in order to receive their treatment which was found to have reached in some cases more than two years (according to the findings from Study 2). These long waiting times can be frustrating and can negatively impact patients' health and outcomes (Reichert and Jacobs *et al*., 2018).

Accordingly, this research offers the following recommendations that could help solve this problem:

1- Hiring more staff to reduce staff shortages, thus reducing the long waiting times.

2- Increase the number of authorised prescribers by authorising pharmacists to prescribe medicines for certain conditions or in certain situations, which in turn could reduce the long waiting times as the workload will be distributed.

3- Healthcare process improvement by assessing and evaluating the processes to identify any areas that may be causing delays in order to eliminate unnecessary stages, or to identify the areas of improvement in order to increase the efficiency of

the process (e.g., checking if the healthcare providers and administrators handle the high workload efficiently, if not, then provide the suitable training)

4- Using technologies to reduce the waiting times which can help in reducing the workload or improve the efficiency.

5.2.4. Addressing the accountability problem

According to the current thesis findings, various Internet platforms including search engines, social media platforms, online payment systems, customer review websites and the online forums could influence consumer's decision to purchase prescription medicines from the Internet, thus putting consumers at risks of purchasing and consuming fake medicines. These Internet platforms could facilitate the purchase of prescription medicines in different ways: first, it could be used by consumers to obtain different health information on how to use medicines that require complex instructions of use and healthcare provider supervision in order to prevent any adverse events; thus, increasing consumers self-efficacy and perceived behavioural control which could drive consumers to purchase prescription medicines without involving the healthcare providers and without any medical supervision. Second, these Internet platforms could also provide direct and private communication channels between buyers and illegal sellers. Illegal sellers can use these social media platforms to promote their products and interact directly and privately with potential customers through direct chat features. Moreover, search engines could be used by consumers to find rogue Internet pharmacies. Furthermore, the review websites play a role in triggering consumers to purchase POMs from the Internet and end up buying fake medicines, as the illegal sellers of medicines could be manipulating the reviews websites by posting fake positive reviews, which can increase the website rating and visibility, and make it more challenging for consumers to distinguish between the legal sellers from the illegal ones. Finally, online payment systems

could facilitate the online purchase of fake medicines, as these payment systems could protect consumers in case a financial scam occurs, thus reimbursing consumers for any financial loses associate with the purchase, thus, giving the consumers the necessary incentive and confidence to make the purchase.

All the Internet platforms mentioned above could facilitate the purchase of fake medicines, however, none would be accountable if any health or financial problems happened with the purchase except the consumers themselves.

In light of the above argument, this thesis recommends to policymakers the creation of legislation and policy that increases accountability by holding search engines, social media platforms, online payment systems, and customer review websites responsible if they permit illegal online sales of medicines to happen through them.

5.2.5. Using the dot pharmacy domain (.pharmacy)

Based on the current thesis findings, people trust online sellers of medicines based on how the website looks. Several website features can have an impact on how consumers perceive the trustworthiness of a website. These features include the website designs, the availability of contact and address information, the availability of security features such as the options of using secure payment systems such as PayPal, the availability of accreditation logos, and the availability of clear product information. This is worrying because previous studies have shown that illegal sellers' websites could imitate these features (Fittler *et al.,* 2022a; Fittler *et al.,* 2013a; Ozawa *et al.,* 2021; Penely *et al.,* 2021). Illegal sellers of medicines could use deception website features that look like legitimate ones. These deception features include the use of fake accreditation logos, displaying fake contact and address details, offer different payment options similar to the payment options available at legitimate websites.

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In light of the above, this thesis recommends and supports the use of top-level domains that are exclusive to legitimate pharmacies such as the (.pharmacy) top-level domain which was introduced by the National Association of Boards of Pharmacy (NABP) in 2014 (Mackey and Nayyar, 2017). To register with this domain, any sellers of medicines must undergo a verification process to confirm that they are authorized, operating legally and comply with the rules and regulations.

Using the dot pharmacy domain as a tool to identify legal sellers of medicines could be more practical as it could be easily recognised because using this domain could increase the visibility of legal online pharmacies (Penley *et al.,* 2021). However, the adoption of the dot pharmacy domain has not been widespread outside the United States and Canada (Mackey and Nayyar, 2017). This is because the accreditation system for the dot pharmacy domain has been established based on the healthcare systems of these countries, making it less applicable or relevant in other regions. Furthermore, several online pharmacies already have an established online presence with other domain names (such as *boots.com*, or *Pharmacy2u.co.uk*), and the transition to the dot pharmacy domain would require significant changes which could disrupt the company's image.

5.2.6. Healthcare providers' role

Based on the thesis findings, healthcare providers could play a role in influencing the patient to purchase prescription medicines from the Internet, particularly when doctors refuse to prescribe a medicine to patients who thought this would be useful to them. Accordingly, this thesis supports a strong recommendation to provide training to healthcare providers to enhance the relationship quality between the healthcare provider and the patients which leads to several positive impacts such as increasing communication and trust between both parties. Consequently, if patients thought about buying medicines from the Internet, they will refer to

their doctors first (Bowman *et al*., 2020). Furthermore, healthcare providers could play a beneficial role by educating patients about the risks of purchasing prescription medicines from the Internet and how to purchase medicines safely.

5.3. Strength

This theory-based research has identified the breadth of reasons that lead people to end up buying fake prescription medicines from the web. In other words, this research explored the factors that could affect consumer's decision to purchase prescription medicines on the Internet, which is a potential source of fake medicines. One strength of this thesis is that it was conducted using triangulation of different relevant sources of data which enhanced the credibility of the findings and increased the confidence in the results through the confirmation of a proposition using three relevant sources (Media, consumers, and previous studies' findings). Another strength of this thesis is that it has adopted qualitative data analysis methods which enable an in-depth understanding of the research problem.

One key strength of this research is that it relies on behavioural theories (i.e., TPB, TDF, and COM-B model) which have been widely applied in a variety of contexts for interpreting and explaining consumer and health behaviours, which increase the credibility of the thesis findings. These theories worked as conceptual lenses through which the analysis has been done, thus helping in simplifying the study of complex consumer behaviour.

This thesis includes diversified views because the data used in this thesis was not limited to people in the UK as the data from the Study 1 and Study 3 have explored articles from different locations (i.e., internationally). The analysis of these diversified views enables the interpretation of the behaviour of consumers from different cultures who were based in countries with different healthcare systems.

One more strength of this thesis is that it focuses on the consumers' perspective and views, which increases the opportunity to get to the heart of what consumers want and need that leads them to purchase prescription medicines from the Internet, thus enhancing the validity and reliability of the research findings.

5.4.   Original contributions to knowledge

According to previous studies, it is almost impossible to keep the Internet free from illegal sellers of medicines due to the complex online supply chain of medicines as well as the hiding techniques used by the illegal sellers of medicines (Hall and Antonopollus, 2015; Fittler l*et al.*, 2013a). Therefore, one potential solution of the problem of purchasing fake prescription medicines on the Internet is to interpret and analyse why consumers themselves purchase prescription medicines from the Internet. Thus, this PhD project contributes to the literature as it is one of the first comprehensive investigations that explores and interprets consumer behaviour of purchasing POMs from the Internet. Furthermore, the interview study (Study 2) conducted in this research is the first interview study conducted in the UK that aims to explore the reasons why people end up buying fake medicines online. Another contribution of this thesis is that the media-based study (Study 1) is also the first study that explores the media coverage of the problem of purchasing fake POMs using the Internet. One more contribution of this thesis is that (to the best of research knowledge) it includes the first systematic review of the literature (Study 3) that focuses on the factors that could influence consumer's decision of purchasing prescription medicines over the Internet.

5.5.   Limitations

This thesis identified the breadth of reasons that drive people to buy medicines using the web. One limitation of this thesis does not involve statistical analysis as it is based on a qualitative research approach which limits the ability to draw conclusions based on statistical

significance. In other words, although this thesis identified the breadth of factors that could affect the behaviour of purchasing POMs from the Internet, this does not necessarily mean that every factor is of equal relevance and with the same influential effect on the behaviour. Therefore, further qualitative research needs to be carried out in order to validate the thesis findings.

Another limitation of this thesis is that non-English language articles were excluded from Study 1 and Study 3 which could affect the generalisability of the findings and lead to a biased or incomplete understanding of the research topic.

5.6. Future research directions

This section considers future research that may complement or expand upon the current work.

5.6.1. Quantitative survey study

This theory-based thesis used a qualitative research approach to provide an in-depth understanding of the breadth of reasons that drive people to buy prescription medicines from the Internet, which is a potential source of fake medicines. However, the phrase "breadth of reasons" does not necessarily mean that every factor is of equal relevance or importance. This means that some factors may be more influential than others, and that some factors may not have a significant effect. Therefore, more work will need to be done to determine the significant level of each of the factors identified in this thesis. This could be achieved through conducting a quantitative survey study in the future to provide more validation of the thesis findings and to obtain a broader view and more generalisable results about the factors that influence people decision to buy POMs from the Internet.

This quantitative survey study will be conducted using the findings of the current thesis (i.e., the questionnaire will be developed based on the results revealed from the triangulation

of the 3 data sources, namely, the news media, consumers actual experiences, and previous studies' findings). This will enable the development of accurate and valid measurements to measure the reasons that lead people to buy POMs from the Internet.

Moreover, the theories adopted in this thesis will enable the development of a valid and reliable measure as these theories have been applied widely by previous researchers to conduct quantitative survey-based studies in different contexts.

In the section below, a first draft of the questionnaire has been developed using the influential factors identified in the current thesis (Figure 5.1).

5.6.1.1. Questionnaire development

This section aims to develop an initial draft questionnaire that will be used to conduct a study in the future which aims to explore the reasons that lead people to end up buying fake medicines by identifying the factors that influence people's decision to purchase POMs on the Internet. This study will use the framework shown in Figure 5.1. One strength of using this model is that it was developed using the findings of 3 previous studies that utilise 3 different sources of data. Another strength of using that model is that it was built using validated behavioural theories (COM-B model and the TDF).

5.6.1.2. Aim and objectives

The aim of this study will be to explore the prevalence of purchasing POMs from the Internet as well as identify the reasons that drive people to make this purchase. The objectives of this study will be to conduct an online cross-sectional survey study to:

1- Explore the prevalence of people purchasing POMs from the Internet.

2- Identify the factors that influence people's decision to make the purchase using the model shown in Figure 5.1 as a conceptual framework.

3- Explore peoples' perceptions about the online availability and risks of fake medicines.

