

Self-medication practices among medical and non-medical university students: The prevalence, knowledge and attitudes

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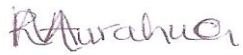
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A dissertation submitted to the School of Therapeutic Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Pharmacy

September 2020, Johannesburg

Declaration

I declare that this dissertation is my own unaided work. It is submitted for the degree of Master of Pharmacy at the University of the Witwatersrand, Johannesburg. It has not been submitted for any other degree or examination at any other university.



Rumbidzai Murahwa

4th day of September in the year 2020

Abstract

Background and objective

The practice of self-medication has formed a momentous area within healthcare systems, and has increasingly become a common practice globally. There have been several reports addressing the prevalence of self-medication practices among university students in other countries, but none from South Africa. The main aim of this study was to determine the prevalence, knowledge and attitudes of self-medication practices among medical and non-medical university students enrolled at the University of the Witwatersrand, Johannesburg.

Subjects and methods

In this study, undergraduate pharmacy students were designated as the “medical” students, while undergraduate psychology students constituted the “non-medical” students. A pre-validated and self-administered questionnaire was distributed to medical and non-medical university students in a cross-sectional design. Data was analysed using the R statistical software (version R 3.6.1), and the descriptive results were presented as counts and percentages. These were illustrated using pie charts, bar charts and tables. Multinomial logistic regression models were used to investigate the four variables, sex, self-care orientation, medication knowledge and type of school (medical/non-medical) for possible correlation with self-medication practices.

Results

Self-medication practices were reported by 77.8% of the respondents (n=473). The prevalence rates reported for the medical and non-medical student groups were 84.9% and 73.5%, respectively. The majority of females were self-medicating than males, 79.4% and 20.1%. A total of 168 (45.7%) respondents reported a high level self-care orientation, whilst 148 (40.2%) respondents reported “good” medication knowledge. Multinomial logistic regression models indicated that sex, medication knowledge and type of school attended were insignificant predictors of self-medication ($p\text{-value} > 0.05$), whereas self-care orientation was a significant predictor ($p\text{-value} < 0.05$). An individual’s level of self-care orientation was significantly associated with the selection of a therapeutic class of medicine. For both groups of the study respondents, the most commonly reported reasons for self-medication were “Health problem is not

serious”, “Quick relief”, “Previous experience with same illness” and “Personal convenience” amounting to 66.6%, 64.4%, 63.3% and 51.6% respectively. The most popular health conditions treated by self-medication for both groups of study respondents were headache (76.1%), colds, flu and sore throat (69.3%) and pain (63.6%). Analgesics (78.8%) were the most commonly reported class of medicine used in self-medication by all study respondents. There was no significant difference between the self-medication practices of medical and non-medical students (p-value = 0.83).

Conclusions

The practice of self-medication in the study was prevalent and common among both the medical and non-medical university students. There was, however, no significant difference in the practice of self-medication among the medical and non-medical students. Analgesics and anti-inflammatories were the most commonly used medicines for self-medication, and the frequency of use of these medicines could be minimised by raising students’ awareness and knowledge of the indications, contra-indications and side-effects of these medicines. The level of self-care orientation of an individual significantly influenced the choice of therapeutic classes of medicines used in self-medication. A greater involvement of pharmacists in patient education regarding the practice of self-medication is needed. Student health groups in universities, with the help of pharmacists and physicians, could assist in promoting student awareness on rational medicine usage. Future research regarding the prevalence of self-medication at a national level or among other cohorts is recommended. It is imperative to provide extensive public education regarding rational medicine use, and to implement strategies and guidelines that promote the safe dispensing of medicines, which is the cornerstone for the appropriate and safe practice of self-medication.

This study employed a cross-sectional design which provided insight into the current self-medication practices, which might differ in other seasons. As a result, the study is unable to produce findings for long-term trends of self-medication practices of university students in South Africa.

Keywords

Self-medication; self-care orientation; medication knowledge; medical and non-medical university students.

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Research outputs

Journal article submission for publication

The following is a manuscript for a journal article submitted for publication in the **Medical Principles and Practice** scientific journal:

Self-medication practices among medical and non-medical university students: The prevalence, knowledge and attitudes

Keywords

Self-medication; self-care orientation; medication knowledge; medical and non-medical university students

Abstract

Objective: The main aim of this study was to determine the prevalence, knowledge and attitudes of self-medication practices among medical and non-medical university students enrolled at a university in the Gauteng province of South Africa.

Subjects and Methods: This was a questionnaire-based and descriptive study that was conducted in April 2019. A pre-validated and self-administered questionnaire, containing close-ended questions, was distributed to medical and non-medical university students in a cross-sectional design. Data was analysed using the R statistical software, and the descriptive results were presented as counts and percentages. These were illustrated using pie charts, bar charts and tables. Multinomial logistic regression models were used in data analysis.

Results: Of the 368 participants who self-medicated, 152 were medical students and 216 were non-medical students. Two hundred and ninety-two respondents (79%) were females and 75 (20.4%) were males. A total of 168 (45.7%) respondents reported a high level self-care orientation, whilst 148 (40.2%) respondents reported “good” medication knowledge orientation. Self-medication practices were reported by 77.8% of the respondents. The most commonly reported reasons for self-medication were “Health problem is not serious”, “Quick relief”, “Previous experience with same illness” and “Personal convenience” amounting to 66.6%, 64.4%, 63.3% and 51.6%

respectively. The most popular health conditions for self-medication were headache (76.1%), colds, flu and sore throat (69.3%) and pain (63.6%). Analgesics (78.8%) were the most common medicine class used in self-medication, followed by anti-inflammatory medicine (53.0%) and combination cold and flu preparations (43.2%).

Conclusion: Self-medication practices were highly prevalent and common among the studied university students. The knowledge on self-medication and medicines was poor. Extensive public education regarding rational medicine use and the safe practice of self-medication is needed.

Introduction

The World Health Organisation defines self-care as the ability of individuals, families and communities to promote, maintain health, prevent disease and to cope with illness with or without the support of a healthcare provider ^[1].

With the increased emergence and discovery of new medicines for the management of various diseases, the practice of self-care in the form of self-medication has been on the rise ^[2-6]. Self-medication has been widely used as an approach to treat illness with over-the-counter (OTC) medicines in the developed world, however, the use of these medicines poses health-related risks that can result from the use of incorrect dosages or the unawareness of potential drug or food interactions ^[7-8].

Self-medication is as an area of healthcare in which the patient assumes a greater degree of responsibility for the management of a minor ailment, using a medicinal product that is available without a prescription from the physician ^[4, 9, 10, 11, 12, 13]. An ailment is defined as a less serious medical condition or minor illness that typically does not require laboratory or blood tests for its diagnosis ^[14].

Self-medication can bring about both benefits and risks for individuals and society ^[2, 6]. Some of these benefits include the ability for individuals to manage their health problems and thus saving both time and money (reduced physician visits), and can therefore result in reducing the burden on public health facilities ^[2, 6]. However, self-medication can also pose potential risks that are related to adverse effects resulting from the misuse of medicines such as inappropriate duration of using medicines, or drug resistance, and abusing medicines without professional advice ^[2, 6].

Studies show that an individual's self-medication practice can be influenced by several personal factors including, gender, level of education, professional status, family, socio-economic status, self-care orientation and medication knowledge [15, 16, 17, 18, 19, 20].

To the best of our knowledge, self-medication practices amongst university students in South Africa has never been conducted while there are several international reports addressing the prevalence of self-medication practices among university students in other countries [21, 22, 23, 24, 25, 26]. The current study aimed to determine the prevalence, knowledge and attitudes of self-medication practices among medical and non-medical university students enrolled at the University of Witwatersrand, Johannesburg.

University students were chosen as this population can be influenced by the media and the internet which promotes self-medication [27], due to advertising by pharmaceutical companies. Furthermore, health science university students, who are future healthcare providers, may have their medical practice influenced by their knowledge and health-seeking behavioural patterns pertaining to self-medication [25].

Subjects and Methods

This cross-sectional descriptive study took place at the University of Witwatersrand, Johannesburg in South Africa. The study was undertaken in April 2019. The study was approved by the Human Research Ethics Committee of the University of Witwatersrand.

The study population comprised first, second and third year pharmacy students, who were designated as the medical students in the study, and the non-medical students were the first, second and third year psychology students. The questionnaires were distributed to all the students attending randomly selected lecture classes for the specified disciplines. A brief description of the nature of the study, including the definition of self-medication and other operational terms, all acronyms used in the questionnaire and the procedure of completing the questionnaire were adequately explained to all respondents before completion of the questionnaire. Only respondents older than 18 years were included in the study. Respondents who had pre-existing chronic conditions, and did not give informed consent were excluded from the study.

A pre-validated questionnaire containing closed-ended questions was developed and used for the study. The questionnaire comprised of a total of 35 closed-ended questions and statements that were categorised into 6 different sections. Part A was designed to collect the demographic information of the respondent, and, part B, included questions that focused on the indications for self-medication. While part C, consisted of questions relating to the therapeutic classes of over-the-counter medicines that respondents used for self-medication. In part D, respondents were asked to select perceived reason(s) for practicing self-medication. Part E of the questionnaire was designed to assess respondents' medication knowledge based on the Isacson and Bingefors methodology [20]. Part F, the final part, made use of a Likert scale to collect data on the respondent's attitude towards self-medication and medicine dispensers i.e. pharmacists and pharmacists' assistants. This section comprised of 13 statements with six different response options ranging from strongly disagree to strongly agree. Any use of the over-the-counter medicine without a doctor's consultation or prescription was considered as self-medication.

The collected data from the questionnaires was captured onto Microsoft Excel™. All the captured data were exported from Microsoft Excel™ to R software, and data cleaning and analysis were performed using the R software. The descriptive results were presented using counts or frequencies. Frequencies were calculated as percentages and illustrated using pie charts, bar charts and tables. Multinomial logistic regression models were used to identify associations among tested variables. A p-value of less than 0.05 was considered statistically significant in all the analyses.

Results

A total of 473 questionnaire responses were collected from both groups of students (medical and non-medical students). Of the 473 surveyed students, 368 (77.8%) students reported self-medication practices within the specified time period (60 days). Of the 368 respondents, 152 (41.3%) were medical students and almost one-third (58.7%) were non-medical students. Females outnumbered the males in both disciplines (Table 1).

Practice

For both groups of the respondents, the most common factors that led to self-medication were, “health problem is not serious”, “quick relief” (64.4%), “previous experience with same illness” (63.3%) and “personal convenience” (51.6%). Table 2 shows the perceived reasons for self-medication reported by both groups of respondents.

There were several indications or symptoms reported for self-medication by the respondents, as shown in Figure 1. The most common indications reported by both groups of respondents were headache (76.1%), colds, flu and sore throat (69.3%) and pain (63.6%). Of the medical group, 74.3% of the respondents reported headache as the most common symptom leading to self-medication, whilst 61.8% and 60.5% of the respondents reported colds, flu and sore throat, and pain as indications for self-medication, respectively. The majority of non-medical student respondents (77.3%) reported headache as the most common indication for self-medication, while 74.5% and 54.2% of non-medical students reported colds, flu and sore throat, and pain as indications for self-medication, respectively.

Among the various types of medicines reported by both groups of respondents for use in self-medication (as shown in Figure 2), analgesics (78.8%) were the most commonly reported medicine class, followed by anti-inflammatory medicine (53.0%) and combination cold and flu preparations (43.2%). A more in-depth analysis showed that 77.6% and 79.6% of the medical and non-medical students, respectively, reported analgesics as the most commonly used medicine for self-medication.

Forty-two percent of the respondents indicated that they obtained their medicines from independent or chain pharmacies, while 24.5% reported using available medication at home. Other reported sources of medicines were friends/family (15.2%) and supermarket/other stores (12.8%).

Medication knowledge

Medication knowledge was determined using the Isacson and Bingefors methodology [20]. It was defined by the number of correct true-false answers to six statements about OTC medications. Of the 152 pharmacy students in this study, 92 (60.5%) students had good medication knowledge, whilst 60 (39.5%) pharmacy students reported poor

medication knowledge. In relation to the psychology students, 56 (26.1%) students had good medication knowledge, while 159 (73.9%) reported poor medication knowledge. Figure 3 shows an in-depth assessment of medication knowledge in each year of study in both pharmacy and psychology students. The majority of students in the first year group, in both pharmacy and psychology, showed poor medication knowledge. The majority of students in the second year group, in both pharmacy and psychology, showed poor medication knowledge. This is not consistent with the third year group as the majority of third year pharmacy students displayed good medication knowledge, while the majority of the third year psychology students were shown to have poor medication knowledge.

Attitude

Generally, the majority of the respondents showed a positive response towards self-medication and the rational use of OTC medicines for self-medication. Sixty percent of the respondents agreed that self-medication can be harmful and cause health-related risks. Moreover, 89.3% of the respondents strongly agreed that it is important to always read the medicine information leaflet before taking an OTC medicine. When asked about the safety of OTC medicines, 63.2% of the respondents acknowledged that the availability of OTC medicines for purchase without prescription, does not warrant their safety. Eighty-one percent of the respondents were strongly of the opinion that it is important to be aware of the possible side effects that a medicine being taken, may potentially cause.

When asked about the roles played by pharmacists in self-medication, most respondents (74.3%) positively responded and agreed that they felt comfortable in telling a pharmacist about their use of OTC medicines in self-medication. However, 61.7% felt that pharmacists do not encourage questions about OTC medicines, whilst 33.4% were dissatisfied with the information obtained from pharmacists regarding self-medication and OTC medicines.

Discussion

Our study indicated that self-medication practices are very common among university students in South Africa. Due to this nature of study not being previously explored in South Africa, there is no data available on the self-medication practices of students from other universities or institutions of higher education, and there is no data on the

self-medication practices of the general population. This made the comparison of self-medication practices among different population settings at a national level, unachievable. However, from previous international studies, self-medication prevalence rates in medical and non-medical university students have been reported to be up to 76.6% in Iranian students ^[28], 88% in Croatia ^[29], 81.3% in Bahrain university students ^[21] and 76% of university students in Karachi, Pakistan ^[26]. Lower rates have reported by students in Germany (40%) ^[30] and the United Kingdom (20%) ^[31].

Practice

The extent of self-medication, i.e. the frequency of self-medication among the respondents was unexpected. Across all the year of study groups, the majority of pharmacy and psychology students reported to have self-medicated five or more times in the stipulated time period (60 days). This showed that there was no difference in self-medication practice between pharmacy (medical) students and psychology (non-medical) students, in terms of frequency of self-medication. The general assumption is that students in medical school have more knowledge and insight on the human body and medicines in comparison to non-medical students, thus self-medicating more than their counterparts. It would then be, again, assumed that non-medical students would practice self-medication less than medical students, but this did not follow in our study. These results could be explained by the fact that non-medical university students lack medical knowledge, as a result, they might use several medications to relieve one symptom or ailment, whilst medical students would self-medicate using the appropriate medicines from the first time.

In this study, the three most common and consistently reported reasons for self-medication were “Health problem not serious” (74%), “Quick relief” (64%) and “Previous experience with illness” (64%). This is consistent with results obtained from previous studies. A study conducted on Palestinian medical and non-medical students indicated that the majority (58%) of students self-medicated because they perceived their illnesses to be simple, whilst 29% self-medicated because they had previously experienced the same illness ^[25]. The common trend indicated by these studies, including ours, poses the concern that most people self-medicate because they perceive their illness or ailment as not serious, and that they have had previous experience with illness. In an ideal setting, these would be unjustifiable reasons as this

potentially puts many people at risk of delaying the treatment of a serious health problem due to masking the symptoms by using OTC medicines.

The most popular health conditions reported in the study were headache (76.1%), colds, flu and sore throat (69.3%) and pain (63.6%). These health conditions were also reported in previous similar studies [21, 32]. Palestinian medical and non-medical students were reported to have self-treated mainly the headache, flu, sore throat and menstrual pain [25].

The most commonly used sources of information reported for self-medication are “Friends & family” (30.5%), “Pharmacist recommendation” (26.8%), and “Self-knowledge/personal study” (26.1%). This is a clear indication of the need for extensive public education on self-medication and OTC medicines. The advertisement of OTC medicines by pharmaceutical companies plays a key role on public education on OTC medicines. The youth are directly influenced to self-medicate by advertisements [27]. Thus, further research should be done in this regard, especially with the increase in accessibility to the internet over the years and the rise of online media in today’s world and the future.

The majority of the study participants obtained medicines for self-medication from pharmacies (42.1%), while 24.5% used available medicines at home. This research finding is also consistent with a similar study conducted in Karachi [26]. The use of stocked or available medicine at home for self-medication brings about the possibility of exposure to expired medicines, the misuse of medicine i.e. the use of medicine intended for use in different health ailments, and the increased risk of the occurrence of polypharmacy. This results in several undesirable health consequences.

In the study, analgesic (78.8%) and anti-inflammatory medicines (53%) were commonly reported for use in self-medication. Analgesics have been reported to be the most commonly used class of medicines [16, 21, 24, 33, 34]. This correlates well with headache and pain being the most common indication for self-medication. The indiscriminate use of medicine for self-medication has detrimental effects. A high intake of analgesics and anti-inflammatory medicines is known to lead to adverse gastrointestinal, renal (nephropathy) and hepatic (hepatotoxicity) effects [35].

Medication knowledge

In this study, the type of school attended (medical/non-medical) was the socio-demographic variable that was positively correlated to the level of medication knowledge (good/poor). As expected, a larger proportion of pharmacy students (medical students) exhibited good medication knowledge in comparison to the psychology students (non-medical students). The third year pharmacy group was the only year of study group where the majority of students showed good medication knowledge. This was expected and can be attributed to the pharmacy study curriculum, where third year students have a substantial understanding of human pathology, certain diseases and medication knowledge gained through Pharmacotherapy (Clinical Pharmacy) and Pharmacology study modules.

Attitude

A greater number of pharmacy students than psychology students disagreed to the statement that “Self-medication can be harmful”. This result was not anticipated as it was expected that pharmacy students would have a greater appreciation of the adverse effects and the potential dangers of OTC medicine usage in self-medication. Attitudes like this are unfavourable as this is an indication that the educated youth underestimate the gravity of irrational OTC medicine use and the related risks of self-medication. This could also serve as explanation for the high self-medication prevalence rates among the youth.

In our study, a considerably small number of the respondents (36.8%) were in slight agreement with the statement “Because OTC medicines are available for purchase without prescription, they are very safe”. Medical literature has shown that commonly used OTC medicines are associated with adverse health effects [36, 37]. This debunks the common misconception among the public that OTC medicines are very safe. Although the appropriate use of OTC medicines for self-medication can be advantageous, it may rise to tragic consequences when there is no adequate education of the public. Emphasis should be put on public education on the dangers of self-medication. Strategies can, however, be implemented to reduce the potential danger and abuse of OTC medicines. For example, if the safety margin of a medicine is too narrow, and if the self-diagnosis by a patient is unreliable, regulatory laws can be enforced that specify the dosage or pack size and the concentration of a medicine that a pharmacist can dispense without prescription [13].