5.6.1.3. Data collection and participant recruitment

The data in this cross-sectional study will be collected using a web-based survey which will be distributed to people in the United Kingdom. The study population will be adults (aged ≥18 years) based in the United Kingdom who have experience of purchasing POMs medicines using the Internet. Purposive sampling will be adopted to achieve diversity in participants' experiences and demography. Individuals who have purchased POMs before 2019 will be excluded to ensure that the participants' recall of their experiences would not be hindered by a large time gap. Participants who do not meet this inclusion criteria will be filtered out.

5.6.1.4. Questionnaire sections

The study questionnaire consists of 5 sections: introduction and screening questions, participants experience information, the research main questions to explore participants opinions about the reasons for purchasing POMs from the Internet, questions to explore people's perception of the online availability and risks of fake medicines, and finally the demographics questions (Appendix 13). The questions used to achieve the study objectives have been developed in two ways, the first way was by using previous studies that explore consumers' behaviour of purchasing different products (e.g., food or e-cigarettes) from the Internet. In this way, the questions used have been modified to fit the study context (i.e., changing the products to POMs). The second way was by creating new questions that are related to the research objectives and based on the current thesis findings.

5.6.1.4.1. Section 1 (Questionnaire introduction and screening questions)

The first section consists of two parts, the introduction, and the screening questions (Section 1, Appendix 13). The introduction includes a brief explanation of the research

purpose, the survey process, explaining that the respondent's participation is voluntary, and that their data will be kept confidential, and that anonymity will be maintained. It will also include an informed consent sentence to make sure that the participants fully understand the study and that the participation is voluntary.

The second part of the first section of the questionnaire is the screening questions. These questions will be at the beginning of the survey and will be used to determine respondents' eligibility for the study based on the inclusion criteria. Noneligible respondents will be filtered out from the study at this stage. Additionally, these simple questions will enable the participants to warm up before the questionnaire main questions. These questions will enable the achievement of objective one of this study (i.e., the prevalence of purchasing POMs using the Internet)

5.6.1.4.2. Section 2 (Questions about participant's purchasing experiences)

The second section of the questionnaire includes questions about the participants' purchasing experience (Section 2, Appendix 13). Particularly, the section will include questions about medicines purchased by the participant, participants' location while making the purchase, medicine source, end-user of the medicines, problems with the purchase, healthcare professional supervision, satisfaction with the purchase, purchase frequencies, last purchase date, willingness of future purchase, health insurance availability, knowledge on how to distinguish legal sellers, and participant's awareness about the accreditation logo.

5.6.1.4.3. Section 3 (Exploring the reasons for purchasing POMs from the Internet)

The third section includes the main research questions that explore the factors that influence consumer's decision to purchase POMs using the Internet. The constructs in the

integrated model (Figure 5.1) which formed from the findings of this thesis have been used to develop the survey questions. The construct (i.e., latent variables) are the perceived benefits and perceived risks of the purchase, emotional influence, the perceived facilitators and barriers of the purchase, knowledge of the purchase, trusting beliefs, social influencing factors, and environmental factors. These constructs are latent variables that could not be measured directly, however, the dimensions (observable variables) available (Tables 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, and 5.7) will enable the measurement of these latent variables.

In total, 159 items were developed in this section of the initial draft of the questionnaire (Section 3, Appendix 13). All the questions in this section have used at least 5 options per scale to capture a wider range of perceptions about the research problem (Nielsen *et al*., 2017; Weng, 2004).

Perceived benefits are categorised into six dimensions encompassing 24 items, covering aspects like convenience, cost savings, privacy, bypassing gatekeepers, medicine availability, and product quality. On the other hand, perceived risks consist of eight dimensions, represented by 35 questions, focusing on concerns related to medicine safety, quality, cost, online payments, accountability, legality, confidentiality, and delivery delays. Additionally, the study explores the role of emotions in influencing consumer behavior and identifies eight facilitators that encourage online POM purchases. It also delves into barriers that may hinder or delay such purchases, categorised into five dimensions. Furthermore, the study evaluates consumers' knowledge about the purchase, assessing procedural knowledge, awareness of potential negative consequences, understanding of prescription medicine usage instructions, and knowledge in distinguishing legal sellers from illegal ones. Trusting beliefs are examined through three dimensions: website features, product appearance, and previous purchase experience.

5.6.1.4.4. Section 4 (Consumer's perception of the online availability and risks of fake medicines)

The fourth section includes questions to explore peoples' perception about the availability of fake medicines on the Internet and the risks associated with these fake medicines. (Section 4, Appendix 13) illustrate these questions.

5.6.1.4.5. Section 5 (Demographic data)

The fifth and final section includes questions about demographic data, particularly, the participant's sex, age, Location, ethnicity, and employment status. As these questions might include some sensitive information, they have been placed at the end of the questionnaire so that respondents will feel more comfortable sharing this information later in the questionnaire (Krosnick, 2018). (Section 5, Appendix 13) illustrates these questions.

5.6.1.5. Questionnaire validity

Although some questions in the survey have been developed using pre-validated surveys used in previous studies, the majority of the survey questions have been developed by the researcher meaning that these questions need to be validated. Thus, the overall questionnaire will be evaluated by conducting interviews with a sample of academic experts, and a sample of consumers with actual experiences of purchasing POMs from the Internet. After that, a pilot test of the questionnaire with a small representative group of individuals will be conducted in order to check the clarity of the questions and to provide a coherent research questionnaire (Kumar, 2011). This process is likely to narrow down the final list of questions considerably.

5.6.1.6. Ethical approval

Due to the anonymised nature of the deidentified study data, no ethical approval will be necessary. However, as the study will adopt interviews to validate the survey, then ethical approval for this stage will be obtained from the University of Reading ethics committee.

5.6.1.7. Reporting tool

This study will use the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) (Sharma *et al*., 2021). This tool composes of 21 items that are used to check the transparency and accuracy of all the parts of the study (Title and abstract, introduction, methods, results, discussion, and other sections such as the conflict of interest or the acknowledgement). Using this tool will enhance the quality of reporting the survey study, thus making it easier for readers to understand the research (Sharma *et al*., 2021).

5.6.2. Behavioural intervention study

This thesis used the COM-B model as a guiding theory to identify the reasons why people end up buying fake medicines from the Internet. One benefit of using the COM-B model theory is that it was used to form the behavioural change wheel (BCW) which enables the development of effective interventions and behavioural change techniques. The BCW was discussed in detail in section (1.10.6). In brief, the BCW is a framework used to design effective behavioural changing techniques. This framework consists of the COM-B model constructs, intervention functions, and the policy categories (Figure 1.11). Linking these parts to gather will enable the development of effective behavioural change techniques (Michie *et al*., 2011).

The process of designing interventions was categorised into 3 stages over 8 steps as shown in Figure 5.3 (Michie *et al*., 2014; Ojo *et al*., 2019). The first stage is to understand the target behaviour which aims to identify what needs to be changed. This stage starts by identifying

the research problem by exploring the literature, then selecting the behaviour that needs to be changed and specifying that behaviour by identifying who would perform the target behaviours, the context, and its consequences. The final stage at this stage is to identify what needs to be changed, and this is done using the COM-B model and the TDF frameworks. The current thesis has almost completed this stage as it has identified the research problem first which is "reasons that lead people to end up purchasing fake medicines", and then selected the behaviour that needs to be changed which is "the purchasing of purchasing prescription medicines using the Internet", and finally it has used the COM-B model and the TDF to provide an overarching view about the breadth of reasons that cause this behaviour, which presented in (Figure 5.1). A further step is needed to complete stage one, which is the identification of the importance and the significance level of the factors identified from the thesis findings which will be achieved by conducting the cross-sectional survey study which was explained in the sections below. After that, (stage 1) will be marked as completed and the findings will be ready for further advancement by starting to create intervention techniques to change behaviour (Stages 2 and 3) which will be explained in the paragraphs below.
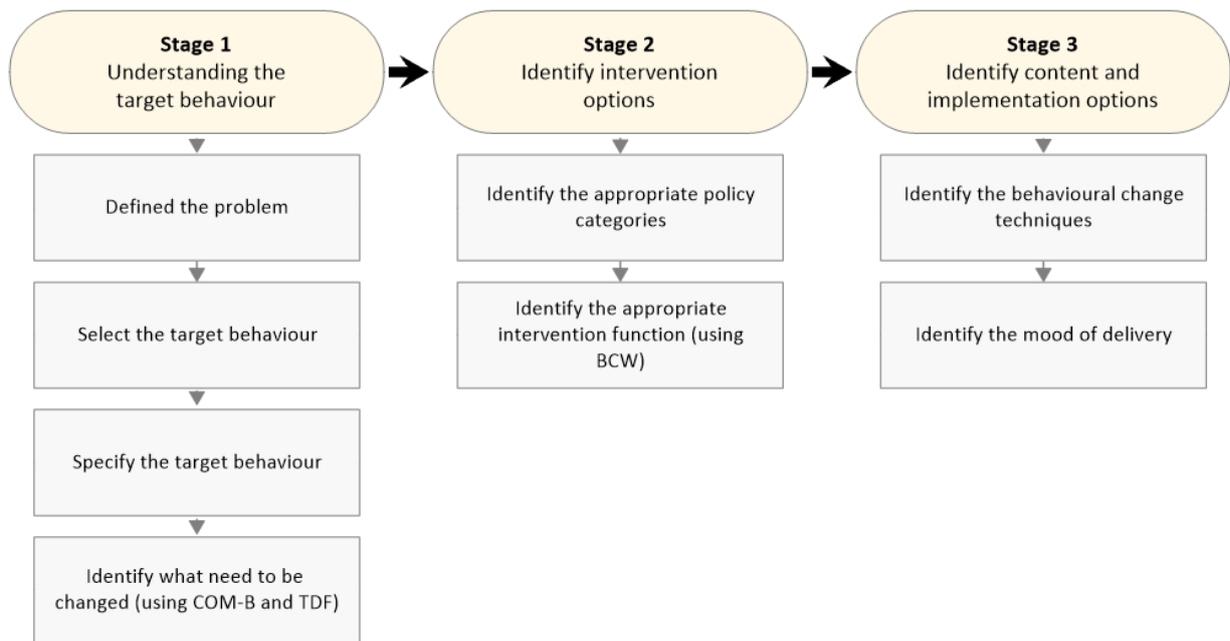
Figure 5.3. Stages of designing interventions using the BCW.

The second stage is to identify the intervention options and the policy categories required to change the behaviour. Section (1.10.6) in Chapter 1 illustrates the links between the COM-B model construct, the intervention functions, and the policy categories. In other words, it illustrates how to select the suitable intervention function and policy categories based on each construct of the COM-B model. As an example, Table 5.8 below illustrates findings from the current thesis linked to the COM-B model constructs, intervention functions, policy categories, and behavioural change techniques.

Table 5.8. Examples on how to use the BCW to develop behavioural change techniques.

Causes of purchasing POMs online (from the Thesis findings)	COM-B model construct	Intervention function	Policy category	Behavioural change techniques
Fear of purchasing POMs without healthcare provider	Automatic motivation	Persuasion	Communication / Marketing	Increasing the negative emotions (i.e., fear) related to the purchase through communication and marketing or using influencers

involvement. (emotion)				
Healthcare provider (social factors)	Social opportunity	Enablement	Environmental/ Social planning	Increase the social support by the healthcare provider
Medicine shortages (environmental factors)	Physical opportunity	Environmental restructuring	Regulations	Regulations (Address regulatory barriers delays in approval of new drugs or restrictions on importing drugs from other countries)
High prescription chargers (Environmental factors)	Physical opportunity	Environmental restructuring	Regulations	Reduce or remove prescription charges
Easy accessibility to POMs without the need for a prescription (facilitator)	Reflective motivations	Persuasion	Communication / marketing	Educate consumers about the risks of the purchase and that they will be the only ones accountable if any problem happened
Low knowledge about the risks of the purchase (knowledge)	Psychological capability	Education	Communication / marketing	Educate consumers about the risks of the purchase using public awareness campaigns

The final stage is to identify the behavioural change techniques and the mode of delivering these changes (for example: face to face or virtually). When selecting and designing the most appropriate behavioural change techniques, the APEASE criteria (acceptability, practicability, affordability, effectiveness, side effects, equity) should be taken into consideration. Acceptability refers to the extent to which the intervention is tolerated and accepted by the individual to whom the change will be made. The practicability refers to the practicality of the intervention with regard to the time, resources and effort required to apply the intervention. Effectiveness refers to the intervention effectivity in reaching the desired outcome. The affordability means that the intervention should be within the individual's financial capability. The Side effects refer to the negative outcomes resulting from applying

the intervention. Equity means that the intervention does not create social inequalities. Applying the APEASE criteria will enable the development of effective behavioural change techniques.

5.7. Conclusion

Millions of medicines have been detected on the Internet and thousands of websites have been closed because they operate illegally and offer fake medicines to the public. Fighting online suppliers and websites that sell fake medicines is complex due to the deception techniques used by online suppliers as well as the absence of effective international regulations. It was even described as "impossible" to make the Internet free from the illegal sellers of medicines (Fitller *et al*., 2013). All these lead to the need to search for alternatives to solve the problem, and there is no better alternative than focusing on the consumers themselves as the consumers play a crucial role in the buying process of medicines from the Internet because they are the ones who ultimately make the decision to purchase medicines. Therefore, the current thesis has explored and analysed consumer behaviour of purchasing POMs from the Internet. Hopefully, the findings of the current thesis could provide the basis to minimise the purchasing of prescription medicines and to protect people from the risks of fake medicines available on the Internet.

Based on the thesis findings, people are aware of the online availability and risks of fake medicines available on the Internet, however, they are still purchasing medicines from the Internet. This is problematic as the Internet is a potential source of fake medicines. This thesis adopted a detailed qualitative research approach to provide valuable insights into the breadth of reasons that lead people to end up buying fake medicines by exploring factors that influence consumers decision of purchasing POMs from the Internet, which is a potential source of fake medicines. The COM-B model, TDF, and the TPB theories have been

employed to guide the research process by providing a set of relevant constructs that facilitated the data analyses and increased the findings' credibility. These theories are well-established and based on years of research and empirical evidence. Thus, using these theories enabled deeper and more valuable insights into the complex factors that influence the behaviour of purchasing POMs from the Internet.

This thesis has used multiple sources of data which enable the development of a comprehensive model that highlighted consumers complex beliefs about the cognitive, affective (emotional), environmental and social influences on consumers behaviour of purchasing POMs from the Internet.

The findings of the current thesis should act as a valuable source to increase the effectiveness of the public awareness campaigns as the findings could provide the basis to develop evidence-based campaigns that target the specific needs and behaviours of the consumers, which could minimise the purchasing of POMs from the Internet.

Future research can build on these findings. A quantitative approach could be used by conducting a cross-sectional survey study which relies on the current study findings to obtain broader views of the research topic in different contexts and cultures. Furthermore, an intervention study could be conducted to provide behavioural changing techniques to minimise the purchase of POMs from the Internet, thus protecting consumers from the risks of fake medicines.

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Appendices

Appendix 1. Included articles' characteristics.

#	Title	Year	Publisher	Location
1	Online HRT health warning	18-Aug-19	The People	UK
2	'Miracle' weight loss injections meant for the clinically obese are sold openly online without prescription	23-Feb-20	The Sun	UK
3	Abortion Pills Should Be Everywhere	05-Aug-19	The New York Times	USA
4	Covid-Vaccine Scams Spread, Preying on an Anxious Public	24-Feb-21	Wall Street Journal	USA
5	China also battles opioid problems	01-Jan-20	Telegraph Herald	USA
6	Pharmacy regulator sets safety rules for online drugs purchases	16-Apr-19	The Guardian (Online)	UK
7	Meghan's war on diet pills scammers	11-Aug-19	Sunday Mirror	UK
8	Criminals cashing in on pandemic panic; Everything from counterfeit medical masks to fake treatments found online	29-Apr-20	Standard - Freeholder	Canada
9	FAKE VIAGRA SEIZURES JUST KEEP ON	09-Aug-19	The Daily Mirror	UK
10	It is illegal use of the Duchess's name and we will be taking action	11-Aug-19	Sunday Mirror	UK
11	Dangerous coronavirus 'vaccines' being sold on dark web	01-May-20	The Canberra Times	Australia
12	Diabetics resort to black market	24-Jun-19	Star Tribune	USA
13	HRT crisis as patches run out on the high street in the UK: Shortage forces desperate women to seek menopause treatment from abroad	24-Aug-19	Daily Mail	UK
14	Men warned not to use 'natural Viagra' lichen because it could be toxic	30-Aug-19	Daily Star (Online)	UK

15	Scots teens 'blind to risks of sedatives'	01-Sep-19	Sunday Times	UK
16	Illegal 'skinny jabs' openly sold online	23-Feb-20	Sunday Times	UK
17	Deadly drug sold as Xanax in Greenville, police warn Drug Enforcement Unit recovers pill presses in Greer apartment	24-Feb-21	The Greenville News	USA
18	VIAGRA FOOLS	09-Apr-19	Daily Star	UK
19	HRT drugs rationed amid UK shortage set to last for months	24-Aug-19	Telegraph	UK
20	Fake vaccines, 'cures' for sale on dark web supplies	30-Apr-20	The Age	Australia
21	Student pills alert	06-Oct-19	The Sun	UK
22	STROKES WARNING OVER FAKE VIAGRA	23-Apr-19	The Sun	UK
23	FDA warns Ontario holistic clinic to stop selling fake coronavirus cures	10-Mar-20	National Post (Online)	Canada
24	Scamwatch	02-Mar-20	Southern Highland News	Australia
25	Social media awash with fake remedies as snake-oil sellers flog harmful products	29-Mar-20	Sunday Age	Australia
26	The drugs don't work	30-Jul-19	iNews	UK
27	Alliance for Safe Online Pharmacies Issues Public Comment on Patent & Trademark Office Notice	10-Jan-21	Targeted News Service	USA
28	From counterfeit medical masks to bogus medical treatments, criminals cashing in on pandemic panic	29-Apr-20	Daily Gleaner	Canada
29	UK joins global fight against 'dangerous' fake medicines touted online	20-Mar-20	The Daily Telegraph	UK
30	How COVID-19 fuels spike in fake drugs	27-Aug-20	The Guardian, Lagos	USA
31	INTERPOL Global Operation Sees a Rise in Fake Medical Products Related to COVID-19	20-Mar-20	Targeted News Service	USA
32	Coronavirus scams infecting the Internet	27-Feb-20	Boston Globe	USA

33	'I could get 500 tablets a month': the ease of buying opiates online	26-Apr-19	The Guardian (Online)	UK
34	Criminals pose as health officials to trick virus victims	19-Mar-20	Daily Mail	UK
35	Fraudsters cash in on coronavirus	26-Mar-20	Mmegi ; Gaborone	USA
36	Interpol warns of online scams offering fake Covid-19 vaccines, treatments	09-Dec-20	Indian Express	India
37	It only takes one ... there is no second chance	20-Aug-20	News - Star	USA
38	U.S. Attorney U.S. Attorney COVID-19 Fraud	25-Mar-20	Targeted News Service	USA
39	Deadly dangers of mail order medicine	27-Oct-19	Sunday Mirror	UK
40	Online demand for hydroxychloroquine surged 1,000% after Trump backed it, study finds	29-Apr-20	The Guardian (Online)	UK
41	Fake abortion pills targeting Maltese women on Facebook, activists warn	16-May-20	MaltaToday	USA
42	Public warned not to buy medicine online which claims to cure Covid-19	18-Sep-20	Irish Examiner	Ireland
43	Online markets deal in death	17-Jul-19	The Times	UK
44	'Stop Sales by Unlicensed E-pharmacies' [Companies Pursuit of Profit] DCGI asks state drug regulators to implement Delhi HC order that barred entities without licences from selling medicines online	04-Dec-19	The Economic Times (Online)	India
45	ILLICIT MEDICINES SEIZED IN SWOOPS	20-Mar-20	The Daily Mirror	UK
46	UK online pharmacies accused of 'aggressive' tactics to sell opiates	26-Apr-19	The Guardian	UK
47	Dangerous fake drugs bought online with Google	09-Sep-19	Sunday Times	UK
48	Council of Europe COVID-19 - How to Protect Against Falsified Medical Products	09-Apr-20	Targeted News Service	USA

49	Scammers Are Setting Up Fake Covid Vaccine Websites	26-Feb-21	Wall Street Journal (Online)	USA
50	Meghan Markle fury as scammers claim she used dangerous diet pills after Archie's birth	11-Aug-19	Daily Star (Online)	UK
51	Online 'miracle cures' pose risk to health, warns	04-Apr-20	Telegraph.co.uk	UK
52	Online pharmacy Chemists, druggists to meet min today	28-Aug-19	The Times of India	India
53	New Survey Reveals Dangerous Disconnect in American Perceptions of Online Pharmacies More Consumers Buy Medicine Online Despite Not Knowing the Risks of Illegal Internet Drug Sellers	19-Oct-20	PR Newswire	USA
54	Public warned against buying illicit medicines	27-Sep-19	The Mercury	South Africa
55	Over 2,500 online listings of health products removed Items made false, misleading claims or were adulterated Health Sciences Authority	20-Mar-20	The Straits Times	Singapore
56	Shopping abroad for drugs How to avoid legal risks and bad medication	11-Sep-19	Chicago Tribune	USA
57	Pharmaceutical association urges DCGI to stop online pharmacies	17-Aug-19	Daily News & Analysis	India
58	National Association of Boards of Pharmacy	06-May-20	Targeted News Service	USA
59	Z-pills UK	07-Mar-21	The Sun	UK
60	Cyber crooks play on corona pandemic panic	28-Apr-20	The Times of India	India
61	Amanda Holden 'furious after being falsely linked to diet pills'	01-Aug-19	Daily Star (Online)	UK
62	AWARENESS CAMPAIGN ON RISKS OF BUYING MEDICINES ONLINE	02-Oct-19	Malaysian National News Agency	Malaysia
63	Prescription Drugs to Your Door, Nearly as Easy as Ordering Pizza	03-Apr-19	New York Times	USA