In our study, 61.7% felt that pharmacists do not encourage questions about OTC medicines, whilst 33.4% were dissatisfied with the information obtained from pharmacists regarding self-medication and OTC medicines. This was a concerning response, as pharmacists have the crucial duty of the provision of healthcare information including medicine information to patients. A past study found that the majority of pharmacy staff did not provide adequate advice when handling self-medication requests in developing countries ^[38]. This brings forth the issue of adequate training on self-medication for both pharmacists and pharmacists' assistants. Sanz et al. ^[39] reported on the application of telematics systems in European community pharmacies, which were intended to provide community pharmacy professionals with information and training on self-medication and OTC medicines. A similar approach could be adopted for the education of pharmacy professionals on self-medication.

Conclusion

The prevalence of self-medication practices is high in the educated youth of South African university students, and the prevalence rates are similar in both medical and non-medical university students. Our research study has opened a gateway for further research in self-medication. Based on our research findings, recommendations can be made for future research. A holistic approach must be taken to promote rational drug usage in self-medication. This would involve awareness and education on the implications of self-medication and the implementation of stringent rules governing pharmaceutical advertising and OTC medicine dispensing. The student health and wellness departments of universities in South Africa in collaboration with pharmacists and physicians, could greatly contribute in raising and promoting awareness on self-medication by use of visual aids and multimedia campaigns. This would be a great step forward in improving the students' knowledge and attitudes on self-medication and OTC medicines.

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The author would like to thank the pharmacy students and psychology students at the University of Witwatersrand, for co-operating and making this research study possible and successful.

Tables and figures

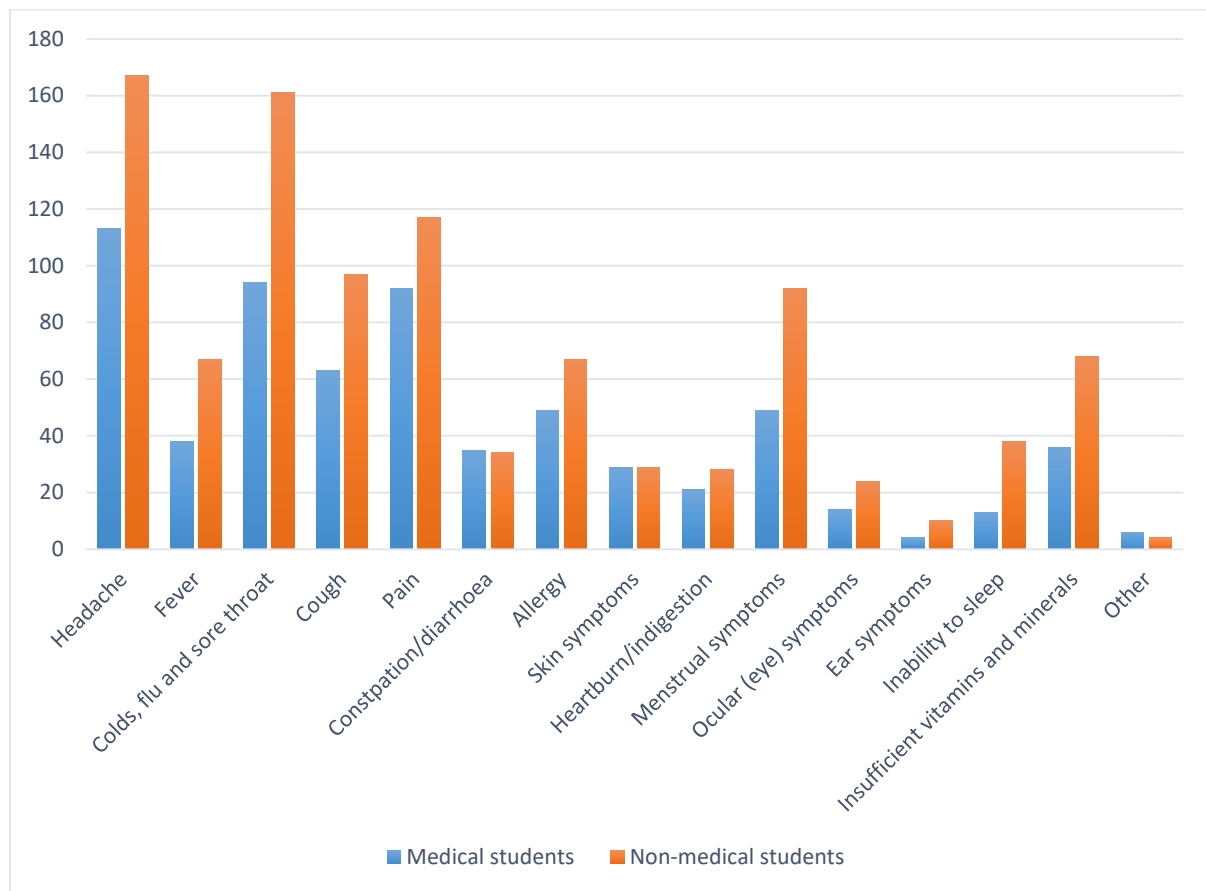
Table 1. Number of questionnaire responses per year of study per faculty (n=368)

Pharmacy (medical) students			Psychology (non-medical) students		
Year of study	Male	Female	Year of study	Male	Female
First year	11	48	First year	19	72
Second year	8	35	Second year	14	58
Third year	13	36	Third year	10	43
Total	152		Total	216	

Table 2. Perceived reasons for self-medication

Perceived reasons for self-medication	Pharmacy (medical) students (n=152)	Psychology (non-medical) students (n=216)
Health problem is not serious	113	132
Quick relief	97	140
Personal convenience	80	110
Avoidance of long waiting at clinic (lack of time)	29	46
High cost of medical consultation	31	79
Suggestion by a relative/friend	34	62
Physician's advice of self-management	12	33
Previous experience with same illness	97	136

Figure 1. Indications/symptoms for self-medication



*Other health indications reported are: nausea, anxiety, shortness of breath, sinusitis, dental symptoms, migraine, stomach ulcers, hair growth and UTI symptoms.

Figure 2. Therapeutic classes of medicines reported in self-medication

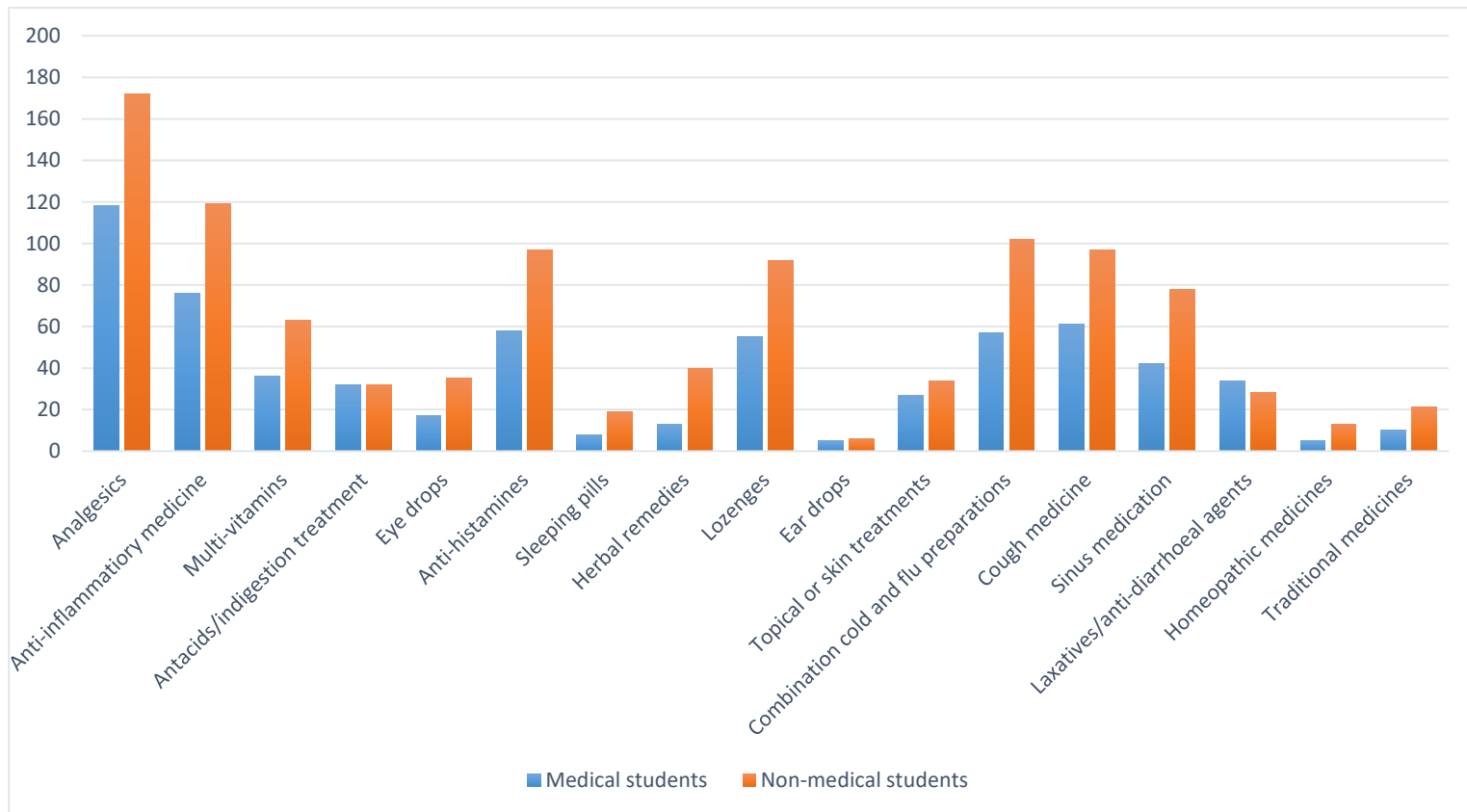
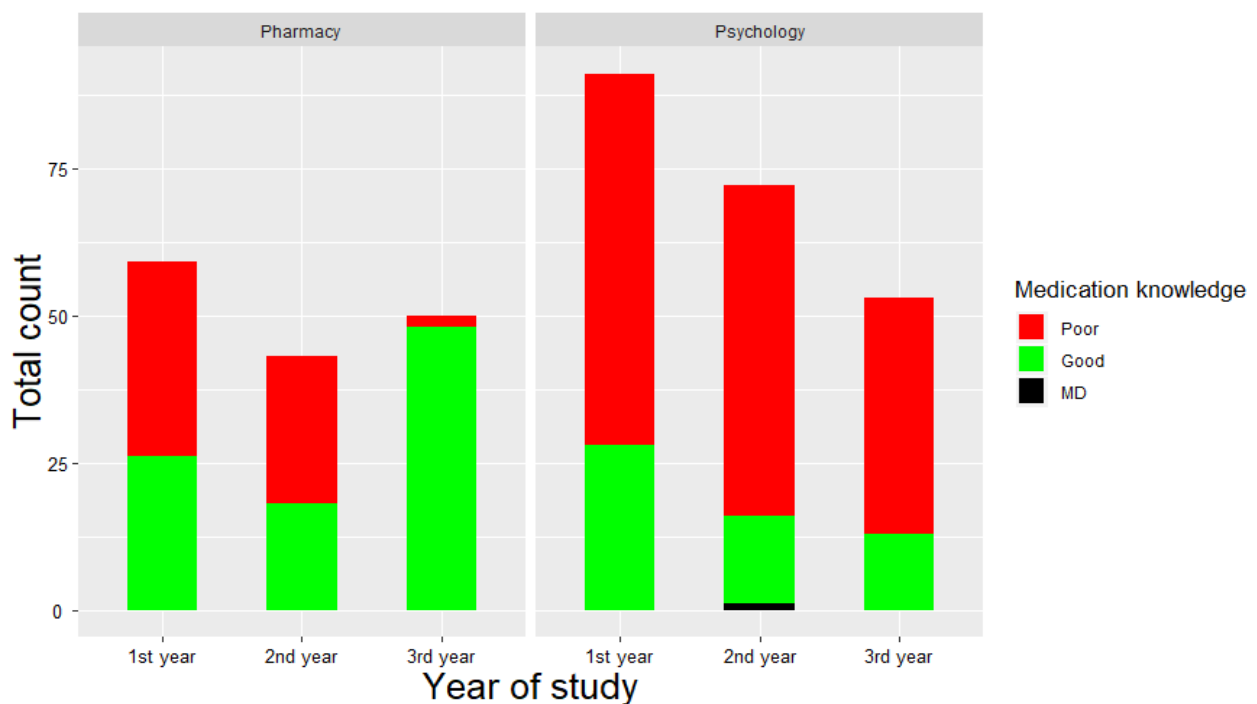


Figure 3. Assessment of medication knowledge among the respondents



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Abbreviations

AESGP	Association Européenne des Spécialités Grand-Public
API	Active Pharmaceutical Ingredient
CPS	Community Pharmacist Sector
FDA	Food and Drug Administration
FIP	International Pharmaceutical Federation
MRSA	Medicines and Related Substances Act
NDoH	National Department of Health
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OTC	Over-the-counter
PIL	Patient Information Leaflet
PSSA	Pharmaceutical Society of South Africa
S0	Schedule 0 medicine
S1	Schedule 1 medicine
S2	Schedule 2 medicine
S3	Schedule 3 medicine
SA	South Africa
SAHPRA	South African Health Products Regulatory Authority
SM	Self-Medication
UK	United Kingdom
USA	United States of America
WFPMM	World Federation of Proprietary Medicine Manufacturers
WITS	The University of the Witwatersrand
WHO	World Health Organization
WSMI	World Self-Medication Industry

Chapter One

Introduction: The concept of self-medication

“The desire to take medicine is perhaps the greatest feature which distinguishes man from animals.” – Sir William Osler (Cushing, 1925).

Healthcare policies in most countries, particularly in European countries, promote citizens' empowerment and responsibility towards their own health and well-being. This is based on the definition of self-care by the World Health Organization (WHO) which dates back to 1983. The WHO defines self-care as the ability of individuals, families and communities to promote and maintain health, prevent disease and to cope with illness with or without the support of a healthcare provider (WHO (World Health Organization), 2014).

The concept of self-care is not confined as it encompasses several factors such as nutrition, hygiene, lifestyle, environmental and socio-economic factors. The promotion of self-care for health results in empowered individuals and communities who make informed and knowledgeable health decisions. Therefore, self-care practices have proven to improve the efficiency of health systems and contribute towards health equity (WHO, 2014).

With the increased emergence and discovery of new medicines for the management of various diseases, the practice of self-care in the form of self-medication has been on the rise (Shamsi & Bayati, 2010). Self-medication (SM) has been widely used as an approach to treat illness in the developed world for many years (Bennadi, 2014; Jones, 1976). The increased incidence of SM in the developing world is also acknowledged (Shankar, Partha & Shenoy, 2003; WHO, 2000a, 2014).

The concept of SM is understood as an area of healthcare in which the patient assumes a greater degree of responsibility for the management of a minor ailment. This is facilitated by the use of a medicinal product that is available for purchase without a prescription from the physician (Hughes, McElnay, & Fleming, 2001). An ailment is defined as a less serious medical condition or minor illness that an individual may self-diagnose, that is, it typically does not require laboratory or blood tests for its

diagnosis. Examples include cold sores, mild eczema, seasonal allergy symptoms, heartburn or indigestion, hay fever, colds and flu, fungal skin infections and other minor skin conditions (New Brunswick Pharmacists' Association, 2020). The practice of SM is relatively popular in areas where medicines or pharmaceutical products are predominantly available (Bennadi, 2014). The medicinal products used for SM are usually termed over-the-counter (OTC) medicines. According to the Food and Drug Administration (FDA), the term "OTC" refers to a medicine that can be purchased without the issue of a medical prescription (FDA, 2019).

In some cases, OTC medicines can be sold directly to a consumer without any intervention from a healthcare provider. This is apparent in cases where OTC medicines are sold in retail outlets. Some medicines may be legally classified as OTC (i.e. no prescription is required for purchase), but may only be dispensed by a pharmacist after an assessment of the patient's needs or the provision of patient education (FDA, 2019). This is in contrast to prescription-only medicines, which may only be sold to consumers possessing a valid prescription from an authorised physician (FDA, 2017). An increasing number of former prescription-only medicines are now available as OTC medicines in many countries, either through pharmacies or retail outlets, consequently extending the range and accessibility of these medicines to the population (Chang & Trivedi, 2003).

In South Africa (SA), the South African Health Products Regulatory Authority (SAHPRA) classifies medicines into different categories using a scheduling system. This scheduling system classifies medicines into different schedules from schedule 0 to schedule 8, based on the properties of the active ingredient(s) in the medicine, the medicine safety profile and the indicated therapeutic use of the medicine. In SA, all OTC medicines are categorised as schedule 0 (S0), schedule 1 (S1) or schedule 2 (S2). Schedule 0 medicines are available in supermarkets and other retail outlets, and their provision does not require the involvement of a pharmacist or any other healthcare professional. These medicines may be sold by anyone and to anyone. Schedule 1 and S2 medicines are available for purchase only from pharmacies, and may be sold only by a pharmacist, pharmacist intern or pharmacist's assistant under the supervision of a pharmacist (SAHPRA, 2019a).

A number of reasons can be enumerated for SM. A study conducted in Nepal reported that low socioeconomic status of an individual, low severity of symptoms and the lack of availability of physicians in rural areas were the major factors influencing SM (Abay & Amelo, 2010). Several personal factors influence SM practice, including, the self-care orientation of an individual, their knowledge on medication, the individual's past experience or familiarity with the illness, sex/gender and their income (Shankar et al., 2003).

The practice of SM can yield benefits for individuals and the society when applied and practised in the correct manner (WHO, 2000b). For example, SM allows individuals to manage their health problems thus saving both time and money (due to reduced physician visits), and greatly assists and relieves the public health system by significantly reducing the burden on public health facilities (WHO, 2000b). However, SM is not without risk despite the advantages associated with patient empowerment. The practice of SM poses potential risks related to adverse effects resulting from the misuse of medicines which usually presents in the form of incorrect diagnosis, inappropriate duration of using medicines, drug resistance, and abusing the medicines without professional advice (WHO, 2000b).

Previous studies have reported prevalence rates of SM as high as 45% to 98% in various countries (Auta, Omale, Folorunsho, David & Banwat, 2012; Sawalha, 2008; Sharma, Madaan & Nagappa, 2012; Zafar et al., 2008). The prevalence rates are inflated throughout the world, with much higher rates being reported in developing countries. Various studies conducted in Iran, Jordan, Uganda and Khartoum, Sudan have reported SM prevalence rates of 53.4%, 39.5%, 75.7% and 81.8% respectively (Abdarzadeh et al., 2016; Al-Azzam, Al-Husein, Alzoubi, Masadeh & Al-Horani, 2007; Awad, Eltayeb & Capps, 2006; Ocan et al., 2014). A systematic review based on the practice of SM in Ethiopia reported varied prevalence rates from 12.8% in Bahir Dar town residents to 77.1% in Arsi University health science students, with an overall averaged prevalence rate of 36.8% (Ayalew, 2017).