64	Struggling to perform Get a diabetes check	31-May-20	Mail on Sunday	UK
65	Be careful when considering buying any medication online	22-Dec-20	Philadelphia Tribune	USA
66	Chinese actresses jailed for selling fake diet pills	20-Apr-19	South China Morning Post	China
67	DOH warns public against buying medicines at online shopping sites	04-Dec-19	Manila Bulletin	India
68	Transgender patients self-medicating over NHS waits	18-Feb-20	BBC news	UK
69	Six arrested following seizure of prescription-only and unlicensed medicines in the West Midlands	10-Mar-21	M2 Presswire	UK
70	Seizures of illegal diazepam tablets double in a year - BBC News	05-Dec-19	BBC news	UK
71	UK joins global fight against 'dangerous' fake medicines touted online IN BRIEF	20-Mar-20	The Daily Telegraph	UK
72	Derry is awash with fake drugs. Too many young people are dying'	06-Jul-19	Derry Journal	UK
73	Don't let our young fall prey to dangerous fake	26-Jul-20	The Independent (Daily Edition)	UK
74	Uncomfortable truth of online marketplaces	26-Jul-20	Mail on Sunday	UK
75	Chemists demand ban on online sale of medicines [Aurangabad]	19-Dec-19	The Times of India	India
76	Covid-19 spawns illegal trade of PPE and antiviral drugs	01-Jul-20	Mint	India
77	GPs may hand out 'benzos' in effort to save lives	07-Mar-21	Sunday Times	UK
78	PILLS, THRILLS & BELLYACHES	23-Apr-19	The Sun	UK
79	Philippines: Cordillera FDA heightens drive vs. fake medicines	10-Jul-19	Asia News Monitor	Thailand
80	'Seeing Others Suffer is Too Stressful' - Why	07-Sep-19	Targeted News Service	USA

81	UK medicines and medical devices regulator investigating 14 cases of fake or unlicensed COVID-19 medical products	06-Apr-20	Presswire	UK
82	WEB MEDS ALERT [Eire Region]	28-Mar-20	The Sun	UK
83	Cheaper drug prices in the U.S. shouldn't involve raiding Canada's medicine cabinet Importing prescription medication from us is a ridiculously simplistic idea that is untenable both politically and practically	29-Jul-19	The Globe and Mail (Online)	Canada
84	Five arrested following seizure of prescription-only and unlicensed medicines in the West Midlands	11-Mar-21	M2 Presswire	UK
85	Alliance for Safe Online Pharmacies Issues Public Comment on U.S. Trade Representative Notice	01-Feb-21	Targeted News Service	USA
86	NIL BY MOUTH... THE FAKE MEDICINES PUTTING LIVES AT RISK	20-Aug-2021	Daily Express	UK
87	Beware of fake Remdesivir offer on social media	01-May - 2021	The Times of India	India
88	'Potentially very dangerous' NHS prescription scam emerges sparking serious warning	21-Jan-2022	Express (Online)	UK
89	Amazon reviews push horse dewormer for covid, despite FDA warnings	03-Sep-2021	The Washington Post	USA
90	Seizure of illegal medicines up 58% in past year	09-Jun-2021	Irish Times	Ireland
91	Alert over drugs claiming to cure cancer and autism	11-Jan-2022	Daily Mail	UK
92	Louisiana Illuminator - States Newsroom: Scam online pharmacies selling fake, dangerous pills find opportunity in the pandemic	12- Oct-2021	Weblog post	USA
93	Counterfeit prescription drugs	25-Mar-2022	The Deming Headlight	USA

94	Maha Cyber cops bust racket of 'water-filled' Remdesivir, Tocilizumab drugs	13-May-2021	IANS English	India
95	US drug overdoses top 100,000 in pandemic year	18 Nov 2021	Manila Bulletin	India
96	FDA warns public vs fake drug products being sold online	04 Oct 2021	Manila Bulletin	India
97	Spike in prescription and fake drug misuse	25-Jun-2021	Derry Journal	UK
98	Warning against using, selling stolen medication	20 July 2021	The Daily News	South Africa
99	Public urged not to buy Covid-19 drugs online after seizures	14 Sep 2021	Irish Times	Ireland
100	'I felt an overwhelming panic' Woman, 48, devastated after losing £148 in online scam	25-Feb-2022	Express	UK
101	Online pharmacies can be risky	31 Oct 2021	The Jackson Sun	USA
102	Advisory - Be informed: know the potential risks of buying health products online	14- Jun-2021	The Bassano Times	Canada
103	NAFDAC, FCCPC Helpless As Unregistered Drugs Take Over Internet Markets	23 Jan 2022	The Daily Trust	Nigeria
104	Do fake Covid-19 vaccine arrests in China herald global crime wave?	23- May - 2021	South China Morning Post (Online)	China
105	Ivermectin use could be harmful	08-Sep-2021	Durban	South Africa
106	'Dangerous!' NHS free prescription warning as Britons trying to 'save money' at risk	30-Jan-2022	Express (Online)	UK

Appendix 2. The Standards for Reporting Qualitative Research.

#	Item - Description	Page
	Title and Abstract	
1	**Title -** Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	77
2	**Abstract -** Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	77, 78
	Introduction	
3	**Problem formulation** - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	79-81
4	**Purpose or research question** - Purpose of the study and specific objectives or questions	81
	Methods	
5	**Qualitative approach and research paradigm** - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	82
6	**Researcher characteristics and reflexivity** - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	82
7	**Context** - Setting/site and salient contextual factors; rationale**	84, 85
8	**Sampling strategy** - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	84, 85
9	**Ethical issues pertaining to human subjects** - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	87
10	**Data collection methods** - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	86, 87
11	**Data collection instruments and technologies** - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection, if/how the instrument(s) changed over the course of the study	86, 87

12	**Units of study** - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	88
13	**Data processing** - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	86, 87
14	**Data analysis** - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	87
15	**Techniques to enhance trustworthiness** - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	86-88
	Results	
16	**Synthesis and interpretation** - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	88-112
17	**Links to empirical data** - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	88-112
	Discussion	
18	**Integration with prior work, implications, transferability, and contribution(s) to the field** - short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	113-117
19	**Limitations** - Trustworthiness and limitations of findings	117
	Others	
20	**Conflicts of interest -** Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	119
21	**Funding -** Sources of funding and other support; role of funders in data collection, interpretation, and reporting	118

250

Appendix 3. Recruitment poster

Appendix 4. Web-based recruitment screener

The online recruitment screener questions:

1. **How old are you?**

   Under 18 (screen out, *i.e., excluded from the study*)
   18-29
   30-39
   40-49
   50-59
   60-69
   >=70

2. **Where in the UK do you live?**

   (England/Scotland/Wales/NI)

3. **What is your gender?**

   (Male, Female, Others, Prefer not to say)

4. **What is your ethnicity?**

   (White British, Asian British, Black British, Others)

5. **Have you ever bought a prescription medicine from the Internet without involving the doctor?**

   Yes
   No (screen out)

6. **What is the name(s) of the prescription medicines you bought online? Please write down all you have bought**

   1.
   2.
   3.
   4.
   5.

7. **How many times have you bought prescription medicines online?**

   Once
   Twice
   Three times or more

8. **Where were you living when you bought the prescription medicines online?**

   In the UK
   Outside of the UK (Screen out)

9. **When was the last time you bought prescription medicines online?**

   This year (2022)

2021
2020
2019
2018 or before (Screen out)

10. **Have you ever faced any problems with the prescription medicines you bought online?**

Yes
No

11. **Thank you for participating so far! You have qualified to participate in the interview!**

I am looking to recruit a range of people for my interview study with people who have bought prescription medicines from the Internet. My aim is to explore what motivates people to buy medicines from unlicensed online pharmacies, and people's awareness about the dangers of fake medicines that could be available online. A detailed Participant Information Sheet and consent form will be sent before any interviews.
The interview would take up to 1 hour and the incentive for this would be £20.00 paid into your Panelbase account 1-2 days after the interview.
Would you be happy to proceed?

Yes
No (screen out)

12. **Question about participants availability. (Date and time)**

13. **Thank you for your time, please enter the following details and the University of Reading will be in touch with an information sheet as well as a consent form that you will need to sign and email back. Your details will only be used to contact you about the interview and will not be used for any other purposes.**

Name:
Email:
Mobile number:

It you are not interested anymore please click here. (Screen out)

14. **Great! You will be contacted by the University of Reading shortly, to arrange the interview date and time! Please click the button below to submit your details.**

Submit

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PARTICIPANT INFORMATION SHEET

Title of the study: Reasons why people end up buying fake medicines on the Internet: interview study.

1. What is the purpose of the study?

The availability of fake medicines for patients online is a worldwide concern. Since 2008, more than 150 million units of different types of medicines were removed from the online market. The Internet provides access to both legal and illegal suppliers of medicines, which are sometimes difficult to distinguish between. Therefore, patients might put themselves inadvertently at risk of buying fake medicines that are provided to them online from illegal suppliers. This study aims to explore what motivates people to buy medicines online, and people's awareness about the dangers of fake medicines that could be available online.

2. Who is undertaking this study?

This study is part of a Ph.D. undertaken by Hamzeh Almomani at the University of Reading under the supervision of Professor Parastou Donyai and Dr Nilesh Patel. This sheet includes detailed information about this study, which should take you approximately 5 minutes of your time to read. Please take at least 24 hours after reading this information sheet before deciding to take part in the study. If you have any questions about the study, you can contact Hamzeh via email (h.q.m.almomani@pgr.reading.ac.uk).

3. Why have you been invited?

You are invited to this study because you are a member of the public over the age of 18 and a resident of the UK. Also, you are invited to this study because you have an opinion about buying medicines that normally require a prescription using an online process/website, but

without a prescription.

Be aware that you should be able to access *Microsoft Teams* because the interview will take place there.

4. Do you have to take part?

Taking part in this study is completely voluntary. If you accept to participate in this study, please fill in the attached consent form and send this back to Hamzeh *(*h.q.m.almomani@pgr.reading.ac.uk*)*. Please note that you can withdraw from the study at any time without giving a reason. Also, you are free to withdraw from the study, up to one month after the interview; this is because after 1 month, your views will have been merged with the views of others and it will not be possible to separate your interview specifically.

5. What will you have to do if you agree to take part in this project?

I am looking to recruit a range of people for my study. If you accept to participate in this study, please fill the *Participant Demographic Data form* attached to the email you have received. Also, please sign the consent form and send both completed forms back to Hamzeh *(*h.q.m.almomani@pgr.reading.ac.uk*)* who will then contact you within three weeks to arrange a suitable time and date for an interview. The interview will last for approximately 1 hour and will be conducted through *Microsoft Teams*. The interview will be audio recorded, and with your permission, also video recorded. During the interview, you will be asked questions about your views and opinions about buying medicines online.

6. Will your personal information and participation remain confidential?

Yes, your personal information will remain confidential. Your interview will only be accessible by Hamzeh and his supervisors. To ensure your confidentiality and anonymity, your name, or any identifiable information about you will never be documented against your interview transcript, instead your interview transcript will be given a unique identification code All the data will be stored on Hamzeh Almomani's secure OneDrive account on a password-protected computer. Only Hamzeh and his supervisors will have access to this information.

7. Payments

After the interview, you will be asked to fill in a *Human Study Volunteer Payment Form* to get reimbursed with £20 for giving up your free time to join the study. And this will be paid by a bank transfer to your account after the interview.

8. What are the possible benefits and risks of taking part?

Hopefully, the study results could contribute to scientific knowledge and published in academic conferences or academic journals.

There are no obvious risks to taking part in this study above any other interview study where your views are explored. However, if you feel uncomfortable at any time, for example if the interview does not meet your expectations then you have the right to withdraw without giving any reason.

9. What if there is a problem?

If you have any concerns, please contact Professor Parastou Donyai, Primary Supervisor, by email (p.donyai@reading.ac.uk) in the first instance. You can also contact the University of Reading's Quality Assurance in Research group at (qar@reading.ac.uk).

10. What will happen to the result of the study?

The study results will be used as a part of a Ph.D. thesis. The results may be presented at conferences or published in an academic journal. You will be given access to your interview transcript before it is used in the research if you request it. You can also have access to the results of this study after it is completed.

11. Who is organising and funding the research?

This study is organised by the University of Reading and supported by a scholarship provided by the Jordan University.

1. Who has reviewed the study?

This study has been reviewed and approved by the University of Reading Research Ethics Committee.

2. What happens now?

If you would like to take a part in this study, please contact Hamzeh by email so that he can arrange to interview you. If you decide not to take a part in the study, no further contact is required.

THANK YOU FOR YOUR HELP

If we have included any additional requests for use of your data, for example adding you to a registration list for the purposes of inviting you to take part in future studies, this will be done only with your consent where you have provided it to us and should you wish to be removed from the register at a later date, you should contact Professor Parastou Donyai by email: p.donyai@reading.ac.uk or by telephone, 0118 3784637.

You have certain rights under data protection law which are:

· Withdraw your consent, for example if you opted in to be added to a participant register.
· Access your personal data or ask for a copy.
· Rectify inaccuracies in personal data that we hold about you.
· Be forgotten, that is your details to be removed from systems that we use to process your personal data.
· Restrict uses of your data.
· Object to uses of your data, for example retention after you have withdrawn from a study.

Some restrictions apply to the above rights where data is collected and used for research purposes.
You can find out more about your rights on the website of the Information Commissioners Office (ICO) at https://ico.org.uk
You also have a right to complain to the ICO if you are unhappy with how your data has been handled. Please contact the University Data Protection Officer in the first instance.

Appendix 6. Consent form

University of Reading

PhD Pharmacy Student
Mr. Hamzeh Almomani
h.q.m.almomani@pgr.reading.ac.uk

Director, Pharmacy Practice
Prof. Parastou Donyai
PHD, BPHARM,
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fax +44 (0)118 378 6331

CONSENT FORM

Title of Project: Reasons why people end up buying fake medicines on the Internet: interview study

Please click on the box after each statement and select a response to confirm it has been read and agreed to.

1.	I have read and had explained to me by the researcher Hamzeh Almomani the accompanying Participant Information Sheet, version (1) dated (26/01/2021), that relates to the project titled: Why do people end up buying fake medicines online? An interview study.
2.	I agree to the arrangements described in the *Participant Information Sheet* in so far as they relate to my participation.
3.	I have had explained to me what information will be collected about me, what it will be used for, who it may be shared with, how it will be kept safe, and my rights in relation to my data.
4.	I understand that participation is entirely voluntary and that I have the right to withdraw from the project any time before, during, or after 1 month of the interview, and that this will be without detriment.
5.	I give the researcher permission to preserve some or all the data I have provided over the long term so that it can be consulted and re-used by other researchers. The data will be held in the strictest of confidence and any identifiable information will be coded and separated from the preserved data.
6.	I understand that my participation in this study involves being interviewed by a researcher from the University of Reading and the interview will be **audio** recorded.
7.	I understand that my participation in this study involves being interviewed by a researcher from the University of Reading and I accept that my interview will be video recorded.

8. I have received a copy of this Consent Form and of the accompanying Information Sheet.

9. I understand that the application has been reviewed by the University Research Ethics Committee.

Name of Participant: …………………………………………………………………………

Participant's date of birth: …………………………………………………………………

Signature: ………………………………….……………………………

Date: …………………………………………………….……………………

Name of Researcher: Hamzeh Qasim Almomani

Signature: Hamzeh Almomani

Date: …………………………………………………….……………………

Appendix 7. Interview Schedule

Introduction
Please note that: • This interview will be recorded for scientific research purposes. • All the information collected during this interview will be treated confidentially. • There are no right or wrong responses; we are just interested in your opinion. Before we start, do you have any questions? This study will explore people views about buying prescription medicines online without involving the doctor. In other words, we want to explore what drive people to do this, or what are the reasons that lead them to do this. **Question 1**: What do you know about the rules that control buying of medicines? what are the different types of medicines based on the level of control? **Question 2**: What type of medicines could be available to buy online? **Question 3**: What sort of websites do you think would offer medicines online? **Question 4**: Do you think all websites that offer Prescription Only Medicines have the licensed to sell those medicines online? Could you explain your thoughts on this please? **Question 5**: How do you think people could obtain the Prescribed-Only Medicines online? **Question 6**: How do you think people might recognise if the website they decide to buy Prescribed only medicines from is licenced or not? **Question 7**: As you indicated your interest to take a part in this study, I assume that you have bought any Prescribe Only Medicines (POMs) online but without involving the doctor (from unlicensed websites). what was that medicine(s), and what was that experience and how did you buy that medicine? **Question 8:** What made you purchase a prescription medicine online without involving the doctor? Is it only you who decide to buy POMs online? Does anyone else influence you to do this ? or are there any other factor made do this?

Behavioural Beliefs (Advantages and disadvantages of the purchase)
Question 9: What do you think are the disadvantages or the risks of buying medicines from unlicenced websites? **Question 10:** What do you think are the advantages or the benefits that people could get if they decide to buy a Prescription Medicine online from unlicenced websites?

Normative Beliefs (Social factors)

Question 11: Which individuals or groups of people do you think would encourage the purchasing of Prescription Medicines online from unlicenced websites? (Why do you think they may do this?)

Question 12: Which individuals or groups might discourage the purchasing of Prescription Medicines online from unlicenced websites? (Why do you think they may do this?)

Question 13: If someone that you care about decides to buy a prescribed medicines online from unlicenced websites, will you agree with this or will you stop them from doing this? Why?

Control beliefs (Facilitators and barriers)

Question 14: Do you think buying medicines from unlicenced websites is easy? What are the things that make it easy process? What are the things or circumstances that facilitate or encourage people to buy prescription medicines from unlicensed websites?

Question 15: what are the things make it difficult or what are the barriers of buying prescription medicines online?

Why have they trusted the online suppliers?

Question 16: Based on your purchasing experience, what are reasons that made you trust the online supplier that you have purchased medicines from? What are the characteristics and features of that online suppliers that made you trust them?

Question 17: What do you understand when I use the words 'fake medicines? Do you think fake medicines could be available online? What do you think about the risks of this?

Question 18: Some people might be aware about the availability of fake medicines online, however, they are still buying their prescription online. What do you the reasons that make do this?

Debriefing

The title of this study is "Why do people end up buying fake medicine online?" I want to thank you for taking your time in participating in this study

The study results will be used in my Ph.D. thesis and may be presented at conferences or published in an academic journal. Please note that you are free to withdraw from this study up to one month after the interview; this is because after one month, your opinions will be combined with other participants opinions, and it will be impossible to exclude yours specifically.

Please note that all your personal information will remain confidential and will never be shared with any other party. Your interview will only be accessible to me and my supervisors.

The aim of this study is to identify the factors that motivate people to buy medicines online which could lead them, inadvertently, to buy fake medicines online. Exploring these factors will help in changing/controlling the purchasing of fake medicines online.

Appendix 8. Ethical approval

Coordinator for Quality Assurance in Research
Dr Mike Proven, BSc(Hons), PhD

Academic and Governance Services

Whiteknights House
Whiteknights, PO Box 217
Reading RG6 6AH

phone +44 (0)118 378 7119
fax +44 (0)118 378 8979
email m.j.proven@reading.ac.uk

Professor Parastou Donyai
School of Chemistry Food and
Pharmacy
University of Reading
RG6 6DZ

27 April 2021

Dear Parastou,

UREC 21/07: Why do people end up buying fake medicines online? An interview study. *Favourable opinion*

Thank you for the response (your email, dated 14th April refers) addressing the issues raised by the UREC Sub-committee at its March meeting (*my Provisional Opinion email of 31st March including attachments refers*). On the basis of these responses, I can confirm that the Chair is pleased to confirm a favourable ethical opinion.

Please note that the Committee will monitor the progress of projects to which it has given favourable ethical opinion approximately one year after such agreement, and then on a regular basis until its completion.

Please also find attached Safety Note 59: Incident Reporting in Human Interventional Studies at the University of Reading, to be followed should there be an incident arising from the conduct of this research.

The University Board for Research and Innovation has also asked that recipients of favourable ethical opinions from UREC be reminded of the provisions of the University Code of Good Practice in Research. Further information may be obtained here:

http://www.reading.ac.uk/internal/res/QualityAssuranceInResearch/reas-RSqar.aspx.