South Africa has a significantly large population, estimated at 59 million in 2018. The management of its healthcare system has become one of the current major problems that the country faces (Ngobeni, Breitenbach & Aye, 2020). South Africa is a developing country, and as a result, the public healthcare system is inadequate to

sustain the tremendous demand from its citizens (Barron & Padarath, 2017). Barron and Padarath (2017) noted that the challenges facing the South African healthcare system are worsened by the unequal distribution of public sector healthcare professionals among the provinces, where some provinces, for example the Eastern Cape, have much fewer healthcare professionals. This results in prolonged patient waiting times at public health facilities due to the shortage of human resources. The practice of SM relieves the workload burden on healthcare professionals through the avoidance of unnecessary patient consultations. Thus, SM proves to be a convenient and time-saving practice for both patients and healthcare professionals.

TimesLive (14 June 2018) reported concerns raised by members of the public regarding the shortage of medicines in hospitals. With the regular occurrence of medicine shortages within public health facilities, SM empowers patients to take responsibility in managing their own health. An increase in the practice of SM by patients within the public health sector can reduce healthcare costs incurred by the government. The strained healthcare system increases the tendency for citizens to self-medicate. The large market for medicines allows SM to continuously become the common and preferred solution for people to resolve their health problems and maintain their health (Abedian, Stratchan & Ajam, 2000).

Interestingly, studies have shown that SM practices are more prevalent in the younger population and in university students who are classified as young adults, in comparison to other age groups, i.e. the middle-aged adult age group and the elderly (Figueiras, Caamano & Gestal-Otero, 2000; Shankar et al., 2003). The misuse of OTC medicines, through SM, amongst university students has become increasingly popular (Bennadi, 2014). The youth are greatly exposed to the media and advertisements by pharmaceutical companies (Andersen, Krolner, Holstein, Due & Hansen, 2007). A survey on extensively advertised medicines showed that the majority of university students used at least one of the advertised medicines without the consultation of a medical practitioner (Burak & Damico, 2000). Therefore, this study aims to understand the primary determinants and other influencing factors of SM amongst university students in South Africa.

For reasons previously cited, this research study was conducted in a university with the study population comprised of university students. Four factors were investigated

for possible influence on SM practices namely sex/gender, type of school attended (medical/non-medical), self-care orientation and medication knowledge. These four factors were selected based on earlier literature reports on the major influencers of SM (Beitz, Doren, Knopf & Melchert, 2004; Martins et al., 2002; Stoelben, Krappweis, Rossler & Kirch, 2000). The patterns of SM in adults are influenced by the sex of the individual. A web-based incidence study conducted on a sample of Slovenian university students reported that more female students, in comparison to male students, acquired medicines for SM in pharmacies and used a wide range of OTC medicines to treat various minor ailments (Klemenc-Ketis, Hladnik & Kersnik, 2010). Moreover, individuals with a high level of self-care orientation are more inclined to undertake activities without professional assistance to promote their own health (Levi & Idler, 2007).

For this research study, a cross-sectional descriptive study design was employed. Undergraduate pharmacy students were selected as the “medical” students, and undergraduate psychology students were selected as the “non-medical” students. First, second and third year pharmacy students and first, second and third year psychology students were invited to complete a questionnaire on their SM practices. This questionnaire comprised of 35 closed-ended questions and statements that were designed to assess and evaluate each student’s SM practices, their level of self-care orientation, their level of medication knowledge, and the student’s attitudes towards OTC medicines and pharmacy staff. The questionnaires were completed as soon as they were received by the students.

Medical and non-medical university students were selected to allow for the investigation of notable differences in SM behavioural patterns due to the different levels of medication knowledge that the students possess. Furthermore, health science university students, who are the future healthcare providers, may have their medical practice influenced by their knowledge and health-seeking behavioural patterns pertaining to SM. Both self-care orientation and medication knowledge are important factors in determining the health-seeking behaviour in the consumption of medicines in SM. Several studies have been conducted on the extent of SM practices among university students in other countries (James, Handu, Al Khaja, Otoom & Sequeira, 2006; Sawalha, 2008; Sedighi, Ghaderi-Sohi & Emami, 2006; Zafar et al.,

2008), but based on the literature search done, there is currently none from South Africa.

The main aim of this study was to determine the prevalence, knowledge and attitudes of self-medication practices among undergraduate medical and non-medical university students enrolled at the University of Witwatersrand. The research study has five main objectives:

- i. To determine the prevalence of self-medication among first, second and third year pharmacy students (medical students), and first, second and third year psychology students (non-medical students) at the University of Witwatersrand.
- ii. To determine knowledge on self-medication practice among first, second and third year pharmacy students (medical students), and first, second and third year psychology students (non-medical students) at the University of Witwatersrand.
- iii. To determine attitude towards self-medication practice among first, second and third year pharmacy students (medical students), and first, second and third year psychology students (non-medical students) at the University of Witwatersrand.
- iv. To investigate the four variables, sex, type of school (medical / non-medical), self-care orientation and medication knowledge for possible correlation with self-medication practises.
- v. To investigate relation between the four variables (sex, type of school, self-care orientation and medication knowledge) and the type of therapeutic class of medicine used in self-medication.

The next chapter reviews the existing literature on SM. In chapter three, the structure of the questionnaire used to achieve the research objectives and the method of data collection are discussed. In the fourth chapter, the responses from the questionnaires collected are displayed with reference to the five research objectives. The results of the research study are discussed in chapter five. Chapter six concludes the dissertation by reflecting upon findings and giving concluding remarks.

Chapter Two

Literature Review

2.1 Introduction

The purpose of this chapter is to discuss literature pertaining to SM, its benefits and risks, and OTC medicines. The chapter also discusses the primary determinants of SM, the medicine regulatory laws in SA that govern OTC medicines, the role of the pharmacist in SM, and the implications of SM in various population groups.

2.2 The evolution of self-care and self-medication

Throughout human history, the dominant pattern of healthcare was individual self-care practiced within families and the local community. Self-treatment involved the use of locally-produced preparations of uncertain efficacy (Osemene & Lamikanra, 2012). According to pharmacologist, medical historian and ethicist Leake (1965), in primitive times, people experimented with making poultices out of plants and minerals; finding applications that could soothe skin and other problems. People were responsible for their own health, as self-sufficiency was obligatory and almost universal.

In the 1970s and 1980s, important developments were made globally which brought forward the concept of a more patient-centered healthcare system, in support of self-care (WHO, 2000b). In 1975, the first international symposium on the role of an individual in primary care was held at the European Regional Offices of the WHO. Thereafter, in 1981, the World Medical Association further supported and emphasised the concept of people taking responsibility for their own health by producing a declaration document titled “Declaration on the Rights of the Patient”. A key development in this time was the creation of the World Federation of Proprietary Medicine Manufacturers Association (WFPMMA) (WHO, 2000b). The WFPMMA, now renamed the World Self-Medication Industry (WSMI), was created in 1970. The WSMI achieved “official relations” status with the WHO in 1977, and its founding members were the Proprietary Association of the United States of America (USA) (now the Consumer Healthcare Products Association), the Proprietary Association of Canada (now Consumer Health Products Canada) and the Association Européenne des Spécialités Grand-Public (AESGP), and the Proprietary Association of Europe (WSMI, 2010). The WSMI’s earliest objective was to push for worldwide regulatory

classification of medicinal products into two classes: prescription and non-prescription/OTC medicines. The WSMI supported the re-classification or “switch” of prescription medicines to non-prescription status where adequate evidence, to ensure safe and effective use of such products without the intervention of a physician, was provided (WSMI, 2010).

In the 1970s and 1980s, the health conditions considered suitable for self-treatment without physician advice/consultation were limited. These included mild to moderate pain, coughs and colds, constipation and minor skin conditions, for which a limited range of medicines were available for SM (WSMI, 2010). Access to modern and effective medicines in the early 1980s resulted in the switch of some prescription medicines to non-prescription medicines. One of the first products switched to non-prescription status was ibuprofen for the treatment of pain and inflammation, in the United Kingdom (UK) (1983) and in the USA (1984). In Canada, hydrocortisone became available without prescription in 1986 (WSMI, 2010).

Consumer information is an extremely important component of responsible SM. A statement of the WSMI policy on consumer information and the role of labelling was formally approved and released in 1979. The policy emphasises the role of labelling in providing all information necessary to enable an individual without medical training to use the medicine appropriately (Herxheimer, 1999).

By the 1990s, there had been a realisation in many parts of the world that people were treating or managing a considerable number of their ailments without consulting a physician or health professional (Herxheimer, 1999). In 1998, WSMI and the International Pharmaceutical Federation (FIP) together in a WHO Consultative Group published a report on the role of the pharmacist in SM (WHO, 2019). The report produced laid the groundwork for a common understanding of self-care, SM and responsible SM. Governments around the world became increasingly interested in working with manufacturers of non-prescription/ OTC medicines, health professionals and patients towards a wider availability of safe and effective OTC medicines for use in responsible SM (WSMI, 2010).

The UK is a leading country in the switch of active pharmaceutical ingredients in prescription medication to non-prescription or OTC status (WSMI, 2010). Switches in the 1990s included products such as Clotrimazole (an anti-fungal agent) in 1992,

Acyclovir (an anti-viral agent used for cold sores) in 1993 and Beclomethasone (a steroidal medicine for the treatment of hay fever) in 1994. Considered controversial at the time, these switches are today well established and recognised as allowing people to self-treat minor ailments and take more responsibility for their own health. In 1999, WSMI and the European association AESGP initiated the “Non-prescription Ingredients Classification Tables” which present a worldwide comparison of the non-prescription status of a selection of ingredients (WSMI, 2010).

By the year 2000, stakeholders in the health industry had acquired a deeper understanding of the potential benefits arising from SM. In 2001, a “Reclassification Alliance” was established between government, industry, pharmacists and other parties in the UK to review the issues and opportunities for switching more medicines from prescription to non-prescription (WSMI, 2010). During the first decade of the 21st century, governments have become more aware of the epidemic of chronic illness and the financial burden it imposes on the healthcare system. Australia, the UK, the USA and other countries began to explore the possibility of switching more medicines intended for chronic conditions, with initial therapy support provided to patients by healthcare professionals. This means that patients will consult with a physician when first presenting symptoms of a condition, but once the physician has made a diagnosis, patients can recognise the symptoms when they recur and can self-treat the condition with a non-prescription /OTC medicine (WSMI, 2010).

2.3 Self-medication in present day

In today’s paradigm, OTC medicines are the “tools of self-care” supporting health awareness and practice. Responsible SM with OTC medicines is recognised as the first line treatment and the foundation of public health through the education of people to treat their own minor ailments and conservation of scarce health resources (Auta et al., 2012).

The concept of SM has been adopted worldwide. SM prevalence rates have been shown to be high globally, where in European countries 68% was reported (Bretagne, Honnorat, Richard-Molard, Caekaert & Barthelemy, 2006), while much higher in the developing countries with rates going as high as 92% in adolescents in Kuwait (Abahussain, Matowe & Nicholls, 2005), 31% in India (Deshpande & Tiwari, 1997) and 59% in Nepal (Shankar et al., 2003). As reported in earlier medical literature

(Abahussain et al., 2005), analgesics were the most commonly used class of medicines for SM. In Africa, an Ethiopian showed a 15% prevalence rate of SM. The magnitude of SM in Addis Ababa and central Ethiopia was as high as 50% (Abay & Amelo, 2010). Nigeria reported a SM prevalence rate of 47.6%, where the headache and fever were the most commonly reported symptoms, followed by the cough and the common cold (Afolabi, 2008).

In the South African health market, 37% of minor ailments are treated with OTC medicines, with a reported 81% of consumers satisfied and confident in their use of OTC medicines (Dreyer, Serfontein, Van der Meer & Wagner, 2013). The most frequently treated conditions were respiratory (37.8%) and gastrointestinal (14.1%). The commonly used medicines were analgesics (Paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs)), cough and cold preparations, laxatives, sedatives and anti-histamines (Dreyer et al., 2013).

2.4 The primary determinants of self-medication

The WHO systematically provides possible factors that may influence SM behavioural patterns in individuals. These possible factors are grouped into 8 different groups which are: socioeconomic characteristics, lifestyle, illness management, medicine availability, epidemiological characteristics, demographics, accessibility and public health conditions (WHO, 2000a). Figure 2.1 displays a framework of the possible factors that have an impact on an individual's SM behavioural patterns. This framework has been successfully used both in the developed and developing world to investigate the important determinants of SM.

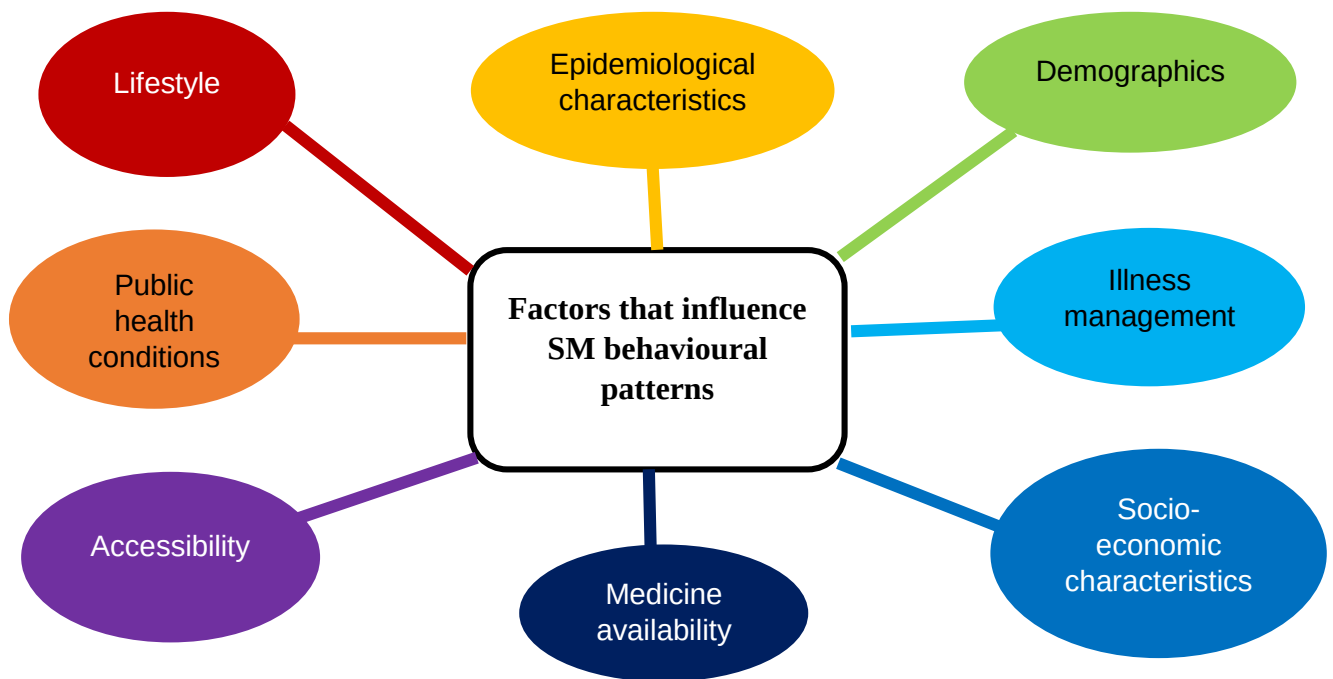


Figure 2.1 Factors affecting self-medication behavioural patterns (WHO, 2000a)

Yusuff and Omarusehe (2011) conducted a study to investigate the key determinants of SM with orthodox and herbal medicines among pregnant Nigerian women in the Ibadan region. The results of the study suggested that SM is significantly influenced or associated with the occupational status and age of the respondents. Additionally, the lack of knowledge on the adverse effects and risks that arise from self-medicating negatively affected the behaviours of SM in Nigeria.

According to Ramalhinho, Corddeiro, Cavaco, and Cabrita (2014), the accessibility of medicines, age and gender are factors strongly associated with self-medicating behaviours with antibiotics. Their study was aimed at relating important variables to SM with antibiotics in the Algrave region of Portugal. Three groups of respondents' possible variables were used in the study including socio-demographic variables, variables related to health and the health system, and behavioural variables.

Figueiras, Caamano, and Gestal-Otero (2000) carried out a study to investigate the determinants of OTC medicine use in Spain. The study relates the socioeconomic factors of the respondents to their SM decisions and behaviours. The results of the study indicated that gender, residential location and marriage status are primary

influencers of SM in Spain. Particularly, female respondents who are single and reside in urban areas cogently tend to self-medicate more than others.

Grigoryan et al. (2008) examined the relationship between predisposing factors (attitudes and knowledge concerning antibiotics use and SM) and enabling factors (country wealth and health care system factors) and SM with antibiotics in 12 European countries. The results showed that the tendency to self-medicate is strongly correlated to perceived beliefs on useful treatments of SM with antibiotics for minor ailments and bronchitis. In addition, the availability of the antibiotics is positively related to the SM behavioural patterns of an individual. At a macro level, the results of the study indicated that the economic standing or wealth measure of the country where the respondents live, negatively impacts the likelihood of SM.

A study implemented in Yogyakarta, Indonesia evidently argued that the possibility of SM depends on the public policies enforced by the government in relation to regulating and monitoring the distribution of medicines within the country. The failure of a government to regulate and supervise informal medicine and drug markets, probes the poorer citizens of the country to self-medicate (Setiawan, Hasanbasri & Trisnantoro, 2012).

Significant factors of SM within the rural Portuguese population include age, type of health consultants, and the duration of time patients waited to consult with a doctor and receive other health professional services. The study also revealed that a seasonal factor of SM exists for some specific diseases and related medicines, particularly cough and cold preparations, dermatological, anti-inflammatory and anti-rheumatic products (Nunes de Melo et al., 2006).

Eticha and Mesfin (2014) studied SM practice in Mekelle, Ethiopia. The results of the cross-sectional study show that the high likelihood of SM is associated with certain health problems such as headache, fever, gastrointestinal diseases, and respiratory tract infections. Medicinal products such as analgesics/antipyretics, gastrointestinal medicines, respiratory drugs are more frequently used for SM than others.

Table 2.1 summarises the research findings of the multiple studies presented above.

Table 2.1 The primary determinants of SM in different countries

Author and year of study	Country/city on which the study is based	Primary determinants of SM
Yusuff and Omarusehe (2011)	Nigeria	• Age • Occupational status • Lack of medication and SM knowledge
Ramlhinho, Corddeiro, Cavaco and Cabrita (2014)	Algrave region of Portugal	• Age • Gender • Accessibility of medicines
Figueiras, Caamano, and Gestal-Otero (2000)	Spain	• Gender • Residential location • Marital status
Grigoryan et al. (2008)	A group of 12 countries in the south and east of Europe	• Availability of medicines • Economic status of the country
Setiawan, Hasanbasri and Trisnantoro (2012)	Yogyakarta, Indonesia	Availability and accessibility of medicines through informal medicine markets.
Nunes de Melo et al. (2006)	Portugal (rural region)	• Age • Public health conditions, i.e. the type of health professionals available and the duration of time waited to consult with a health professional.
Eticha and Mesfin (2014)	Mekelle, Ethiopia	Epidemiological characteristics i.e., the type of illness encountered.

2.5 The growth of OTC medication sales

There are more than 300 000 OTC medicines in 80 different therapeutic categories available on the worldwide pharmaceutical market; many of these made available through the deregulation of prescription medication (Soller, Chan & Shaheen, 2011). It has been reported that although consumers may only visit their family physician or health care provider three times a year, trips to purchase OTC medication may occur approximately 26 times a year (Consumer Healthcare Products Association, 2015). This fact has fuelled the growth of the OTC medicine industry.