Yours sincerely

Dr M J Proven
Coordinator for Quality Assurance in Research (UREC Secretary)
cc Barbara Parr (Ethics administrator)

Appendix 9. Quality assessment or the qualitative articles

CASP Qualitative Studies Checklist
Note: This tool developed for a critical assessment of the quality of qualitative studies
Answers: [Yes = 1] [No or Can't Tell (CT) = 0]

Questions	1QL	2QL	3QL	4QL
Section A: Are the results valid?				
1. Was there a clear statement of the aims of the research?	Y	Y	Y	Y
2. Is a qualitative methodology appropriate?	Y	Y	Y	Y
Is it worth continuing?				
3. Was the research design appropriate to address the aims of the research?	Y	Y	Y	Y
4. Was the recruitment strategy appropriate to the aims of the research?	Y	Y	Y	Y
5. Was the data collected in a way that addressed the research issue?	Y	Y	Y	Y
6. Has the relationship between researcher and participants been adequately considered?	Y	CT	CT	CT
Section B: What are the results?				
7. Have ethical issues been taken into consideration?	Y	Y	CT	Y
8. Was the data analysis sufficiently rigorous?	N	CT	CT	Y
9. Is there a clear statement of findings?	Y	Y	Y	Y
Section C: Will the results help locally?				
10. Is the research valuable?	Y	Y	Y	Y
Score	**9**	**8**	**7**	**9**

Appendix 10. Quality assessment of the mixed methods studies

Mixed Methods Appraisal Tool (MATT) (2018 version)
Note: This tool developed for a critical assessment of the quality of mixed methods studies
Answers: [Yes = 1] [No or Can't Tell (CT) = 0]

Questions	1 MX
Screening questions	
1. Are there clear research questions?	Y
2. Are there clear research questions?	Y
Qualitative part	
3. Is the qualitative approach appropriate to answer the research question?	Y
4. Are the qualitative data collection methods adequate to address the research question?	Y
5. Are the findings adequately derived from the data?	Y
6. Is the interpretation of results sufficiently substantiated by data?	Y
7. Is there coherence between qualitative data sources, collection, analysis, and interpretation?	Y
Quantitative part	
8. Is the sampling strategy relevant to address the research question?	Y
9. Is the sample representative of the target population?	Y
10. Are the measurements appropriate?	Y
11. Is the risk of nonresponse bias low?	CT
12. Is the statistical analysis appropriate to answer the research question?	Y

Mixed Methods part	
13. Is there an adequate rationale for using a mixed methods design to address the research question?	Y
14. Are the different components of the study effectively integrated to answer the research question?	Y
15. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Y
16. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Y
17. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?	Y
Score	**16**

Appendix 11. Quality assessment of the quantitative articles

AXIS quality assessment checklist

Note: This tool was developed for a critical assessment of the quality of cross-sectional studies
Answers: Yes / No / Do not know (DK)
Yes = 1, No and DK = 0

Questions	1 QN	2 QN	3 QN	4 QN	5 QN	6 QN	7 QN	8 QN	9 QN	10 QN	11 QN	12 QN
Introduction												
1. Were the aims/objectives of the study clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Methods												
2. Was the study design appropriate for the stated aim(s)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3. Was the sample size justified?	Y	N	N	Y	N	N	N	N	N	N	N	N
4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

5. Was the sample frame taken from an appropriate population base so that it closely represented the target population under investigation?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
6. Was the selection process likely to select participants that were representative of the target population under investigation?	DK	DK	Y	DK	Y	Y	Y	Y	DK	DK	DK	DK
7. Were measures undertaken to address non-responders?	DK	DK	DK	DK	N	DK	DK	N	N	DK	DK	N
8. Were the outcome variables measured appropriate to the aims of the study?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9. Were the outcome variables measured correctly using instruments/ measurements that had been trialled, piloted, or published previously?	Y	DK	DK	DK	Y	Y	Y	Y	DK	DK	DK	Y
10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p values, CIs)	N	Y	N	N	Y	N	N	N	Y	Y	N	Y
11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Results												
12. Were the basic data adequately described?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
13. Does the response rate raise concerns about nonresponse bias?	DK	DK	DK	Y	N	Y	N	DK	DK	N	DK	N
14. If appropriate, was information about non-responders described?	N	N	Y	N	N	N	N	N	N	N	N	N

15. Were the results internally consistent?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
16. Were the results for the analyses described in the methods, presented?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Discussion												
17.Were the authors' discussions and conclusions justified by the results?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
18. Were the limitations of the study discussed?	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Others												
19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	Y	N	N	Y	N	Y	Y	N	Y	Y	N	DK
20. Was ethical approval or consent of participants attained?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Score (out of 20)	15	13	14	14	15	16	15	14	14	14	11	13

Appendix 12. Quantitative part findings

Code	Citation	Analysis used	Type of medicines purchased	Factors that could influence people decision to buy medicines online
1QN	Alwhaibi *et al.*, 2021	Descriptive analysis (frequencies and percentages) and chi square	POMs + OTC - Viagra - Birth control bills - Antibiotic - Narcotics - Refill medication for chronic condition - Herbal medicine, supplements. - Cosmetics	**Motivational factors for online purchasing of medicinal products:** - Lower cost. - Variety of discount offers. - Convenience - easy access to medicines information from home at any time. - Convenience - it reduces visits to Healthcare professionals and community pharmacies. - Availability of wide variety of medicines. - Privacy. - Accessibility. - Availability of detailed information about the products. - Better quality products. - Unsatisfied with the quality of clinical services provided in local community pharmacy. - Unavailability of medicines in the local market. **What are the risks of purchasing medicinal products from the Internet?** - It could be unsafe purchase. - The difficulty in distinguishing between registered online pharmacies and other unlicensed commercial websites. - Instructions in an unknown foreign language.

				- Product quality concerns. - Lack of supervision of a healthcare professional. - No proper information regarding the use of the products. - People may get medicinal products that they don't need that can worsen their condition. **Where did participants hear about online medicine purchasing?** - Social media/Internet websites. - Family. - Friends or co-workers. - Healthcare provider (physician, pharmacist, nurse). **Demographics:** - Age. - Gender. - Education. - Employment. - Income.
2QN	Jairoun et al., 2021	Descriptive + inferential statistics (CI)	POMs and OTC medicines - Dietary supplements - Analgesics - Antihistamines - Anti-cough medicine	**Motivational factor:** - COVID-19 outbreak. **Socio-demographics characteristics:** - Sex. - Marital status. - Education. - Age.

3QN	Moureaud *et al.,* 2021	Descriptive statistics (Mean and SD) + Inferential statistics (binomial logistic regression)	POMs - Sedatives (Xanax®, Valium®, Ativan®, etc.). - Stimulants (Adderall®, Ritalin®, etc.). - Narcotics (Vicodin®, Percocet®, Oxycontin®, fentanyl, etc.). - COVID-19 medicines or vaccines.	**Motivational factor:** - Getting legitimate medicine. - low price. - Purchasing from a source recommended by people I know. - Being able to purchase from a reliable source. - Getting a generic prescription medicine. - Getting a brand name prescription medicine. - Being able to purchase in bulk. - Being able to purchase without a prescription. - Being able to purchase non-FDA approved treatment. **Demographic characteristics:** - The higher a participant's education, the lower the odds for purchasing each type of medicines online. - Employment was associated with increased odds of buying different types of medicines online. - Social media affinity (favourable attitudes toward social media) positively predicted the odds of purchasing prescription medicines online. **Risk perception:** - The higher risk perceived by the participants, the lower the probability of purchasing online. **Past purchase behaviour** - Past experience with purchasing medicines on online pharmacies, e-retailer sites, and instant messaging services, respectively, predicted purchase behaviour.

4QN	Ashames *et al.,* 2019	Descriptive analysis (frequencies and percentages)	POMs + OTC	**Motivational factors:** - Low prices. - The nonavailability of certain medications in local Pharmacies. - No prescription needed. - Wide choice of products. - Not sure about the quality of the purchased online medication. - Unaware about the law of UAE that considers purchasing medications from online sources as illegal. - Believed in high quality of online medications. **Demographics:** - Education. - Age.
5QN	Fittler *et al.,* 2018a	Descriptive statistics (Mean and SD) + correlation (for demographics)	POMs + OTC	**Motivational factors:** - Convenient. - People who cannot get to a pharmacy can also purchase products. - People can purchase medicines after opening hours. - People can access products which are otherwise not available. - Fast. - Products can be compared faster and more easily than in the pharmacy. - Inexpensive. - Can get more information compared to the pharmacy.

- Can get products with better quality compared to the pharmacy.

Potential disadvantages:

- It is easier to abuse preparations.
- People can get products they do not need or worsen their condition.
- I do not get proper information regarding the use of the products.
- Due to the delivery time, I'm getting the drug later compared to a pharmacy.
- The source of the product is not reliable.
- It is hard for me to choose between the great numbers of products.
- Possibility of not getting the right product.
- Possibility of getting counterfeit medicine.
- The quality of the product is lower compared than in local pharmacies.

Demographics and Internet using habits that could influence the purchasing decision:

- Level of education (People possessing higher level college degrees and having a more positive attitude regarding online medication purchase, are more likely to do so).
- The younger generation is much more involved in the online market.
- Internet purchase frequency in general.
- Average time spent on the Internet

6QN	Koenraadt & Katinka, 2018	Descriptive statistics (Mean and SD)	POMs	**Motivational factors:**
				- Convenience.
				- Low prices.
				- Home delivery.
				- Helpful if consumers do not want to make a discussion with the doctor.
				- Able to order after office hours.
				- Advised by others.
				- Helpful if consumers cannot receive a prescription.
				- Can obtain products that are not for sale in Netherlands.
				- More effective.
				Trust factors:
				- Clear information about vendors and medicines.
				- Clear overview of available lifestyle drugs.
				- Reviews by others.
				- Vendor s known.
				- Vendor's expertise.
				- Satisfaction.
7QN	Abanmy, 2017	Descriptive analysis (frequencies and percentages)	POMs + OTC	**Reasons to buying medicines online:**
				- Unavailable in local market.
				- Cheaper.
				- More convenient.
				- Good services such as home delivery and refill reminder by email.
				- Available 24 h, 7 day a week.
				- Providing health information and some consultation.

				- Easy delivery especially for those far from any community pharmacy.
				- More privacy.
				- Avoid bad services of community pharmacy such as long waiting time.
				- Satisfaction with the online seller.
				Reasons for not buying medicines online:
				- No license.
				- Quality of the medicine.
				- Simple prescription.
				- Extra money.
				- No privacy and confidentiality.
				- No idea about online pharmacy.
				- Medicines needed is available in community pharmacy.
				- No trust.
				- No interest.
				- Medicines available in hospitals.
				- Bad mail services.
				- Inappropriate storage.
				- Not allowed to enter Saudi Arabia.
				Demographics:
				- Age.
				- Gender.
				- Education.
				- Income.
8QN	Assi *et al.,* 2016	Descriptive analysis	POMs + OTC	**Reasons for buying products online:**
				- Quick/time saving.