The monetary value of OTC medicines is increasing annually in all therapeutic categories of the medicines. In 2015, OTC medication sales in the USA were approximately US\$40 billion, which represents a 2.8% increase since 2014 (Consumer Healthcare Products Association, 2015). Approximately every dollar spent by a consumer on OTCs saves the USA healthcare system US\$6 - US\$7 per patient resulting in annual cost savings of US\$102 billion (Consumer Healthcare Products Association, 2015). Overall OTC sale figures in the UK (excluding Northern Ireland) showed an increase from £1275.8 million in 1996 to £1541.7 million in 1999 (Brass, 2001). Globally, the Indian pharmaceutical industry has been ranked fourth in terms of volume of OTC medicine production, and thirteenth in terms of OTC medicines value. India exports OTCs of a value of approximately US\$2.6 billion, with local domestic sales reaching a value of approximately US\$4 million (Sharma et al., 2012; Yadav & Rawal, 2015).

A retail pharmacy in SA grossly yields over R5 million (five million rands) annually, from OTC medicine sales only (NEWS 24, 2017). Analgesics represent one of the leading therapeutic medicine classes used for self-treatment in SA (NEWS 24, 2017). A sample report from a pharmaceutical manufacturing company, Adcock Ingram, which is the leading manufacturer for OTC analgesics in SA, indicated that Adcock Ingram's OTC analgesic sales turnover increased from R761.5 million for the period ended 31 December 2015 to R884.6 million for the period ended 31 December 2016 (Adcock Ingram, 2017). These statistics are a clear indication of the rapid growth of OTC medicine production and market availability. The careful management of the use of these medicines is becoming imperative, particularly in developing countries such as SA, which has limited health resources and is experiencing a slowed economy.

2.6 South African medicine regulation in terms of the Medicines and Related Substances Act, 1965 (Act No. of 1965)

The prevalence of SM is greatly influenced by the medicine regulatory laws enforced in a country. These laws are in relation to the manufacturing of medicines and more specifically, the monitoring of the dispensation or distribution of medicines within the country. The accessibility and availability of medicines is evidently a key factor in SM.

The sale and supply of all scheduled medicines in SA is governed by section 22A of the Medicines and Related Substances Act (MRSA), 1965 (Act 101 of 1965). The MRSA (Act 101 of 1965) defines a scheduled substance as any medicine or other substance prescribed by the Minister of Health under section 22A. All medicines are subject to a scheduling process on the basis of the active pharmaceutical ingredients they contain and their safety profile, in relation to the therapeutic indications for its use. This regulates the accessibility of medicines by the public. Medicines may be listed in one or more of eight schedules (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965)*, 2017).

In SA, medicines are designated as OTC medicines by the SAHPRA regulatory body. This regulatory entity ensure that all OTC medicines contain ingredients that are safe and effective when used without a physician's care and intervention (SAHPRA, 2019a). OTC medicines are regulated according to the active pharmaceutical ingredient (API) contained, rather than the final medicinal product or formulation. By regulating APIs instead of specific medicine formulations, the regulatory bodies allow for medicine manufacturers to formulate ingredients and combinations of ingredients, into proprietary mixtures (SAHPRA, 2019a).

2.6.1 Regulations related to the scheduling of OTC medicines

Section 22A of the MRSA, 1965 (Act 101 of 1965) provides for a graduated system of control over the sale and supply of medicines, ranging from access via any retail outlet, to outright prohibition. Medicines available OTC are scheduled at S0, S1 and S2; and their sale does not require a prescription from an authorised prescriber. Schedule 0 medicines, are indicated for minor diseases or symptoms which can be easily recognised by the patient and which do not require medical diagnoses or monitoring. As a result, S0 medicines may be sold in an open shop (i.e. any setting, including general dealers) and pharmacies. Thus, S0 medicines are known to be substantially

safe in use, without routine necessity for advice or counselling by a healthcare practitioner (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965)*, 2017).

In addition, S1 and S2 medicines are indicated for minor diseases/ ailment. While these medicines are known to be substantially safe in use and indicated for minor diseases recognisable by the patient, advice/counselling by a pharmacist or other healthcare practitioners is required to ensure safe use. Therefore, S1 and S2 medicines may only be obtained from a pharmacy after consultation with a pharmacist, pharmacist intern or pharmacist's assistant acting under the supervision of a pharmacist. These medicines may also not be sold by any person other than a practitioner, nurse or a person registered under the Health Professions Act, 1974, with the exception of a medical practitioner or dentist (SAHPRA, 2019a). A licence, as stipulated in section 22C(1)(a) of the MRSA, is required for the sale of S1 and S2 medicines. To ensure the rational use and dispensation of S1 and S2 medicines, regulation 11 of the General Regulations published in terms of the MRSA, specifies the information that must be recorded when a S1 or S2 medicine is supplied. The following information must be recorded with regard to the supply and sale of S1 and S2 medicines without a prescription: the name of the person to whom it was sold; the medicine name and quantity; and the name of the pharmacist, pharmacist intern, and pharmacist's assistant or authorised healthcare professional who sold it.

Schedule 3 medicines (S3) may be sold without a prescription from an authorised prescriber, provided that the quantity being sold and the ailment being treated are as stipulated in legislation (SAHPRA, 2019a). Cimetidine is a S3 API that is contained in medicines indicated for the treatment of gastro-oesophageal reflux disease. The API cimetidine is listed and scheduled as a S3 medicine. However, it can be sold and supplied OTC as a S2 medicine, when its use is intended for the short-term symptomatic relief of heartburn, hyperacidity and dyspepsia, subject to a maximum unit dose of 200mg, a maximum daily dose (per 24 hours) of 800mg and a maximum treatment period of 2 weeks. Another example is diclofenac. Diclofenac is a NSAID used to treat pain and inflammation. The scheduling status of this medicine changes due to its intended use or indication. Diclofenac is listed as a S3 medicine except when its use is intended for application to the skin (S1), for the emergency treatment of acute gout attacks (S2), and for the treatment of post traumatic conditions, for a maximum

treatment period of 5 days (S2). The scheduling status changes for cimetidine and diclofenac are depicted in Table 2.1 and Table 2.2 respectively.

Table 2.2 Scheduling status of cimetidine (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965), 2017*)

Scheduling status	Indication for use	Concentration per dosage unit
S3	The symptomatic relief of heartburn, hyperacidity and dyspepsia for a treatment period of more than 2 weeks.	More than 200mg of cimetidine per dosage unit, with a maximum daily dose exceeding 800mg.
S2	The short-term symptomatic relief of heartburn, hyperacidity and dyspepsia for a maximum treatment period of 2 weeks.	Maximum unit dose of 200mg of cimetidine, with a maximum daily dose not exceeding 800mg.

Table 2.3 Scheduling status of diclofenac (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965), 2017*).

Scheduling status	Indication for use
S3	The treatment of post-traumatic conditions for a treatment period of more than 5days. Diclofenac, as a S3 medicine, is not intended for application to the skin, and the emergency treatment of acute gout attacks.
S2	- Emergency treatment of acute gout attacks. - The treatment of post-traumatic conditions, for a maximum treatment period of 5 days.
S1	Application to the skin.

Some schedule 4 (S4) medicines may also be sold without a prescription from an authorised prescriber, provided that the quantity being sold and the use of the medicine are as stipulated in legislation (SAHPRA, 2019a). Atovaquone is a schedule 4 medicine indicated for the acute treatment of mild to moderate *Pneumocystis* pneumonia. When used in combination with the proguanil, the scheduling status of the medicine changes from S4 to S2. Atovaquone/proguanil is a S2 medicine used in the prophylaxis of *P. falciparum* malaria. (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965)*, 2017). Table 2.3 presents the scheduling status of atovaquone.

Table 2.4 Scheduling status of atovaquone (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965)*, 2017)

Scheduling status	Medicine formulation	Indication for use
S4	Single component atovaquone preparations.	The acute treatment of mild to moderate <i>Pneumocystis</i> pneumonia.
S2	Oral preparations in combination with proguanil (Atovaquone/proguanil).	Prophylaxis of <i>P. falciparum</i> malaria.

The abuse of OTC medicines has been highlighted in SA, and although the implicated medicines vary, the key group of medicines that is mostly abused is codeine-based medicines i.e. codeine, and pseudoephedrine. In response to concerns about the potential misuse of products containing (pseudo)ephedrine and codeine (methyl morphine), the SA government and regulatory authorities have “up-scheduled” some formulations containing these APIs, to gain ‘prescription-only’ status (SAHPRA, 2019a). A list of medicines containing codeine and pseudoephedrine is depicted in Tables 2.5 and Table 2.6 respectively. In some pharmacy settings, patient identification is required for the OTC purchase of codeine-containing medicines. This allows for the amount of codeine consumed by a patient to be linked to the patient identification number, which is then loaded onto a database that would be accessible to all registered pharmacies nationwide. This requirement is not an enforced law but was initiated by the Community Pharmacist Sector (CPS) which represents about 80% of South Africa’s pharmacists and is a division of the Pharmaceutical Society of South Africa (PSSA) (Dada, Harker Burnhams, Van Hout & Parry, 2015). The non-

compliance to this requirement has led to the inadequate documentation of OTC codeine medicine sales.

Table 2.5 Scheduling status of codeine (methyl morphine) (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965), 2017*)

Scheduling status	Medicine formulation	Concentration per dosage unit
S6	Single component codeine preparations.	-
S3	Oral solid preparation in combination with one or more therapeutically active substances.	More than 10 milligrams of codeine per dosage unit.
S3	Liquid oral preparations and mixtures, in combination with one or more therapeutically active substances.	More than 10 milligrams of codeine per 5 millilitre dosage unit.
S2	Oral solid preparation in combination with one or more therapeutically active substances.	Less than 10 milligrams of codeine per dosage unit, with a maximum daily dose not exceeding 80 milligrams, and in packs containing dosage units for a maximum treatment period of 5 days and limited to one pack per customer.
S2	Liquid oral preparations and mixtures, in combination with one or more therapeutically active substances.	Less than 10 milligrams of codeine per 5 millilitre dosage unit, with a maximum daily dose not exceeding 80 milligrams, and with a pack size not exceeding 100millilitres, and limited to one pack per customer.

Table 2.6 Scheduling status of pseudoephedrine (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965), 2017*)

Scheduling status	Medicine formulation and indication of use	Concentration per dosage unit
S6	Single component pseudoephedrine preparations not intended for the symptomatic relief of colds and flu.	-
S2	Oral preparations and mixtures, when in combination with another pharmacologically active substance and intended for the symptomatic relief of colds and flu.	Less than 60 milligrams of pseudoephedrine per dose, with a maximum daily dose not exceeding 240 milligrams per day, subject to a maximum pack size of 720 milligrams and limited to one pack per customer.

2.6.2 The advertising of medicines

A recent study has shown that familiarity and easy access to certain pharmaceuticals largely influences SM (Sonam, Reetesh & Jeetendra, 2011). For instance, there are about 200 different brands for every drug molecule in India (Clark, 2004), thus creating a vast market of medicines. This has led to fierce competition among pharmaceutical companies, consequently giving rise to a marked increase in unethical marketing practices of medicines (Sharma et al., 2012).

As mentioned in the previous chapter, it has been proven that most consumers use at least one extensively advertised medicines without consulting a healthcare practitioner (Alghanim, 2011; Amani, Mohammadi, Shaker & Shahbazzadegan, 2011). This particularly impacts the youth who spend a copious amounts of time on the cyberspace and are highly influenced by digital marketing practices. In consequence, the increased digital advertising of pharmaceuticals poses a large influence in the SM behavioural patterns of the young population (Andabaka, Globočnik, Vukelić, Esposito & Baršić, 2011). The control over misguiding advertisements is imperative to managing the accessibility and availability of OTCs on the market. An individual's

knowledge and use of OTCs is mainly based on medical knowledge obtained from unreliable sources, mainly, advice from friends/family, and unverified internet sources. There is only a small fraction of consumers that follow a reliable set of information sources such as approved medical journals or websites to gain medication knowledge (Segall, 2005).

As a measure of controlling the unethical marketing of medicines, the MRSA of SA stipulates legislature on the correct marketing practice of medicines. The General Regulation 45(2) (a) of the MRSA, states that S0 and S1 medicines may be freely advertised to the public. According to the General Regulation 45(2) (b), S2 medicines may be advertised only for the information of medical practitioners, dentists, veterinarians, pharmacists and other persons authorised to prescribe or in a publication which is normally or only made available to persons referred to therein. This, however, does not prohibit the provision of information to the public on the prices, names, pack sizes and strengths of S2 medicines (*Medicines and Related Substances Act, 1965 (ACT 101 OF 1965)*, 2017).

2.7 The benefits of self-medication

The practice of SM enables pharmacists to assume a greater clinical role and have more substantial participation in increasing therapeutic options for the patient. This practice has promoted greater involvement of pharmacists with patients, and has enhanced pharmacists' professional status (Bradley & Bond, 2008). In countries like SA where the government is the main payer of services, SM is observed as a way of constraining healthcare costs (Blenkinsopp & Bradley, 1996). The encouragement of SM gives patients every opportunity to take responsibility and build confidence in their capacity to manage their own health. This is a positive step towards the development of a patient-clinician partnership, where doctors and pharmacists are seen as collaborators with patients in the management of health rather than controllers of access to medicine (Blenkinsopp & Bradley, 1996).

Reports have shown that patients find greater access to OTC medicines to be more convenient, effective and economical, as there is no need for a doctor's visit (Bradley & Bond, 2008). This has been further confirmed by a survey in the UK conducted by the British Market Research Bureau International (Beitz et al., 2004). This work was commissioned by the Proprietary Association of Great Britain (the trade association

representing manufacturers of non-prescription medicines and food supplements). Over 2000 individuals were interviewed and almost 80% reported that it was important to have non-prescription medicines for minor health problems, 67% reported that such medicines were just as effective as those obtained from a doctor and 86% stated that they would purchase again, the same medication that they had previously used (Beitz et al., 2004).

These results suggest that the public have confidence in self-treatment of certain health conditions using the available OTC medicines. The benefits of SM translate into patient and consumer wellness and productivity, economic gain for employers (through good employee attendance records due to the practice of SM) and cost savings to healthcare budgets through reduced medicine budget cost and reduced physician visits (Sonam et al., 2011). However, patient confidence and preference for SM does not mean that the use of OTC medicines is always optimal or appropriate in all cases. The latter fact is a major concern in promoting OTC medicine usage, and will be reviewed in the next section.

2.8 The risks of self-medication

Over-the-counter medicines are generally considered for short-term use in the management of a self-limiting condition. Many OTC medicines are not potent enough or appropriate for long-term use. It has been generally noted that risks resulting from SM are largely due to some form of inappropriate use (Hughes et al., 2001). Inappropriate medicine use is sometimes described as misuse or abuse, terms which are interchangeably used, but have distinct meanings. The term misuse is applied as the use of a medicine for a legitimate medical reason, but in an incorrect manner, for example, use at an increased dosage or for a longer duration than recommended (Sonam et al., 2011). The term abuse, is used to describe the use of medicines for non-medical purposes, for example, the use of medicines for euphoric effects or to achieve body weight loss (Sonam et al., 2011).

Literature presents numerous examples of individual case studies highlighting problems or risks that may arise from SM using OTC medicines. The overall extent of the risks proves difficult to quantify. This is partly due to the fact that there is insufficient record-keeping or monitoring associated with OTC medicine supply or transactions, and hence, physicians and pharmacists may be highly unaware of patients incorrectly

using these medicines. The incorrect use of medicines may stem from incorrect self-diagnosis. The management of vaginal candidiasis has generated some concern in this respect (Russell, Barton & Lawrence, 2009; Sihvo, Ahonen, Mikander & Hemminki, 2000; Taylor & Lipsky, 2002). Ferris, Dekle and Kitaker (2002) assessed the ability of women (with and without a previous physician-confirmed diagnosis of vaginal candidiasis) to diagnose this condition based on the reading of a classic case scenario. A minority of patients were able to diagnose correctly upon reading the case scenario; a previous diagnosis had only a moderate impact on the patient's ability to correctly diagnose a case. The authors concluded that women may be using non-prescription anti-fungal medication to treat conditions which may have similar symptoms to vaginal candidiasis, but are potentially more serious (Ferris et al., 2002).

The geriatric population has often been viewed as a population that may be at an increased risk from SM due to concomitant medication use and various medical conditions brought on by old age. Chrischilles, Lemke and Wallace (2001) reported multiple analgesic product use in older patients (>65 years of age) in rural Iowa, USA. Batty, Osborne and Swift (2000) also surveyed the use of non-prescription medicines by hospital in-patients over the age of 65 years in the UK. The authors reported that there was little to no documentation of pre-hospital admission use of non-prescription medicines in patient clinical notes, that patients continued to use these medicines in hospital, and that they were unaware of the possibility of adverse drug effects (Batty et al., 2000).

Moreover, the practice of SM has been seen to lead to other potential risks, including drug dependence and addiction, masking of malignant and potentially fatal diseases, increased polypharmacy, hazard of misdiagnosis, problems relating to over and under dosing, drug interactions and tragedies relating to the side effect profile of specific drugs (Andabaka et al., 2011). The use of left-over medicines stored at home carries the risk of exposure to expired medicine. The spread of SM has accounted for about 2.9-3.7% causes of death in hospitals due to drug-drug interactions (Bradley & Bond, 2008).

Table 2.7 Benefits and risks of self-medication from the perspective of principal stakeholders (Hughes et al., 2001)

Principal Stakeholder	Benefits	Risks
Pharmaceutical industry	Market for the medicines produced widens as more patients self-medicate.	The increased market for medicines has led to aggressive competition among pharmaceutical companies. In India, this aggressive competition among companies has led to the controlled pricing of medicines, which, in turn leads to the increased availability of medicines at extremely low prices. This has also resulted in a marked increase in unethical marketing practices, leading to the uncontrolled availability of medicines. Such practice, coupled with poor medicine regulatory laws increase the probability of irrational SM and medicine abuse.
Pharmacists	• An increased advisory and informative role for patients. • Substantial involvement in patient therapy. • Enhancement of professional role.	-
Physicians	Avoidance of unnecessary consultations. Time saved for more severe patient cases.	-
Healthcare payers	The financial burden on the healthcare system can be reduced, especially in countries where the government is the main payer of services.	-

Table 2.7 is continued on the subsequent page

Principal Stakeholder	Benefits	Risks
Patient	Patient has greater confidence and is empowered to take responsibility for their own health.	• Incorrect and inappropriate use of medicines. • Masking of symptoms of a serious medical condition by use of OTC medicines. • Poly-pharmacy • Drug interactions • An under appreciation of the role of a physician.

2.9 The role of the pharmacist and pharmacy staff in self-medication

In developing countries, SM is considered a core activity conducted by community pharmacies (WHO, 2000a). This involvement of pharmacists has extended the participation of the pharmacy profession in the rational management of minor illness. The effectiveness of the communication channel between the pharmacist and patient is of great importance for achieving desired patient satisfaction as well as for improving treatment outcomes (Hussain & Ibrahim, 2012). Pharmacists' counselling of patients on OTC medicines results in optimal rates of patient compliance and adherence (Shah & Chewning, 2006). In support of this view, Kansanaho, Cordina, Puumalainen and Airaksinen (2005) further assert that good communication skills among pharmacists are accompanied by key benefits such as improved patient understanding and reduction in patient anxiety as well as increased pharmacist status, satisfaction and self-esteem. This reduces the potential risks associated with SM.

The process of SM consultation in community pharmacies includes two main stages: patient assessment and the provision of advice (Schneider, 2010). According to the FIP and the WHO, pharmacists should provide advice to ensure that the patient receives and understands sufficient written and oral information to derive maximum benefit from the treatment (Berardi, Ferreri, Hume, Brown & Isetts, 2009). In SA, pharmacists are trained and obligated to, give the patient personalised information on

the medicine received, ensuring that the patient knows how to use or take the medicine and making certain that the patient is achieving the desired effects from the medicine being taken (The South African Pharmacy Council, 2010).

In 2013, Brata et al. conducted an in-depth literature review to determine the rate of information collection and to understand the types of information collected by community pharmacy staff in developing countries. The majority of the studies concluded that the information-collection process for the provision of SM consultation via community pharmacies in developing countries was inconsistent and the information collected was not comprehensive. For example, a study in Guatemala showed that while appropriate advice was provided to patients in 55% of encounters in the hypertension scenario, it was 0% for acute respiratory infection and 3% for diarrhoea (Kroeger et al., 2001). The reason for the differences in the provision of appropriate advice in the different scenarios could be that the pharmacy staff have different levels of knowledge for different scenarios and human pathologies, thereby resulting in the variation in the proportion of appropriate advice given (Brata et al., 2013).

Contextual factors such as differences in the legislation, health care resources, and socio-cultural factors cause variation in the management of SM requests by pharmacy staff across a country. The FIP reports that in developing countries, health care resources such as the number of practising pharmacists could be significantly different between urban and rural areas (International Pharmaceutical Federation, 1998). As a result, the benefit of having pharmacists available to provide quality services is not in an area where there is a lack of pharmacists (International Pharmaceutical Federation, 1998), thus leading to differences in how pharmacy staff respond to a SM request.

2.9 Self-medication among adolescents and university students

Shehnaz, Agarwal and Khan (2014) provide a comprehensive review of factors of SM behaviour among adolescents aged 13 -18 years of age. The results show that the prevalent determinants of SM among adolescents comprise the female gender, older age, maternal education, and familial practices. In addition, headache, fever and allergies were the frequently reported self-medicated health problems among diseases or symptoms.

The practice of SM in university students been found to be up to 45%, 88% and 94% in Turkey, Croatia and Hong Kong respectively (Buke et al., 2005; Lau, Lee & Luk, 1995; Vucic, Trkulja & Lackovic, 2005). A relatively high SM prevalence rate of 76% has been reported among the university students of Karachi (Zafar et al., 2008). Sharif and Sharif (2014) also studied the SM prevalence among non-healthcare students attending a university in the United Arab Emirates. A prevalence rate of 59% was reported among the university students. Sarahroodi, Maleki-Jamshid, Sawalha, Mikaili & Safaeian (2012) conducted a study to investigate the pattern of SM with analgesics among Iranian university students in central Iran. The population of this study consisted of medical and non-medical university students. The results of the study showed that 76.6% of the respondents self-medicated with analgesics. The rate of SM in university students varies in different countries, with rates of 81.3% reported in Bahrain (James et al., 2006), 40% reported in Germany (Du & Knopf, 2009) and 20% in the UK (Dengler & Roberts, 1996). These study findings generally revealed no significant difference in SM between female and male students. However, the symptoms that led to SM were different between the two genders. These findings are in agreement with an earlier study of university students in Bahrain (James et al., 2006). In contrast, data from Spain (Figueiras et al., 2000), Brazil (Sa, Barros & Sa, 2007) and Kuwait (Abahussain et al., 2005) indicated higher SM rates among women. There was no significant difference in the prevalence of SM between medical and non-medical students reported in central Iran. This finding is in agreement with studies done in Pakistan (Zafar et al., 2008), Slovenia (Klemenc-Ketis et al., 2010) and Mozambique (Lucas et al., 2007), and in contrast with a study in Palestine (Sawalha, 2008).

Some studies also found that SM is predominantly popular among people who have knowledge related to medical or pharmacy sciences (Abay & Amelo, 2010; Sharif & Sharif, 2014). Alam, Saffoon and Uddin (2015) evidently show that the likelihood of SM is considerably high among medical and pharmacy students in Bangladesh. The reported SM prevalence rate among the pharmacy and medical students was 87%. Most medicines were purchased directly from pharmacies, while medicines stored at home ranked as the second most common source of medicine (Alam et al., 2015).

Sawalha (2008) investigated the SM practices among Palestinian medical and non-medical university students. Of the 1581 surveyed students, 96.6% of medical

students and 98.6% of the non-medical students reported SM practices. An overall 98% of the surveyed students reported SM practices. The results of the study further demonstrated that non-medical university students had higher odds of self-medicating. In this Palestinian study, although sex, level of self-care orientation, and the level of medication knowledge were insignificant predictors of SM practices, they were significantly influential in the selection of the medicine used in SM practices (Sawalha, 2008).

A study was conducted in the south of India that investigated the prevalence of SM among undergraduate medical and non-medical students in south India. The prevalence of SM was reported to be 96% among the medical students and 92% among the non-medical students (Daniel, Prasanand, Joice & Rani, 2019).

Table 2.8 summarises the SM prevalence rates of university students, from the abovementioned literature.

Table 2.8 Self-medication prevalence rates of university students from different countries

Author and year of the study	Country/city on which the study is based	SM prevalence rate (%)
Buke et al. (2005)	Turkey	45.0
Lau, Lee and Luk (1995)	Hong Kong	94.0
Vucic, Trkulja and Lackovic (2005)	Croatia	88.0
Sarahroodi, Maleki-Jamshid, Sawalha, Mikaili and Safaeian (2012)	Iran	76.6
James et al. (2006)	Bahrain	81.3
Du and Knopf (2009)	Germany	40.0
Dengler and Roberts (1996)	UK	20.0
Sawalha (2008)	Palestine	• 96.6 (medical students) • 98.6 (non-medical students) • 98.0 (Overall study population)
Alam, Saffoon and Uddin (2015)	Bangladesh	87.0
Daniel, Prasanand, Joice and Rani (2019)	South India	• 96.0 (medical students) • 92.0 (non-medical)
Zafar et al. (2008)	Karachi, Pakistan	76.0
Shariff and Shariff (2014)	United Arab Emirates	59.0

The SM prevalence rates of university students are predominantly high globally. Much lower prevalence rates have been reported in developed countries such as Germany and the UK, while, alarmingly high prevalence rates have been reported for countries in the developing world such as Palestine. The WHO has identified the condition of public health facilities as a potential factor in influencing SM behaviours (WHO, 2000a). Developed countries have well-structured and efficient public health services

in comparison to developing countries. As a result, individuals in developing countries are more propelled to take responsibility for their own health through SM (Nunes de Melo et al., 2006). Research by Grigoryan et al. (2008) showed that, at a country level, higher gross domestic product (wealth) and economic stability were associated with lower likelihood of SM in 12 European countries.

It is of great importance to identify and to have an evidence-based understanding of the potential factors associated with SM practices in order to recommend public health policies aimed to reduce medicine-related health risks among the population, particularly in university students. The next chapter discusses the methodology of the research and provides an explanation as to how the research objectives were addressed.

Chapter Three

Methodology: A descriptive cross-sectional study

3.1 Introduction

This chapter presents and describes the research design, data collection, and data interpretation and analysis methods employed in the study in order to address the research objectives mentioned in Chapter Two. The various ethical measures applied throughout the duration of the study are also outlined.

3.2 Research design

Kumar (2011) explains that the principal role of a research design is to provide an explanation as to how a researcher finds solutions or answers to their research questions. The use of an applicable research design allows for the researcher to meet the study aims and objectives, and ensures that the findings attained are valid, conclusive and comparative.

The selection of the design for this research study was guided by the primary aim of the research, which is to determine the prevalence, knowledge and attitudes of SM practices among medical and non-medical university students. A descriptive cross-sectional study design was chosen and applied. A cross-sectional study is an observational study that characterises the prevalence of health-related outcomes in a specified population or representative subset, at a specific point in time (Alexander, Lopes, Ricchetti-Masterson & Yeatts, 2014).

In order to address the research objectives, a quantitative approach was used. This included the use of an anonymous-based questionnaire as the main and only study tool. Quantitative research designs emphasise objective measurements and the statistical, numerical or mathematical analysis of data collected through questionnaires and surveys. Quantitative research focuses on gathering numerical data and generalising it across groups of people or, to explain a particular phenomenon (Alexander et al., 2014). The quantitative approach arises from the belief that human phenomena and variables in human behaviour can be studied objectively (Parahoo, 2006). This approach was specifically selected to obtain numerical data from the questionnaire. A descriptive design was used to establish associations

between variables. This research also adopts a comparative case study approach by comparing selected degree programmes (Pharmacy and Psychology) from two contrasting departments.

3.3 Study setting

The study was conducted at the University of the Witwatersrand (WITS) in Johannesburg, which is situated in the Gauteng province of South Africa. The location of the university in central Johannesburg ensured its convenience as a study site. The university has a diverse student population with a wide array of socio-demographic characteristics. In 2019, a reported total of 25 352 undergraduate students were enrolled into the university with 54.63% of these students being female and 45.35% being of the male gender. WITS is structured into five faculties comprising of 33 schools offering a total of 346 courses (The University of the Witwatersrand, 2019a).

In order to address the research objectives, two faculties were selected to partake in this study namely: the Health Sciences faculty and the Humanities faculty. Undergraduate pharmacy students from the School of Therapeutic Sciences in the Health Sciences faculty were selected to partake in the study as medical students. Undergraduate psychology students from the School of Human and Community Development in the Humanities faculty were selected to partake in the study as non-medical students.

3.4 Study population and sample size

In order to maintain a common institutional context, the research study took place in different departments of the same university. The study population comprised of first, second and third year pharmacy students, who were designated as the medical students in this study and, first, second and third year psychology students, who were designated as the non-medical students in this study. The department of psychology is situated in the university's main campus in Braamfontein. The department offers a Bachelor of Arts degree in psychology, with a duration of three undergraduate years. The department offers core learning courses for each undergraduate year as follows:

Table 3.1 Biographic information of the psychology students (non-medical student respondents) (The University of the Witwatersrand, 2019b)

Year of Study	Number of students currently enrolled	Course Outline
1	300	Psychology 1 .This is a full year course that addresses the systematic and scientific study of human behaviour.
2	250	Psychology 2. This is a full year course covering core theories and research in human development, personality, cognition and social psychology.
3	110	The department offers 12 modules focussing on specialised areas of Psychology. Students are required to choose four of these modules, leading to either a Psychology or an Organisational Psychology Major, depending on the specific modules selected.

The pharmacy and pharmacology department is located in the university's medical school campus situated in Parktown. The department offers a Bachelor of Pharmacy, with a duration of four undergraduate years. The department offers the following learning courses for each undergraduate year:

Table 3.2 Biographic information of the pharmacy students (medical student respondents) (The University of the Witwatersrand, 2019c)

Year of study	Number of students currently enrolled	Courses Outline
1	113	Introduction to medical science, Chemistry 1, Physics 1, Pharmaceutical practice, Sociological foundations of health, System dynamics for health sciences, First aid, Computer literacy
2	93	Anatomy for pharmacy students, Physiology and medical biochemistry 1, Pharmaceutical chemistry 1, Pharmaceutics 1, Pharmacy Practice 1
3	78	Pathology, Medical microbiology, Introduction to biomedical ethics, Pharmaceutical chemistry 2, Pharmacotherapy 1, Pharmacy Practice 2, Pharmaceutics 2, Pharmacology 1

All undergraduate students from both departments befitting the inclusion criteria of the study were included in the study. The following equations were used in the calculation of the appropriate sample size:

Equation 1: Formula for sample size calculation

$$ss = \frac{Z^2 \times (p) \times (1 - p)}{c^2}$$

Equation 2: Correction for finite population

$$\text{new ss} = \frac{ss}{1 + \frac{ss - 1}{\text{pop}}}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p = % picking a choice, expressed as decimal (0.5 used for sample size needed)

c = confidence interval, expressed as a decimal

Pop = population

At a confidence level of 95% and using a confidence interval of 0.05, the appropriate sample size for the study was calculated to be 360 students. The sample size was also calculated using the EPI INFO V 7.2.0.1 statistical software to rule out calculation error.

3.5 Inclusion criteria

- Age of 18 years and above.
- Must be a currently enrolled as a first, second or third year pharmacy student, or a first, second or third year psychology student at University of Witwatersrand.
- Must be enrolled as a full-time student.
- Must practise SM.
- Must be able to provide consent to participate in the research study (ethical requirement).

3.6 Exclusion criteria

- First, second or third year psychology students enrolled as part-time students at the University of Witwatersrand (WITS Plus Students).

3.7 Data Collection

Robson (2007) states that the researcher must conduct the data collection process in the simplest manner that caters to the research objectives, and should not collect more data than is necessary. He maintains that data collection should be systematic, repeatable and objective. A structured, paper-based questionnaire that makes use of a quantitative self-report technique was used as the data collection tool for the study. The data collection method chosen for the study was a paper-based questionnaire. The use of a questionnaire allows for a large sample size for the study population without incurring major expenses.

In order to act in accordance with the persons in authority, permission to disseminate the questionnaire to the pharmacy and psychology students was sought from the respective head of departments. Permission was granted to work with the students. In order to attain a favourable response rate, appropriate times and dates were set up with both departments, and the questionnaires were distributed to the students during a lecture period. Students were invited to take part in the questionnaire study, and it was made clear in spoken introduction that participation was voluntary. A brief description of the nature of the study, including the definition of SM and other operational terms, all acronyms used in the questionnaire and the procedure of completing the questionnaire were adequately explained to all respondents. The lecturers made time for the questionnaires to be completed as soon as they were received by the students (see Table 3.3 for questionnaire ethical considerations). The questionnaires were collected soon after completion. All the data for this research study was collected within a two-week period during the month of April 2019. This was to ensure that any seasonal factors that exist for certain ailments such as colds and flu, and seasonal allergies, were not an influence in the varying responses of the surveyed students.

3.8 Questionnaire design

Following the literature review process conducted during the early phases of the study to gain background information on the subject matter, a questionnaire was compiled

based on previous studies and previously-used questionnaires which were found to be appropriate to this study (Hoai & Dang, 2017; James et al., 2006; Sawalha, 2008; Zafar et al., 2008). The questionnaire (see Appendix B) comprised of a total of 35 closed-ended questions and statements that were categorised into different sections.

The questionnaire consisted of six sections. Part A was designed to collect the demographic information of the respondent. The second section of the questionnaire, Part B, included questions that focused on the indications for SM, i.e. the health conditions that respondents self-treat with OTC medicines. This section was used to assess the level of self-care orientation of the respondents. Respondents who reported the self-treatment of five or more health conditions listed were considered to possess high self-care orientation, whereas those who reported treatment of less than five health conditions were considered to have low self-care orientation. This analogy was guided by previous research, where respondents reporting 30% of the listed health conditions were considered to possess a high level of self-care orientation (Isacson & Bingefors, 2002). The third section of the questionnaire, Part C, consisted of questions relating to the therapeutic classes of OTC medicines that respondents used for SM. The questionnaire presented a list of therapeutic medicine classes and a branded medicine example for each class from which to choose; and respondents were asked to self-report any OTC medicines they had consumed in the last two months (60 days). In the fourth section of the questionnaire, Part D, respondents were asked to select perceived reason(s) for practicing SM. This section of the questionnaire also included questions regarding the sources of medicine for SM and sources of information for SM.

The fifth section, Part E, was designed to assess respondents' medication knowledge based on the Isacson and Bingefors methodology. Medication knowledge was defined by the number of correct true/false answers to six generalised statements about OTC medicines. The six statements used were established as per the Isacson and Bingefors methodology. A point was given for each correct answer, and no points were awarded for an incorrect answer. "I don't know" was provided for as an alternative answer, however no points were added or subtracted on the selection of that response. Respondents with a score of one or more are considered to have high medication knowledge, and those with a score of 0 (zero) to have poor medication

knowledge. Respondents who answered less than four questions were excluded in the assessment of medication knowledge (Isacson & Binglefors, 2002). The last section of the questionnaire, Part F, made use of a Likert scale to collect data on the respondent's attitude towards pharmacy staff (Pharmacists and Pharmacists' assistants). This section comprised of 13 statements with six different response options ranging from strongly disagree to strongly agree.

Table 3.3 Questionnaire ethical considerations (Hay, 2003)

Ethical Issues	Application into the questionnaire and data collection
Access	Permission to work with the students was sought from respective heads of departments and lecturers.
Consent	• Students were verbally invited to take part in the study at the beginning or end of a lecture period they were attending. • A participant informant sheet (see Appendix A) was attached to, and presented at the same time as the questionnaire.
Confidentiality	• The questionnaire was anonymous-based. • Information collected from the questionnaire was unidentifiable and could not be traced back to any student.
Harm	The participant information sheet (see Appendix A) clearly stated that there would be no risk or benefit to the students if they chose to participate in the study or not.
Cultural awareness	No sensitive or highly personal questions were included in the questionnaire (see Appendix B).
Dissemination	The results of the study will be published, and the information will be available for all respondents.

3.9 Data Analysis

A statistical descriptive analysis was carried out on the data collected. The collected data from the questionnaires was captured onto Microsoft Excel™. All the captured data were exported from Microsoft Excel™ to R software, and data cleaning and

analysis were performed using the R software (software version R 3.6.1). R is a programming software for statistical computing and graphics. The R software is used extensively among statisticians for data analysis (Hornick, 2017). Descriptive statistics explored the distribution of the study variables. The descriptive results were expressed as counts and percentages. These were illustrated using pie charts, bar charts and tables.

Multinomial logistic regression models were used to identify the predictors of SM practices among the tested variables, which are gender, type of school in which the student is enrolled (medical /non-medical), self-care orientation, and medication knowledge. Inferential statistics, the Chi-squared test of independence and unadjusted logistic regression, were incorporated to investigate for possible correlation between each variable and the medicine therapeutic classes reported in the questionnaire. Contingency tables were set up to cross-tabulate the abovementioned variables. P-value <0.05 was considered statistically significant in all the analyses.

3.10 Validity

According to Polit and Beck (2010) the validity of a questionnaire is a measure of the extent to which the instrument (questionnaire) is an adequate and accurate means of measure and evaluation of all aspects in the study. The questionnaire went through validation processes to ensure that it was appropriate for local student use. The most frequently reported validity issues in literature, are content validity and face validity (Parahoo, 2006).

A content validity test involves the analysis of the content (questions and statements) in the questionnaire (Parahoo, 2006). The test is purely based on judgement as no objective methods exist. Experts on the subject matter are usually used to evaluate the content validity of new questionnaires to make certain that the scope of questions is adequate and indicates the concepts being investigated (Polit & Beck, 2010). The content validity of the questionnaire was performed by senior lecturers from the Department of Pharmacology and Pharmacotherapy, with research expertise on the field of study.