		(frequencies and percentages)		- Cheap. - Easy. - Convenient. - More details on product than ones provided by the pharmacist. - No need for embarrassment of communicating with pharmacist. - Lack of availability of products in stores. - Not able to get prescription for some products. - Wide variety of products and offers. - Ability to purchase illegal drugs. - Better quality products. - Medicine shortage.
9QN	Szekely *et al.,* 2015	Descriptive analysis (frequencies and percentages) Pearson Chi-Square was used to compare demographic variable effect on the purchasing behaviour.	POMs +OTC	**Factors that could influence the purchasing decision:** - Quality concerns (some believed medicine available online are with inferior quality while others' beliefs it is come with a better quality. - Better quality. - Cheaper. - Awareness about the hazardous effect of medicines purchased online (safety concerns). - Still consider that information from pharmacists and physicians is necessary to start using a new medicine with confidence. (Lack of medical oversight). - One-third of the subjects consider that the information from healthcare professionals is not by all means necessary, and they can get sufficient information about a

				new medicine from the medicine leaflet, the Internet or from marketing flyers.
				Safety evaluation for drugs purchased from the Internet:
				- Significantly more men than women think that it is not unsafe to purchase medicines online.
10QN	Cicero & Ellis, 2012	Chi-square and logistical regression analyses at a P<.01 level.	Tramadol	**Motivational factors:**
				- Accessibility (cannot find doctor who will prescribe, doctor will not prescribe enough, no other way to get it, convenience).
				- Economic (cheaper, Lack of healthcare coverage, do not want to pay for doctor).
				- Others (Anonymity, curiosity, prevent withdrawals, hate going to doctor, others-not specified).
				Demographics and health information:
				- Age.
				- Healthcare coverage.
11QN	Fittler *et al.,* 2012	Descriptive analysis (frequencies and percentages) to calculate variables and (mean and SD) for age.	POMs + OTC	**Motivational factors:**
				- Lower prices.
				- Low awareness about the risks associated with purchasing medicines online.
				- Online advertisements.
				- Websites containing information on medicines.
				- Time spends on the Internet.

Code	Citation	Analysis used	Type of medicines purchased	Factors that could influence people decision to buy medicines online
12QN	Svorc, 2012	Factor analysis, t-test, multiple regression analysis.	POMs + OTC	**Motivation factors:** - Consumer perceived usefulness. - Consumer perceived ease of use. - Subjective norms (celebrities and people who consumers care about). - Past experience with online shopping. - Low perceived risk of online shopping. - Trust.
1MX	Bowman et al., 2020	Descriptive statistics. Chi-square tests were used to establish associations between demographics and various responses.	POMs + OTC	**Motivational factors:** - Had experienced using prescription-only medicines (POM) for themselves. - Cheaper. - Medicine is not found locally. - More convenient that going to local pharmacy. - Saw advert through the Internet. - Brand availability. - Advised by friend or family member. - Not entitled to get them for free through the national health service (NHS) (medicines that are not covered by the insurance). - Medicines are not available from the NHS (Medicines not available locally). - Side effect from previous purchase. - Safety concerns. - Trusted source.

- Quality concerns.
- Satisfaction level with healthcare services.

Demographics:

- Age.
- Educational level.

Appendix 13. Initial questionnaire development.

Section 1: Questionnaire introduction and screening questions.

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Questionnaire Introduction

Many people in the UK are turning to the Internet to purchase their prescription medicines. The Internet is a potential source of fake medicines, this kind of medicine could be toxic and life-threatening. According to the world health organisation (WHO), 50% of the medicines available on the Internet are fake. In the UK, 1 in 10 people bought fake medicines online in 2021. To help address this problem, it is important to understand why people buy POMs from the Internet in the first place. Thus, this survey study aims to identify the reasons why people in the UK purchase prescription medicines online. Addressing these reasons could minimise the purchasing of fake medicines.

In the survey, researchers from the University of Reading would like to ask you about your opinion on this relevant topic. This survey consists of five parts: the first part consists of screening questions to check whether you are eligible to participate in the study or not. The second part includes general questions about your experience. The third section includes questions about your opinion about the reasons that lead people in the UK to buy prescription only medicines online. The fourth part includes 2 questions related to fake medicines available online. The Fifth section includes some demographic questions. Please note that there are no right or wrong answers, we are just interested in your opinion.

Please note that your participation is voluntary, and that your participation in this study is anonymous, which means that we will not be collecting any identifying information. Your responses will be kept confidential and will only be used for research purposes. All the data collected in this survey will be held anonymously and securely.

Your honest feedback is highly valued, and we appreciate your contribution to this research project. Thank you for the time to fill in this survey. If you have any questions about the survey, please contact one of the following researchers:

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Section 2: Questions about participant's purchasing experiences

Variable	Item	Responses	Sources
Medicines purchased	Please write down the name(s) of all the medicine(s) you have bought.	Fill in the blank	Moureaud *et al.*, 2021
Location while made the purchase	Where were you living when you bought the prescription medicines online?	Inside the UK/ Outside the UK/ Cannot remember	Almomani *et al.*, 2023a
Medicine source	Which online platforms have you used to purchase prescription medicines	Social media/ Online pharmacy/ e-commerce website Cannot remember/ others (please specify here)	Moureaud *et al.*, 2021
End-user	Did you purchase medicines for yourself or others?	Myself/ Others	Almomani *et al.*, 2023a
Problems with the purchase	Have you ever faced any problems with the prescription medicines you bought online?	Yes/ No/ Cannot remember	Almomani *et al.*, 2023a
Healthcare professional supervision	Have you been asked to……? - Submit the prescription.	Multiple selections	Alwhaibi *et al.*, 2021

	• Fill out a survey about your health status. • Make a conversation with a doctor or pharmacist. • Nothing of the above.		
Satisfaction with the purchase	From your experience, are you satisfied with the overall online purchasing of medicinal products?	Yes/No/Not sure	Alwhaibi *et al.*, 2021
Purchase frequencies	How many times have you bought prescription medicines online?	Once/ Twice/ Three times or more/ Cannot remember.	Almomani *et al.*, 2023a
Last purchase date	When was the last time you bought prescription medicines online?	This year (2022)/ 2021/ 2020/ 2019	Almomani *et al.*, 2023a
The willingness of future purchase	In future, will you continue purchasing medicinal products over the Internet?	Yes/No/Cannot tell	Alwhaibi *et al.*, 2021
Health insurance	Do you have health insurance?	Yes/ No	Cicero & Ellis, 2012
Knowledge on how to distinguish legal sellers	how would you check the originality of online pharmacies?	It should be registered with the GPhC It should be registered with the MHRA It should be registered with the MHRA I do not know Others (please specify)	Koenraadt *et al.*, 2018
Accreditation logo awareness	Do you know any of these two logos? Click to verify if this website is operating legally Registered Pharmacy 1000001	- Yes, I know the first one. - Yes, I know the second one. - Yes, I know both. - No, I do not know any. - Not sure.	New

Section 3: Exploring the reasons for purchasing POMs from the Internet.

Percieved benefits of the purchase

Variable	Item	Responses	Sources
Convenient process	I shop online as I do not have to leave home for shopping	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	I feel purchasing medicine online is convenient for me.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	How far do you agree with this statement: "Buying prescription medicines online is more convenience because it reduces visits to Healthcare professionals and community pharmacies"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Alwhaibi *et al.*, 2021
	How far do you agree with this statement: "Buying prescription medicines online is more convenience because of the accessibility to information from home and at any time"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Alwhaibi *et al.*, 2021
	I shop online as I can shop whenever I want to. (24/7 availability)	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Adnan, 2014
Lower costs	The price of medicine available online is much lower.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	The prices of prescription medicines are less expensive online than in-store pharmacies.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	I think buying medicines online costs less	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I think buying medicine online is more affordable if the medicines I need are not covered by my health insurance	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

	I think buying medicine online is more affordable compared to obtaining medicines through the NHS insurance	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I believe it is less expensive to buy medicines online than it is to pay the prescription fee required by the NHS	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Privacy	How far do you agree with this statement: "Buying prescription medicines online is more private"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines online because I can make the purchase anonymously	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines online as I can purchase privacy at home	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Javadi *et al.*, 2012
Bypassing gatekeepers	I prefer buying prescription medicines online because I can bypass doctors	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying prescription medicines online because I can bypass pharmacists	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying prescription medicines online because I can bypass doctors	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Medicines availability on the web	I prefer buying medicine because I can purchase medicines that are not licensed in the UK but licensed in other countries	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicine because I can purchase medicines that are not available in the local market (NHS or local community pharmacies)	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicine because I can exceed the limits and purchase bulks of medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

		Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	
	I buy medicines online as I get broader selection of products online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	I prefer buying medicine online because I can purchase branded medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Better quality products	I think medicines available online are with better quality	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines online because they are more effective	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I feel better quality medicines are offered on the Internet	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Gupta and Nayyar, 2011

Perceived risks of the purchase

Variable	Item	Responses	Sources
Medicines safety concerns	I'm afraid that online medicines are harmful to my health.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I'm afraid that online medicines are fake and dangerous.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I do not prefer buying medicines online because I could misuse the medicines in the absence of a doctor's supervision	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Medicines quality concerns	The medicines available online are not of good quality.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	It is hard to tell if the medicines being sold online are effective.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	I do not like buying prescription medicines online because they could be expired	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

	I think medicines available online are stored in poor storage conditions	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	The medicines available online are below standards.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	It is hard to judge the quality of products over Internet	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
Higher cost	I think medicines available online are expensive	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer not to buy medicines online because it costs me more	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer to buy medicines using my health insurance because is cheaper	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Financial and online payment risks	I do not prefer to buy medicines online because it could be a scam	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I feel that my credit card number may not be secure I am buying medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	Buying medicines online can involve a waste of money	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	I feel that my credit card details may be misused if I purchase medicines online.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Javadi *et al.*, 2012
	I get scared by identity thefts through credit cards while purchasing online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Gupta and Nayyar, 2011
	I am concerned that I cannot get the product after paying.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Suki and Suki, 2017
	I do not trust the security of my credit card when I make payments online.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Suki and Suki, 2017
	I am afraid I will have a future financial loss when I submit my personal information (e.g., credit card numbers, bank account numbers).	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Suki and Suki, 2017