Face validity is a means of examining the ability of the questionnaire to assess the various concepts being tested (LoBiondo-Wood & Haber, 2010). A test-run on the

instrument is usually performed to ensure that the questions are relevant and unambiguous. In this study, face validity was implemented in the form of a pilot study.

3.10.1 Pilot study

The pilot study is a fundamental stage in the development of questionnaire study tools. This stage allows for the study instrument to be evaluated before implementation in the main study. The pilot study is usually conducted on a small sample of the population in a similar manner as intended for the main study. The pilot study gives comprehensive information on the respondents' understanding of the questions and content of the questionnaire, as well as the instructions given. The study also provides a means of checking whether the structural design and length of the questionnaire is conducive (Jones & Rattray, 2010).

For this research study, the pilot study was conducted in the exact way as the main study. The pilot study was implemented using a small sample of the study population, i.e., 10% of the calculated sample size of the main study. Thirty-six students were chosen for the pilot study, in accordance to the inclusion criteria and exclusion criteria of the study. The questionnaire was piloted to these students on two separate occasions that were two weeks apart. The questionnaires collected from the pilot were analysed, and the students were debriefed to inquire on any questionnaire-based issues or concerns. The structure and content of the questionnaire was modified accordingly. Care was taken to ensure that the respondents of the pilot study were excluded from the main study and that the details of the research study were not passed on to the main study respondents.

3.10.2 Generalisation and transferability of the outcomes

According to Shenton (2004), in order for the transferability to occur, the researcher must provide a sufficiently detailed description of the data in context to allow the reader to make judgements about transferability. A clear and detailed description of the research methodology and results obtained have been provided.

The findings of the study can be generalised to other universities or institutes of higher education in relation to the study site of the study. However, the findings may not be consistent in other university settings. Similarities in the findings are expected, as with similar previous studies.

3.11 Ethical considerations

Ethical approval was applied for and granted by the University of the Witwatersrand Human Research Ethics Committee (Medical) (**No. M180740**) (see Appendix C). The main ethical principles that were considered in this study were beneficence/non-maleficence, respect for persons and confidentiality.

Table 3.4 Summary of the ethical principles employed in the research study
(Hay, 2003)

Ethical Principle	Application into the research study
Beneficence/non-maleficence	Questionnaires are considered to be less intrusive in comparison to other research methods. No harm or risks were exposed to those who chose to participate in the study. No sensitive or highly personal questions were asked. Ethical rules such as the respondents not answering a question they did not wish to answer; withdrawing from the study at any time desired, were considered.
Respect for persons	The participant information sheet (see Appendix A) explained the role of the respondents in the study. The respondents' values and rights were safeguarded through the communication, both verbally and in writing, of the aims and procedures of the study. Completion of the questionnaire by the respondents was considered consent to participate in the study.
Confidentiality	The questionnaire was anonymous and no identifying information was collected. Accessibility of the data collected was limited to the researcher only.

Chapter Four

Results and data analysis

4.1 Introduction

This chapter displays the data obtained from the study questionnaire. It focuses on the quantitative analysis of the data collected, which addresses all the five research objectives. In this chapter, the demographic characteristics of the study respondents are presented. Additionally, a comparative analysis between the medical and non-medical students is given for the perceived reasons for SM, the health conditions treated in SM and the use of different medicines in SM. Furthermore, the chapter presents the various factors influencing the practice of SM among the two cohorts. The practice of SM i.e. the frequency of SM and the SM prevalence rates of the two cohorts, is explored, and the attitudes of the respondents pertaining to SM and pharmacy staff is shown. Moreover, the four variables (sex, type of school, self-care orientation and medication knowledge) are investigated for possible correlation with SM. Finally, an analysis of the factors associated with the use of certain medicines in SM is given. A p-value of less than 0.05 was considered statistically significant in all the analyses. Throughout the chapter, data is presented in tables and schematic diagrams.

4.2 Socio-demographic characteristics of respondents

All the data for the research study was collected in April 2019 from the first, second and third year pharmacy (medical) students, and the first, second and third year psychology (non-medical) students. A total of 473 questionnaire responses were collected from both groups of students (pharmacy and psychology students) across all years of study.

Most of the study respondents (93.7%) were in the 18-23 years age group, while only 6.3% of the respondents were in the 24 years and above age group. The female gender comprised 75.5% of the study population, while males constituted 24.5% of the population. A total of 179 (37.8%) pharmacy students took part in the study, and a total of 294 (62.2%) psychology students also participated in the study. With reference to the three years of study, for both pharmacy and psychology students, a total sum of 215 (45.5%) first year students, 137 (28.9%) second year students and 121 (25.6%)

third year students participated in the study. The majority of the respondents (81.2%) did not have part-time employment. At most, 55.4% of the respondents were reported to have health insurance. Most (86.5%) of the respondents lived in close proximity to a pharmacy, while 49.3%, 50.1% and 34.3% lived in close proximity to a hospital, clinic and healthcare centre respectively.

Table 4.1 below shows a frequency distribution table of the demographic characteristics of the study population.

Table 4.1 Frequency distribution table of the socio-demographic characteristics of respondents (n=473)

Variable	Number (%) (n=473)	Practised self- medication number (%)
Age		
18-23 years	443 (93.7)	345 (77.9)
>24 years	30 (6.3)	23 (76.7)
Gender		
Male	116 (24.5)	76 (65.5)
Female	357 (75.5)	292 (81.8)
Degree enrolled		
Pharmacy (medical)	179 (37.8)	152 (84.9)
Psychology (non-medical)	294 (62.2)	216 (73.5)
Year of study		
1st year	215 (45.5)	150 (69.8)
2nd year	138 (29.2)	116 (84.1)
3rd year	120 (25.4)	102 (85.0)
Employment		
Yes	89 (18.8)	77 (86.5)
No	384 (81.2)	291 (75.8)
Health insurance		
Yes	262 (55.4)	215 (82.1)
No	211 (44.6)	153 (72.5)

(Table 4.1 is continued on the subsequent page)

Variable	Number (%) (n=473)	Practiced self-medication number (%)
Access to pharmacy near residence		
Yes	409 (86.5)	330 (80.7)
No	64 (13.5)	37 (57.8)
Access to hospital near residence		
Yes	233 (49.3)	195 (83.7)
No	240 (50.7)	173 (72.1)
Access to clinic near residence		
Yes	237 (50.1)	184 (77.6)
No	236 (49.9)	184 (77.6)
Access to healthcare centre near residence		
Yes	162 (34.3)	135 (83.3)
No	311 (65.8)	233 (74.9)

As shown in Table 4.1, 368 (77.8%) of the study respondents reported to have practised SM in the past two months (60 days). A reported 81.8% of the female respondents practised SM, while 65.5% of the males self-medicated. A summation of 152 (84.9%) pharmacy students practised SM, and a total sum of 216 (73.5%) of psychology students practised SM. Inclusive of both groups of students (pharmacy and psychology), 150 (69.8%) first year students, 115 (83.9%) second year students and 103 (85.1%) third year students practised SM.

Of the 152 pharmacy students that practised SM, 39%, 28% and 33% were first, second and third year students respectively. Of the 216 psychology students that practised SM, 42%, 33% and 25% were in their first, second and third years of study, respectively.

Table 4.2 shows an in-depth distribution of the respondents who practised SM per year of study per faculty (pharmacy and psychology).

Table 4.2 Number of respondents who practised self-medication per year of study per faculty (n=368)

Pharmacy (medical) students			Psychology (non-medical) students		
Year of study	Male	Female	Year of study	Male	Female
First year	11	48	First year	19	72
Second year	9	35	Second year	14	58
Third year	13	36	Third year	10	43
Total	152		Total	216	

4.3 The reasons, extent and prevalence of self-medication among the students

4.3.1 Reasons for self-medication practice

Table 4.3 displays the various reasons reported for SM practice among the respondents in this study. With reference to the pharmacy students, the three most common and consistently reported reasons across each year of study were: *Health problem is not serious* (74%), *Quick relief* (64%) and *Previous experience with the illness* (64%). The three abovementioned reasons were also the most commonly reported reasons among the psychology students, however, these reasons were not consistent across each year of study.

The majority of the first year psychology students reported *Quick relief* (65.9%) as a perceived reason for SM, while *Previous experience with the illness* (58.2%) and *Health problem is not serious* (54.9%) were the most commonly reported by second and third year psychology students, respectively. As a whole, across both groups of students (medical and non-medical), *Health problem is not serious*, *Quick relief*, *Previous experience with same illness* and *Personal convenience* were the primarily reported reasons for SM amounting to 66.6%, 64.4%, 63.3% and 51.6% respectively.

Table 4.3 Perceived reasons for self-medication

Perceived reasons for self-medication	Degree enrolled								Total (%) (n=368)
	Pharmacy (medical)				Psychology (non-medical)				
	1st year	2nd year	3rd year	n (%)	1st year	2nd year	3rd year	n (%)	
Health problem is not serious	40	34	39	113 (74.3)	50	49	33	132 (61.10)	245 (66.6)
Quick relief	37	26	34	97 (63.8)	60	46	34	140 (64.8)	237 (64.4)
Personal convenience	28	21	31	80 (52.6)	36	44	30	110 (50.9)	190 (51.6)
Avoidance of long waiting at clinics (lack of time)	10	11	8	29 (19.1)	24	17	5	46 (21.3)	75 (20.4)
High cost of medical consultation	9	15	7	31 (20.4)	28	28	23	79 (36.6)	110 (29.9)
Suggestion by a relative/friend	20	9	5	34 (22.4)	27	26	9	62 (28.7)	96 (26.1)
Physician’s advice of self-management	6	1	5	12 (7.9)	12	13	8	33 (15.3)	45 (12.2)
Previous experience with same illness	32	32	33	97 (63.8)	53	47	36	136 (63.0)	233 (63.3)

4.3.2 Indications for self-medication

Table 4.4 reports the indications or health conditions that the respondents self-treated using OTC medicines. Most pharmacy students reported self-treatment of pain (77%) and headache (74.3%), whilst psychology students reported the headache (77.3%) as the most popular indication for SM. Encompassing both groups of students (medical and non-medical), the most popular health conditions for SM were headache (76.1%), colds, flu and sore throat (69.3%) and pain (63.6%). Other less commonly reported health conditions for SM were cough (43.5%), menstrual symptoms (38.3%), allergy (31.5%), fever (28.5%) and insufficient vitamins and minerals (28.3%). The terms 'insufficient vitamins and minerals' refer to the deficiency of vitamins and minerals in the body where supplementation is required.

Table 4.4 Health conditions treated in self-medication

Health indications/ conditions	Degree enrolled								
	Pharmacy (medical)				Psychology (non-medical)				Total (%) (n=368)
	1st year	2nd year	3rd year	n (%)	1st year	2nd year	3rd year	n (%)	
Headache	44	33	36	113 (74.3)	66	60	41	167 (77.3)	280 (76.1)
Fever	19	12	7	38 (25.0)	19	31	17	67 (31.0)	105 (28.5)
Colds, flu and sore throat	39	26	29	94 (61.8)	63	61	37	161 (74.5)	255 (69.3)
Cough	29	18	16	63 (41.4)	41	38	18	97 (44.9)	160 (43.5)
Pain	49	43	25	117 (77.0)	49	43	25	117 (54.2)	234 (63.6)
Constipation/ diarrhoea	10	10	15	35 (23.0)	8	18	8	34 (15.7)	69 (18.8)
Allergy	21	16	12	49 (32.2)	27	25	15	67 (31.0)	116 (31.5)
Skin symptoms	13	8	8	29 (19.1)	10	12	7	29 (13.4)	58 (15.8)
Heartburn/ indigestion	11	6	4	21 (13.8)	10	12	6	28 (13.0)	49 (13.3)
Menstrual symptoms (dysmenorrhoea)	19	14	16	49 (32.2)	37	31	24	92 (42.6)	141 (38.3)
Ocular (eye) symptoms	4	5	5	14 (9.2)	9	10	5	24 (11.1)	38 (10.3)
Ear symptoms	2	0	2	4 (2.6)	3	6	1	10 (4.6)	14 (3.8)
Inability to sleep	4	4	5	13 (8.6)	14	11	13	38 (17.6)	51 (13.9)
Insufficient vitamins and minerals	16	10	10	36 (23.7)	20	25	23	68 (31.5)	104 (28.3)
Other*	1	0	2	3 (1.9)	2	2	1	5 (2.3)	8 (2.2)

*Other health indications reported are: nausea, anxiety, shortness of breath, sinusitis, dental symptoms, migraine, stomach ulcers, hair growth and urinary tract symptoms.

4.3.3 Factors influencing self-medication

Table 4.5 displays the sources of information for SM used by the study respondents, per year of study for both pharmacy and psychology students. With reference to the pharmacy student group, the two most commonly reported sources of information were self-knowledge/ personal study (73.7%) and friends and family (63.8%). A

substantial proportion (62.5%) of pharmacy students indicated that they rely on pharmacist recommendations for information on SM.

On the contrary, the two most commonly reported sources of information used by the psychology student group were friends and family (81.9%) and pharmacist recommendation (67.1%). A substantial proportion (56.0%) of the psychology students relied on self-knowledge/ personal study for SM information.

Table 4.5 Sources of information used in self-medication

Sources of information used	Degree enrolled								Total (%) (n=368)
	Pharmacy (medical)				Psychology (non-medical)				
	1st year	2nd year	3rd year	n (%)	1st year	2nd year	3rd year	n (%)	
TV (television)	13	6	5	24 (15.8)	25	21	9	55 (25.5)	79 (8.8)
Advertisements	14	7	6	27 (17.8)	18	19	6	43 (19.9)	70 (7.8)
Friends and family	43	35	19	97 (63.8)	74	57	46	177 (81.9)	274 (30.5)
Pharmacist recommendation	35	25	35	95 (62.5)	56	51	38	145 (67.1)	240 (26.8)
Self-knowledge/ personal study	35	30	47	112 (73.7)	48	40	33	121 (56.0)	233 (26.1)

Figure 4.1 below is a representation of the sources of information reported for use by all the study respondents (both pharmacy and psychology students) in the acquisition of information for SM. In totality, the majority of the respondents relied on information from friends and family (30.5%) for SM practice. The other reported sources of information used were the television (TV) (8.8%), advertisements (7.8%), pharmacist recommendation (26.8%) and self-knowledge/personal study (26.1%).

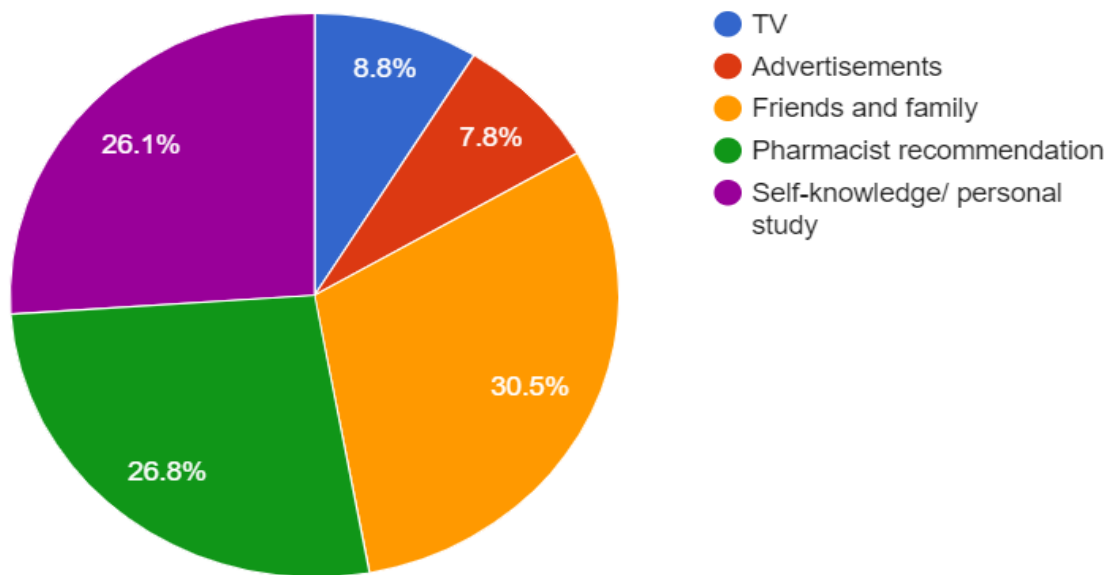


Figure 4.1 Sources of information used for self-medication practice

Table 4.6 displays the various sources of medicines for SM used by the study respondents, per year of study for both pharmacy and psychology students. For the pharmacy student group, the two most popularly used sources of medicines were the pharmacy (90.8%) and the use of available medication at home (55.3%). A substantial number of pharmacy students (33.6%) obtained medicines from friends/family.

Similarly, the two most popularly used sources of medicines by the psychology student group were the pharmacy (96.3%) and the use of available medication at home (54.6%). A considerable proportion of psychology students (34.3%) obtained medicines from friends/family.

Table 4.6 Sources of medicines for self-medication

Sources of medicine for self-medication	Degree enrolled								Total (%) (n=368)
	Pharmacy (medical)				Psychology (non-medical)				
	1st year	2nd year	3rd year	n (%)	1st year	2nd year	3rd year	n (%)	
Pharmacy	52	38	48	138 (90.8)	87	69	52	208 (96.3)	346 (42.1)
Friends/family	21	18	12	51 (33.6)	36	24	14	74 (34.3)	125 (15.2)
Supermarket/other stores	24	12	6	42 (27.6)	29	21	14	64 (29.6)	106 (12.8)
Available medication at home	31	22	31	84 (55.3)	49	41	28	118 (54.6)	202 (24.5)
Herbal/health store	3	1	2	6 (3.9)	7	12	5	24 (11.1)	30 (3.6)
Traditional healer/practitioner	2	3	1	6 (3.9)	5	2	2	9 (4.2)	15 (1.8)

In totality, encompassing both the pharmacy and psychology student groups, most students (42.1%) indicated that they obtained their medicines from pharmacies, while 24.5% reported the usage of available medication at home. Other reported sources of medicines were friends/family (15.2%) and supermarket/other stores (12.8%). A lesser proportion of the respondents reported acquisition of medicines from herbal/health stores (3.6%) and traditional healers/practitioners (1.8%).

Figure 4.2 shows a representation of the use of various sources of medicines in SM practice, by all the study respondents.