	If I buy on the Internet, the supplier might not send me the product and keep my money	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Kuhlmeier and Knight, 2005
Lack of accountability	No one will be accountable except me if any problem occurs with the medicines, I bought online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If I suffered from any side effects, no one will be accountable except me	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If I incurred any financial losses, no one will be accountable except me	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Engage in an illegal behaviour	I think that buying medicines online is illegal	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer not to buy medicines online because they could be stolen medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer not to buy medicines online because I could be subjected to fines or penalties	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer not to buy medicines online because I could be arrested	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
No confidentiality	I prefer not to buy medicines online because of the absence of confidentiality	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If I buy medicines on the Internet, my private information (e.g. credit card number) might be used by someone else without my permission	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Kuhlmeier and Knight, 2005
	I prefer not to buy medicines online because there is no privacy	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	It bothers me to give personal information to so the online sellers of medicines.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Lian and Lin, 2008
Delayed deliveries	I prefer not to buy medicines online because it takes a long time	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I am afraid of getting the product after a long period of waiting time.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Suki and Suki, 2017

	I might not receive the product ordered online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Javadi *et al.*, 2012

Emotional impact

Variable	Item	Responses	Sources
Desperation, curiosity, hate, fear, ashamed	To what extent the following emotions could motivate you to purchase prescription medicines from the Internet? - Desperation - Curiosity - Hate - Fear - Ashamed.	Never 1 2 3 4 5 6 7 Always	Willmott *et al.*, 2021
	How far do you agree with this statement: "People are more likely to buy medicines online when they are desperate"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "Curiosity could drive people to buy prescription medicines online"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "If people hate going to doctors, they are more likely to purchase prescription medicines online"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "Fear from disease could drive people to buy prescription medicines online"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I feel ashamed when buying medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

The facilitators of the purchase

Variable	Item	Responses	Sources
POMs accessibility	I can purchase prescription medicines online easily without the need for prescription	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	Prescription medicines are widely available and easily accessible on the Internet	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I will consider buying prescription medicines online when I did not able to get a prescription for some products	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Alwhaibi *et al.*, 2021
Search engines	How far do you agree with this statement: "Search engines such as Google, Yahoo, and Bing could facilitate purchasing prescription medicines from the Internet"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I can find sellers of medicines easily using search engines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Social media	How far do you agree with this statement: "Social media platforms such as Facebook, Twitter, and WhatsApp could facilitate purchasing prescription medicines from the Internet"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I can find sellers of medicines easily using search engines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "Social media platforms such as Facebook, Twitter, and WhatsApp allow me to communicate easily with the online sellers of medicines"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Customer support offered by the sellers	How far do you agree with this statement: "Customer support available from the sellers of medicines facilitate the purchase"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

Signposting by online support communities	How far do you agree with this statement: "Online support groups could facilitate purchasing prescription medicines online"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Easy and secure payment options	I buy medicines online as there are more payment options available.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Adnan, 2014
	I buy medicines online because I can pay easily	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I buy medicines online because payment is secure and easy	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	Payment systems that offer refunds (such as PayPal) could make the payment more secure	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Website usability	I prefer buying medicines from websites that are easy to use	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines from websites easy to navigate	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines from websites easy to find	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying medicines from websites with professional shapes and well organised	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Review websites	I use customer review websites before purchasing prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: Customer review websites could facilitate the purchase of prescription medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

The barriers to the purchase

Variable	Item	Responses	Sources

Variable	Item	Responses	Sources
Complexities of medication instructions	I will not buy medicines online if I do not know how to use them	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Financial capabilities	My financial situation could prevent me from buying medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Absence of suitable and secure payment options	I will not be able to buy prescription medicines online if no suitable payment option is available	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How important is payment security to you when making online purchases?	Not important 1 2 3 4 5 6 7 Very important	New
	I avoid purchasing medicines from websites that do not offer secure payment options.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I will not purchase medicines from websites that do not offer secure payment options	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Delivery problems	I might not receive the product ordered online.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	Sellers may not be timely delivery.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	Delivery may be sent to the wrong place.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	Customs or police could seize my parcel	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Language of the websites	I will not buy medicines from websites using a foreign language	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If I found a website in a foreign language, I will try to search for alternatives	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

Consumer's knowledge about the purchase

Variable	Item	Responses	Sources

Procedural knowledge (Computer and Internet literacy)	I am knowledgeable in using different electronic payment systems like credit cards, debit cards	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	I know how to purchase online medicine.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	My Internet searching/browsing skills are excellent.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	I consider myself a computer expert.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	Learning how to purchase medicine online is easy for me	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
Knowledge about the consequences of the purchase	I know that purchasing medicine online has a big risk.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I know that online medicine purchasing will reveal my identity.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I know that fake medicines are widely available online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I know that fake medicines could threaten my life	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Prescription medicines instructions for use	I know how to use prescription medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I can use prescription medicines without involving the doctor	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I can use prescription medicines without any side effects happened to me	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Knowledge on how to distinguish legal sellers from the illegal ones	I know how to distinguish legal sellers from the illegal one	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I have the knowledge to identify and avoid fraudulent websites or scams when buying medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

Variable	Item	Responses	Sources
	I am confident of my ability to identify a legitimate online seller of prescription medications	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

Trusting beliefs

Variable	Item	Responses	Sources
Website features	On a scale of 1 to 7, how important are the following website features to you when purchasing medicines online? a. User-friendly interface and easy navigation between webpages b. Product descriptions and information availability and clarity c. Quality of product images d. Collection of medical history before the purchase e. Contact information availability. f. Customer support availability g. Availability of customer reviews h. Secure payment options availability e. Ease of checkout process	Not important at all 1 2 3 4 5 6 7 Extremely important	New
	How likely stop the purchase if the checkout process is too complicated or confusing?	Very likely 1 2 3 4 5 6 7 Very unlikely	New
Product appearance	How far do you agree with this statement: "The appearance of a product influences my level of trust in it."	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	To what extent is product appearance important to you when deciding whether to purchase it from the Internet?	Not important at all 1 2 3 4 5 6 7 Extremely important	New
Previous purchase experience	I will decide on whether to buy medicines from an online seller or not based on my experience with the online seller in the past	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

| | I trust websites which I used in the past to buy medicines before | Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree | New |

Social influencing factors

Variable	Item	Responses	Sources
Healthcare providers	My doctor thinks that I should not purchase medicine online.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I think that my doctor prefers me to the buying prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If my doctor advised me not to buy prescription medicines online, then I would not do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	My pharmacists think that I should not buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	I think that my pharmacist prefers me to the buying prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If my pharmacist advised me not to buy prescription medicines online, then I would not do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Other consumers reviews and experiences	If anyone in my same situation advised me not to buy prescription medicines online, then I would not do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	Positive customer reviews could encourage me to purchase medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	Negative customer reviews could increase me discourage me from purchasing medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Trusted friends or family member	Purchasing medicines online may be disapproved by family	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
	If my family advised me not to buy prescription medicines online, then I would not do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

	My friends think that I should buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Yin *et al.*, 2016
	Buying medicines online may affect the image of people around me including my friends and family members	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Masoud *et al.*, 2013
Influencers endorsement	If an influencer promotes buying prescription medicines from the Internet, then I would do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If an influencer endorsed prescription medicine, then I purchase it from any source including the Internet	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "Influencers could drive people to purchase prescription medicines from the Internet"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Peer influence	People how are in the same situation think that I should buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I often consult peers to help them choose the best products.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Hu *et al.*, 2019
	If members of social groups with similar experiences to mine advised me to purchase prescription medicines online, then I will do that	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
People at support groups	If an online support group advised me to buy medicines online, then I will do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	People at online support groups think that I should buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If anyone in an online support group advised me not to buy prescription medicines online, then I would not do this	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I often consult others on these online support groups to help them choose the best products.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Hu *et al.*, 2019

The environmental factors

Variable	Item	Responses	Sources
Medicine shortages	I will buy prescription medicines online if the medicines are in shortages evening if my doctor does not approve it	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How much have medicines shortages influenced your decision to buy medicines online	Not at all 1 2 3 4 5 6 7 Extremely	New
	I prefer buying prescription medicines online because I can buy medicines in shortages	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Pandemic diseases (e.g., COVID-19)	How much has the COVID-19 pandemic influenced your decision to purchase prescription medicines from the Internet?	Not at all 1 2 3 4 5 6 7 Extremely	New
	How far do you agree with this statement: "COVID-19 pandemic could trigger people to purchase prescription medicines on the Internet"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Illegal suppliers marketing	A variety of discount offers are available when purchasing medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How much have discounts influenced your decision to buy medicines online?	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How much have the seller's marketing and promotion influenced your decision to buy medicines online?	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Barriers of accessing clinic and pharmacies	How much have the barriers to accessing healthcare clinics influenced your decision to buy medicines online?	Not at all 1 2 3 4 5 6 7 Extremely	New
	If the clinics are very far from my home, then I will buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	If accessing the clinics cost me a lot, then I will buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

	If accessing the clinics takes a very long time, then I will buy prescription medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Average time spent on the Internet	Spending more time on the Internet could lead me to purchase medicines online	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
Availability of wide range of medicines	I purchase medicines online because branded medicines are available here	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	How far do you agree with this statement: "Broader selection of products is available if I decided to buy medicines online"	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying prescription medicines online because I can buy them without limits	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying prescription medicines online because I can buy unlicensed medicines	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New
	I prefer buying prescription medicines online because I can buy are out of the NHS stocks	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	New

Section 4: Consumer's perception of the online availability and risks of fake medicines

Variable	Item	Responses	Sources
Online availability of Fake medicines	I am confident that the prescription medicines being sold online are original.	Strongly agree/ Agree/ Neutral/ Disagree/ Strongly disagree	Bringula *et al.*, 2018
	Do you think fake medicines are available online?	Widely available 1 2 3 4 5 not available	New
Risks level of fake medicines	Do you think fake medicines have risks?	Very risky 1 2 3 4 5 Very safe	New

Section 5: Demographic data

Variable	Item	Responses	Sources

Sex	What is your gender?	Male/ Female/ Others (please specify here) / Prefer not to say	Alwhaibi *et al.*, 2021
Age	What is your age group?	(18-29)/ (30-39)/ (40-49)/ (50-59)/ (60-69)/ (70-79)/ (>=80)	Almomani *et al.*, 2023a
Location	Where in the UK do you live?	England/ Scotland/ Wales/ Northern Ireland	Almomani *et al.*, 2023a
Ethnicity	What is your ethnicity?	White British/ Asian British/ Black British/ Others (please specify here)/ Prefer not to say	Almomani *et al.*, 2023a
Employment status	What is your employment status?	Employed/Unemployed/ Prefer not to say	Moureaud *et al.*, 2021