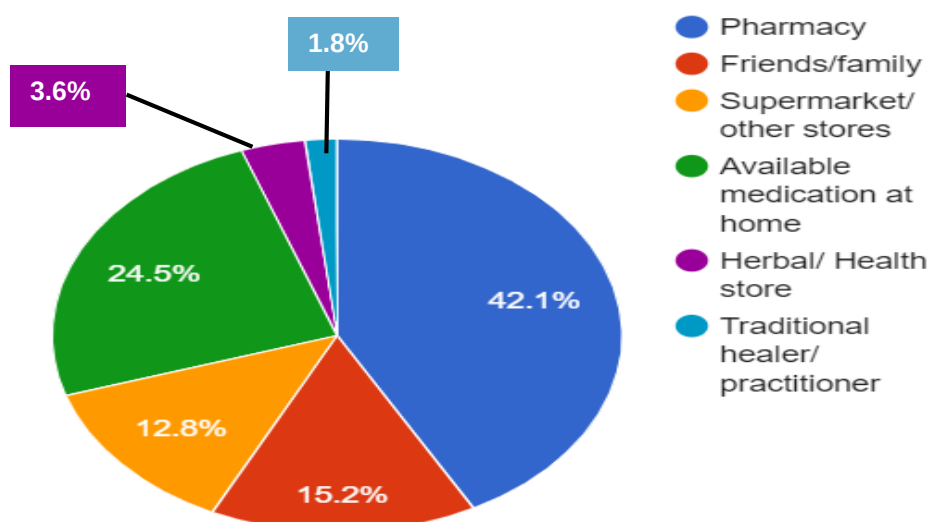


Figure 4.2 Sources of medicines for self-medication

4.3.4 Therapeutic classes of medicines reported in self-medication practice

In part B of the questionnaire, the study respondents reported the various therapeutic classes of medicines used in the practice of SM within a specified time period. Table 4.7 displays the various types of medicines reported by the study respondents, per year of study for both pharmacy and psychology students. For the pharmacy student group, the two most commonly reported medicines used in SM were analgesics (76.9%) and anti-inflammatory medicine (49.3%). A substantial proportion of the pharmacy students reported the use of cough medicine (40.1%), while 38.2% of the students reported the use of anti-histamine medication and comb. A smaller proportion of pharmacy students (36.8%) made use of combination cold and flu preparations for SM.

A similar trend in the use of medicines was observed in the psychology student group, where, 79.6% of the psychology students reported the use of analgesics, and 55.1% reported the use of anti-inflammatory medicine. Analgesics and anti-inflammatory medicine were the two most commonly used medicines by the psychology students. A substantial number of psychology students (47.2%) used combination cold and flu preparations. Equal proportions of psychology students reported the use of cough medicine (44.9%) and anti-histamine medication (44.9%).

In totality, encompassing both the pharmacy and psychology student groups, analgesics (78.5%) was the most commonly reported medicine class, followed by anti-inflammatory medicine (52.7%). An equal proportion of the study respondents reported use of cough medicine (42.9%), and combination cold and flu preparations (42.9%). There was no significant difference in the use of the different classes of medicines between the pharmacy (medical) and psychology (non-medical) students (p -value = 0.076). Table 4.7 below shows the medicines used by the students in SM practices.

Table 4.7 Therapeutic classes of medicines reported in self-medication

Therapeutic class of medicine used for self-medication	Degree enrolled								
	Pharmacy (medical)				Psychology (non-medical)				Total (%) (n=368)
	1st year	2nd year	3rd year	n (%)	1st year	2nd year	3rd year	n (%)	
Analgesics	48	30	39	117 (76.9)	73	58	41	172 (79.6)	289 (78.5)
Anti-inflammatory medicine	25	20	30	75 (49.3)	44	40	35	119 (55.1)	194 (52.7)
Multi-vitamins	18	10	8	36 (23.7)	23	20	20	63 (29.2)	99 (26.9)
Antacids/indigestion treatment	16	7	9	32 (21.1)	8	16	8	32 (14.8)	64 (17.4)
Eye drops	5	5	7	17 (11.2)	10	18	7	35 (16.2)	52 (14.1)
Anti-histamines	27	15	16	58 (38.2)	40	35	22	97 (44.9)	155 (42.1)
Sleeping pills	2	2	4	8 (5.3)	8	4	7	19 (8.8)	27 (7.3)
Herbal remedies	4	6	3	13 (8.6)	10	16	14	40 (18.5)	53 (14.4)
Lozenges	21	21	13	55 (36.2)	34	36	22	92 (42.6)	147 (39.9)
Ear drops	3	1	1	5 (3.3)	2	2	2	6 (2.8)	11 (2.9)
Topical or skin treatments	11	9	7	27 (17.8)	9	16	9	34 (15.7)	61 (16.6)
Combination cold and flu preparations	25	12	19	56 (36.8)	39	39	24	102 (47.2)	158 (42.9)
Cough medicine	30	16	15	61 (40.1)	32	45	20	97 (44.9)	158 (42.9)
Sinus medication	14	15	12	41 (26.9)	31	30	17	78 (36.1)	119 (32.3)
Laxatives/ anti-diarrhoeal agents	9	10	15	34 (22.4)	9	13	6	28 (12.9)	62 (16.9)
Homeopathic medicines	1	3	1	5 (3.3)	6	1	6	13 (6.1)	18 (4.9)
Traditional medicines	6	3	1	10 (6.6)	8	9	4	21 (9.7)	31 (8.4)

The total number of medicines used by the respondents was 1702, which resulted in an average of 4.62 ± 2.69 medicines per respondent with a range of 1 to 16 medicines. The percentage usage of each therapeutic class of medicine was calculated by dividing the total number of respondents who used the medicine in the specified therapeutic class by the total number of respondents who practiced SM (n=368).

Analgesics (78.8%) were the most commonly reported medicine class used in SM, followed by anti-inflammatory medicine (53.0%) and combination cold and flu preparations (43.2%). It was noted that many of the respondents were taking several different classes of medicines simultaneously. For example, respondents who were self-medicating with anti-histamines were using simultaneously an average of 6.11 ± 2.79 medicines; an average of 7.03 ± 3.15 simultaneous medicine use was reported among those taking antacids/indigestion treatment. Table 4.8 below shows the percentage use of each therapeutic class and the average number of simultaneous medicines taken.

Table 4.8 The simultaneous use of medicines in self-medication

Therapeutic class of medicine	n (%)	Average number of medication taken simultaneously $\pm$ standard deviation SD
Analgesics	290 (78.8)	5.23 $\pm$ 2.61
Anti-inflammatory medicine	195 (53.0)	5.6 $\pm$ 2.76
Multi-vitamins	99 (26.9)	6.11 $\pm$ 3.11
Antacids/indigestion treatment	64 (17.4)	7.03 $\pm$ 3.15
Eye drops	52 (14.1)	7.38 $\pm$ 3.26
Anti-histamines	155 (42.1)	6.11 $\pm$ 2.79
Sleeping pills	27 (7.3)	6.88 $\pm$ 3.37
Herbal remedies	53 (14.4)	8.06 $\pm$ 2.79
Lozenges	147 (39.9)	6.51 $\pm$ 2.71
Ear drops	11 (3.0)	10 $\pm$ 4.27
Topical or skin treatments	61 (16.6)	6.85 $\pm$ 3.11
Combination cold and flu preparations	159 (43.2)	6.32 $\pm$ 2.76
Cough medicine	158 (42.9)	6.21 $\pm$ 2.67
Sinus medication	120 (2.6)	6.74 $\pm$ 2.83
Laxatives/ anti-diarrhoeal agents	62 (16.8)	6.98 $\pm$ 3.18
Homeopathic medicines	18 (4.9)	8.71 $\pm$ 3.7
Traditional medicines	31 (8.4)	6.77 $\pm$ 3.42

4.3.5 The extent (frequency) of self-medication practices

The respondents reported the number of times or frequency of SM within the specified time period (60 days). Figure 4.3 below illustrates that, across all year of study groups, the majority of the pharmacy student respondents, reported to have self-medicated five or more times in the stipulated time period. This indication is also consistent with the psychology student respondents, where the majority of students in each year of study reported to have self-medicated five or more times within the stipulated time period. There was no significant difference between the SM practices (frequency of SM) of pharmacy (medical) and psychology (non-medical) students (p -value = 0.83).

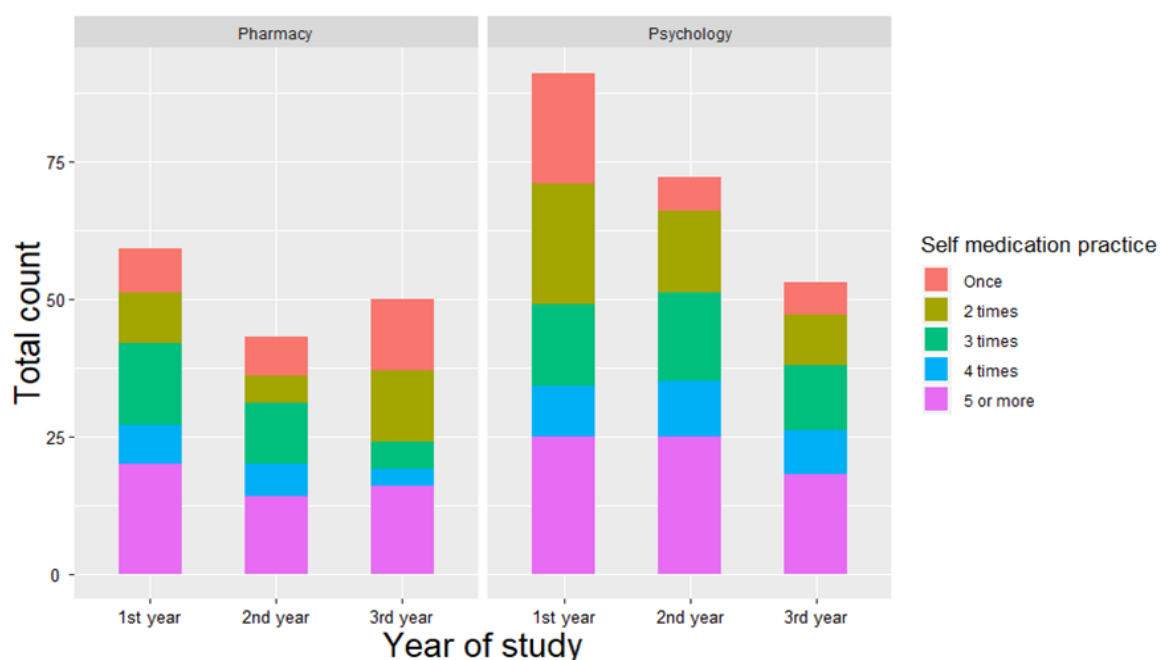


Figure 4.3 The extent (frequency of self-medication) among respondents

Table 4.9 below presents an in-depth analysis of the frequency of SM practices among the pharmacy and psychology students. For both the pharmacy and psychology student groups, most students self-medicated five or more times within the specified time period. A reported 32.9% of the pharmacy students self-medicated five or more times, while 20.4% and 18.4% of the students self-medicated three times and once within specified time period, respectively.

In relation to the psychology student group, 31.5% of the students self-medicated five or more times, whilst 21.3% and 14.8% of the students self-medicated two times and once within specified time period, respectively

Table 4.9 The frequency of self-medication among the respondents

Frequency of self-medication	Pharmacy (medical) students n (%)	Psychology (non-medical) students n (%)
Once	28 (18.4)	32 (14.8)
2 times	27 (17.8)	46 (21.3)
3 times	31 (20.4)	43 (19.9)
4 times	16 (10.5)	27 (12.5)
5 or more times	50 (32.9)	68 (31.5)

4.3.6 The prevalence of self-medication practices

Prevalence is defined as the proportion of individuals in a population having a certain characteristic (Parahoo, 2006). For this research study, the SM prevalence rates, among the study respondents, were calculated using the following formulae:

Equation 3: Self-medication prevalence for each year of study

$$\text{Prevalence (\%)} = \frac{\text{Total number of students who practised SM in specified year of study}}{\text{Total number of students surveyed in specified year of study}} \times 100$$

Equation 4: Self-medication prevalence for medical and non-medical respondents

$$\text{Prevalence (\%)} = \frac{\text{Total number of medical or non-medical students who practised SM}}{\text{Total number of medical or non-medical students surveyed}} \times 100$$

Equation 5: Self-medication prevalence of study population

$$\text{Prevalence (\%)} = \frac{\text{Total number of students (medical and non-medical) who practised SM}}{\text{Total number of students (medical and non-medical) surveyed}} \times 100$$

Table 4.10 below shows the prevalence rates for each year of study of the pharmacy (medical) and psychology (non-medical) students.

Table 4.10 Reported self-medication prevalence rates

Pharmacy (medical) students		Psychology (non-medical) students	
Year of study	SM prevalence (%)	Year of study	SM prevalence (%)
First year	78.7	First year	65.0
Second year	88.0	Second year	81.8
Third year	90.7	Third year	80.3
Total SM prevalence for pharmacy (medical) students	84.9	Total SM prevalence for psychology (non-medical) students	73.5
Total SM prevalence for entire study population (n=473) = 77.8%			

The overall SM prevalence for the entire study population was 77.8%. The prevalence of SM was 84.9% among the pharmacy students, and 73.5% among the psychology students. Pharmacy students had a higher SM prevalence rate in comparison to the psychology students. Different prevalence rates were calculated and reported for the different year of study groups. Prevalence rates of 78.7%, 88.0% and 90.7% were reported for the first, second and third year pharmacy students, respectively. Prevalence rates of 65.0%, 81.8% and 80.3% were reported for the first, second and third year psychology students, respectively. In all the three year of study groups, pharmacy students had higher SM prevalence rates, in comparison to psychology students. The third year pharmacy student group reported the highest SM prevalence (90.7%), across all year of study groups in both pharmacy and psychology students. Among the psychology students, the second year psychology student group, reported the highest SM prevalence (81.8%).

4.4 Medication knowledge among medical and non-medical students

As mentioned in the previous chapter, medication knowledge was defined by the number of correct true-false answers to six generalised statements on OTC medicines. Of the 152 pharmacy students who participated in this study, 92 (60.5%) of them exhibited good medication knowledge, whilst 60 (39.5%) of the pharmacy students were found to have poor medication knowledge. In relation to the psychology students, 56 (26.1%) students had good medication knowledge, while 159 (73.9%) were found to have poor medication knowledge. Figure 4.4 shows an in-depth assessment of medication knowledge in each year of study in both pharmacy and psychology students. Most students in the first year of study group, for both the pharmacy and psychology students, showed poor medication knowledge. Most students in the second year of study group, for both the pharmacy and psychology students, showed poor medication knowledge. This is not consistent with the third year of study group as the majority of third year pharmacy students displayed good medication knowledge, while the majority of the third year psychology students were shown to have poor medication knowledge.

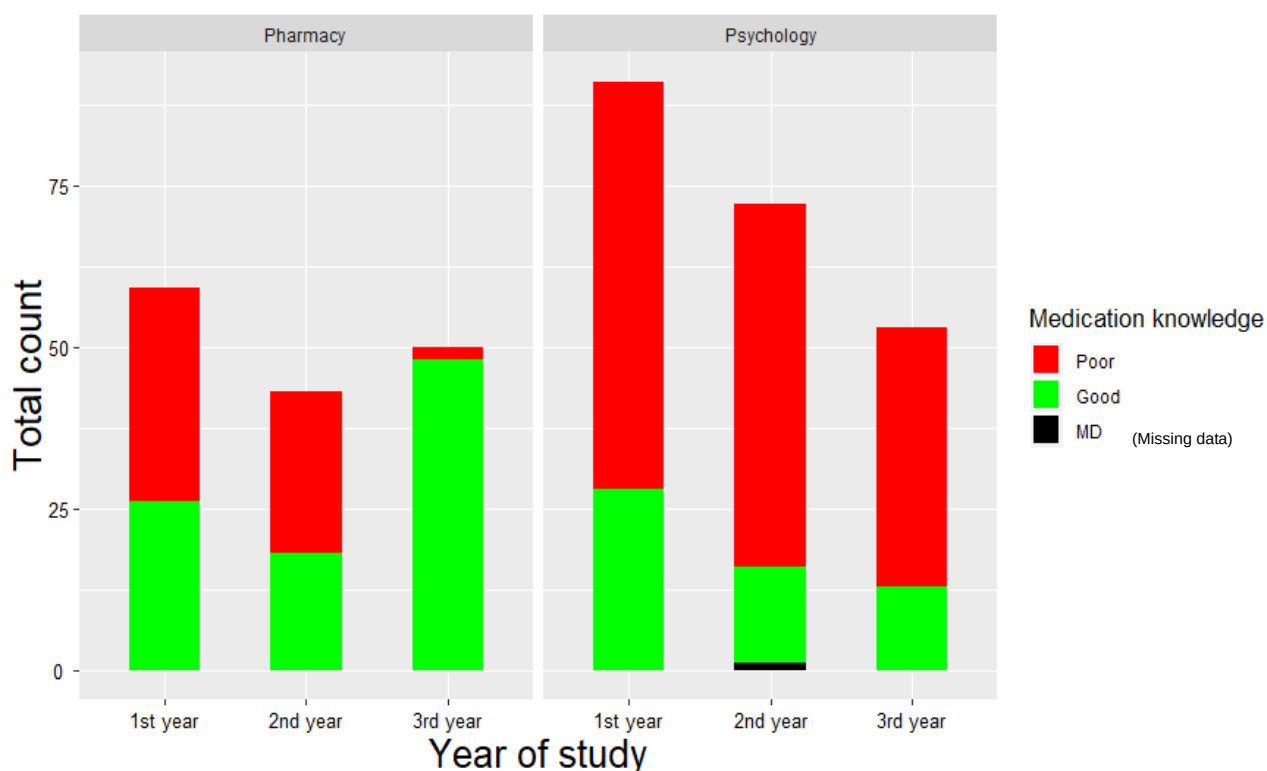


Figure 4.4 Medication knowledge among the respondents

A comparative evaluation of SM knowledge and the socio-demographic characteristics of respondents was done using the chi-square test of independence. This was done to investigate for positive correlation between the level of medication knowledge (good/poor) and socio-demographic variables of the respondents. The results, as displayed in Table 4.11, show that there is no significant association between medication knowledge and certain demographic factors like age and gender. There is, however, a significant difference in the level of medication knowledge between pharmacy and psychology students; a larger proportion of pharmacy students exhibited good medication knowledge in comparison to the psychology students (p -value <0.001). This was an indication that the socio-demographic characteristic 'degree enrolled' was a positive determinant in the level of medication knowledge (good/poor). The results further indicated that third year students, followed by first year students had the most number of students with good medication knowledge, compared to second year students ($p <0.001$). This was noticed in both pharmacy and psychology students. Respondents with health insurance proved to have good medication knowledge in comparison to those without health insurance ($p =0.013$).

Table 4.11 Respondents' socio-demographic characteristics by medication knowledge

Variables	Level of medication knowledge		χ^2 p-value
	Good: n (%)	Poor: n (%)	
Age			
18-23	7	15	0,584
>24	140	204	
Gender			
Female	119	172	0,668
Male	28	47	
Degree enrolled			
Pharmacy	92	60	<0.001
Psychology	56	159	
Year of study			
1st year	54	96	<0.001
2nd year	33	81	
3rd year	61	42	
Employment			
Yes	39	38	
No	108	181	0.048
Health insurance			
Yes	98	116	
No	49	103	0.013
Access to pharmacy			
Yes	138	192	
No	10	27	0.1182

4.5 Attitude towards self-medication

The respondents' attitudes pertaining to OTC medicines and pharmacy staff (pharmacists and pharmacists' assistants) were recorded with the use of a Likert scale. The first six statements were regarding OTC medicines. Figure 4.5 and Figure 4.6 show the opinions of pharmacy and psychology students on the six statements on OTC medicines, respectively. On the following figures, "Q1" represents Statement 1, "Q2" represents Statement 2, and so on. The six statements on OTC medicines were:

Statement 1: Self-medication can be harmful

Statement 2: OTC medicines may have drug-drug interactions with chronic medication or any other medicines being taken

Statement 3: It is important to always read the medicine information leaflet before taking an OTC medicine

Statement 4: In the case of adverse/side effects, physician help must be sought

Statement 5: Because OTC medicines are available for purchase without prescription, they are very safe

Statement 6: It is important to be aware of possible side effects that the medicine you are taking may potentially cause

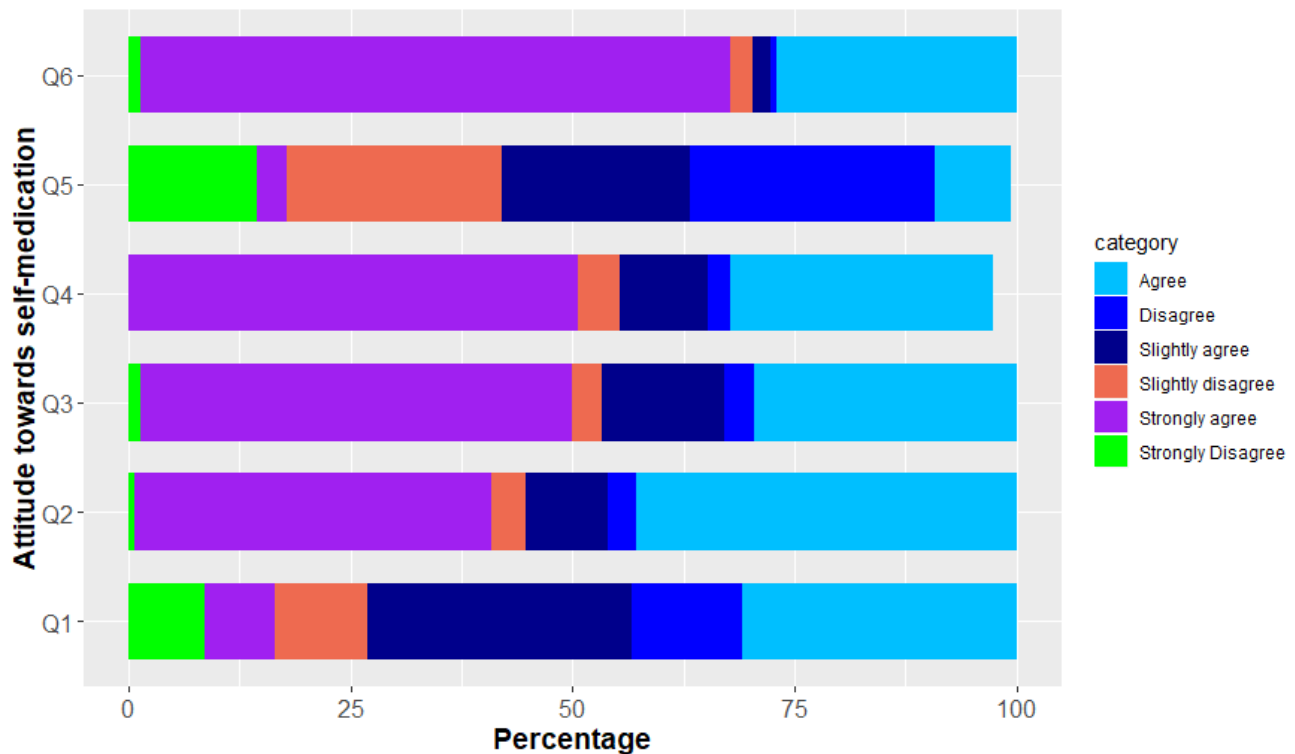


Figure 4.5 Attitudes/Opinions of pharmacy students on OTC medicines

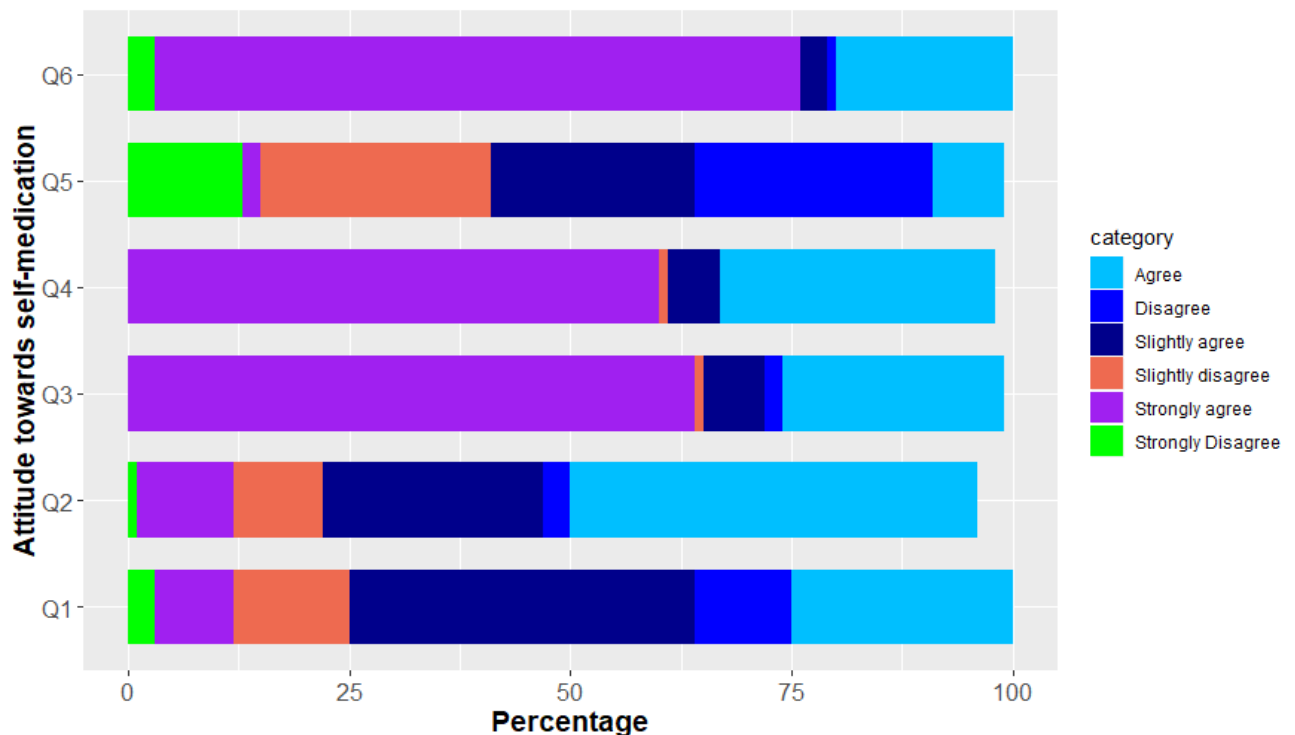


Figure 4.6 Attitudes/Opinions of psychology students on OTC medicines

In summary, pharmacy students had a greater appreciation, in comparison to the psychology students, of the fact that OTC medicines may have drug-drug interactions with chronic medication or any other medicines being taken (Statement 2). A greater proportion of pharmacy students were not in agreement with Statement 3. More psychology students than pharmacy students, were in strong disagreement with Statement 6 which stated that, it is important to be aware of possible side effects that the medicine you are taking may potentially cause.

The next seven statements addressed the respondents' attitudes or opinions about pharmacy staff i.e. pharmacists and pharmacists' assistants. On the following figures, "Q1" represents Statement 1, "Q2" represents Statement 2, and so on. The six statements made on pharmacists and pharmacists' assistants were:

Statement 1: I feel comfortable telling my pharmacist about my use of OTC medicines

Statement 2: It is important for pharmacists to be aware of OTC medicines people use

Statement 3: My pharmacist encourages questions about OTC medicines

Statement 4: My pharmacist provides useful information about OTC medicines

Statement 5: I think it is important for herbalists/natural medicine practitioners to be located in a pharmacy where they sell OTC medicines

Statement 6: I trust my pharmacist's advice on OTC medicines

Statement 7: Pharmacists' assistants give me more advice and information about OTC medicines than my pharmacist

Figure 4.7 and figure 4.8 show the opinions of pharmacy and psychology students on the seven statements on pharmacy staff, respectively.

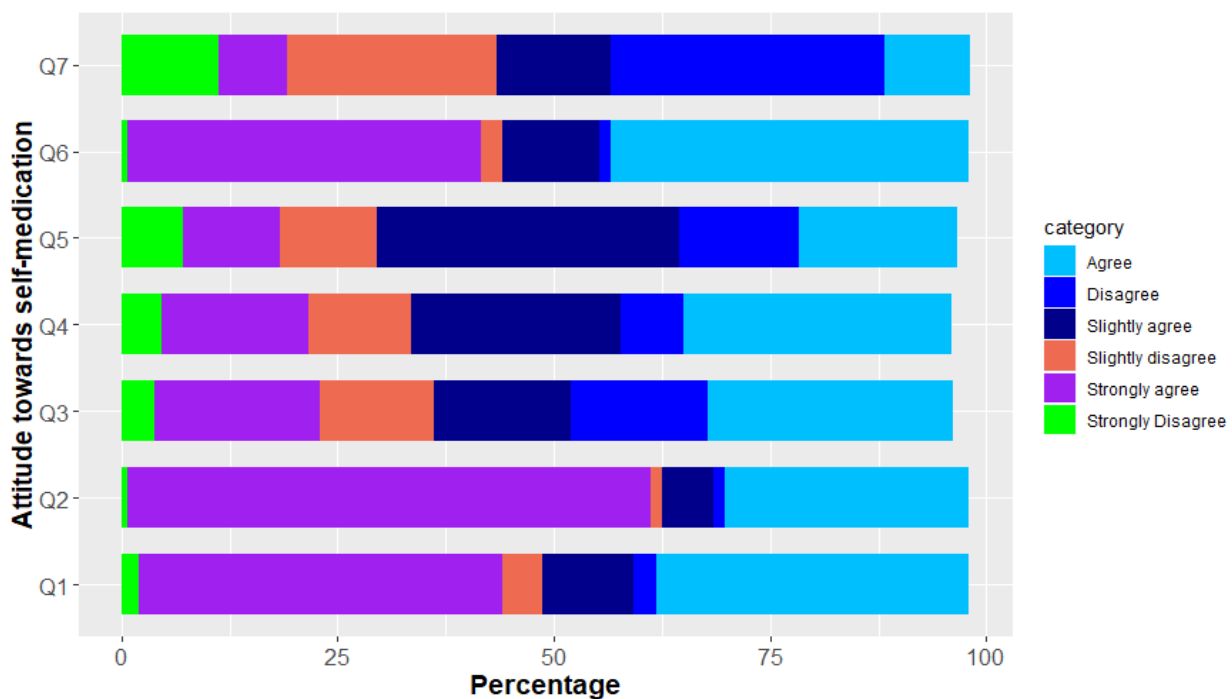


Figure 4.7 Attitudes/Opinions of pharmacy students on pharmacy staff

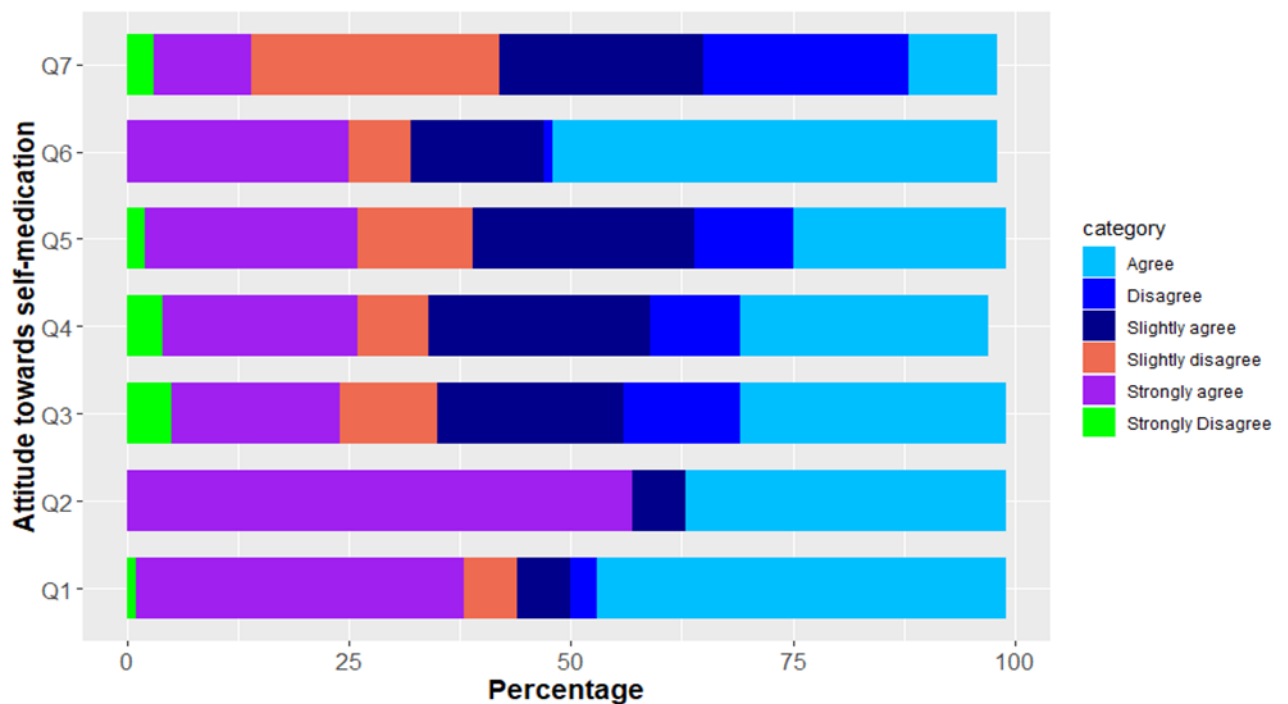


Figure 4.8 Attitudes/Opinions of psychology students on pharmacy staff

In summary, a greater number of pharmacy students than psychology students disagreed to the statement that “*Self-medication can be harmful*”. Encompassing both the pharmacy and psychology students, most students were in agreement with Statement 2, and a much lesser number of students strongly disagreed to the statement. Most students reported to be comfortable with informing a pharmacist on their use of medicines, while on the other hand, a substantial number of students disagreed to Statement 3. Most students were also not satisfied with the amount of information provided by pharmacy staff on OTC medicines.

4.6 Correlates of self-medication practices

The ordinal logistic regression model was fitted to determine the impact of four main variables on SM practice. The four main variables tested for possible correlation with SM practice were sex, the type of school the respondent is enrolled in (medical/non-medical), the respondent’s level of self-care orientation, and the respondent’s medication knowledge. These four variables were selected on the basis of the literature provided in Chapter One and Chapter Two (Section 2.9). SM practice was quantified and assessed by the frequency or number of times the respondent would have self-medicated (Once, two times, three times, four times, or more than five times) in the specified time, i.e. 60 days.

The results of the Brant test suggested that the proportional odds assumption of the ordinal logistic regression model was not applicable (p -value <0.05). This indicated that the effect of each of the variables (sex, type of school, self-care orientation and medication knowledge) in the model was not consistent across the five categories of the frequency of SM. Hence, a multinomial logistics regression was considered. Only variables that were significantly associated with the frequency of SM were retained in the model as shown in Table 4.12.

Of the four main variables tested, the level of self-care orientation was the only variable found to be significant across all the categories of SM frequency (p -value <0.05). Hence, sex, level of medication knowledge and type of school were insignificant predictors/influencers (p -value >0.05) of the practice and frequency of SM. The results of the model showed that students with a high level of self-care orientation were more than 5 times more likely to self-medicate at least twice within the specified period of time (60 days) in comparison to those with a low level of self-care orientation, who were more likely to self-medicate only once during the specified time (60 days). Although the “year of study” variable had a significant effect on medication knowledge, the variable did not show significant correlation with SM practices (p -value >0.05).

There was a significant association between the use of available medication at home, and frequency of SM. The use of available medication at home increased the chances of a respondent self-medicating from 2 times to 4 times, within the specified time. Health insurance was found have possible correlation with the frequency of SM. The results indicated that the chances of self-medicating twice and, 5 or more times are 2.6 and 2.9 times greater, respectively, for students that have health insurance than for students that have no health insurance. Finally, we found that having access to a pharmacy within 5km radius proximity to place of residence significantly influenced the frequency of SM. The results show that the access of a pharmacy near residence may increase the chances of a respondent self-medicating from once to 2 times, and from once to 4 times within the specified period.

Table 4.12 Correlates of the frequency of self-medication practices

Frequency of self-medication practice	OR(95% CI)	p-value
2 times		
Self-care orientation	5.41 (1.71 - 17.11)	0,004
Health insurance	2.58 (1.23 - 5.43)	0,012
Living in close proximity to a pharmacy	0.11 (0.02 - 0.52)	0,006
The use of available medication at home	0.19 (0.03 – 0.64)	0.007
3 times		
Self-care orientation	12.11 (3.96 - 37.05)	<0.001
Health insurance	1.81 (0.87 - 3.77)	0,112
Living in close proximity to a pharmacy	0.26 (0.05 - 1.39)	0,115
4 times		
Self-care orientation	47.33 (13.59 - 164.83)	<0.001
Health insurance	2.39 (0.98 - 5.85)	0,056
Living in close proximity to a pharmacy	0.13 (0.02 - 0.74)	0,022
The use of available medication at home	0.38 (0.09 – 1.20)	0.016
5 or more		
Self-care orientation	27.35 (9.16 - 81.66)	<0.001
Health insurance	2.88 (1.41 - 5.92)	0,004
Living in close proximity to a pharmacy	0.32 (0.06 - 1.71)	0,181

4.7 Self-medication within therapeutic classes of medicines

The four main variables (sex, type of school, level of self-care orientation and level of medication knowledge) were investigated for significant association with SM within specific therapeutic classes of medicines. The results show that the level of self-care orientation is significantly associated with an individual's selection of a medicine within the seven therapeutic classes of medicines. Respondents with a high level of self-care orientation were more inclined to use all the seven therapeutic classes of medicines for SM (p-value <0.05), than those with a low level of self-care orientation. Male students were 55% less likely to self-medicate with analgesics compared to female students. A significant difference in the use of anti-inflammatory medicines between third year students and first year students (from both medical and non-medical student

groups) was reported; third year students were approximately two times more likely to use anti-inflammatory medicines in comparison to first year students. Health insurance and the accessibility of a pharmacy near place of residence were variables that influenced the use of certain medicines for SM. Respondents with health insurance were more inclined to use sinus medication and combination cold and flu preparations, whilst respondents who lived closed to a pharmacy were more inclined to use anti-histamines and cough medicines.

Table 4.13 below shows the analysis of the variables that affect the utilization of the seven most commonly reported therapeutic classes of medicines.

Table 4.13 The analysis of the most commonly reported therapeutic classes of medicines, and the factors associated with their utilization

Therapeutic class of medicine	Type of variable	Unadjusted odds ratio (95% CI)	p- value
Analgesics	Self-care orientation		
	Low	-	
	High	3.28 (1.86 – 5.78)	<0.001
	Gender		
	Female	-	
Anti-inflammatory medicine	Male	0.45 (0.26 – 0.75)	0.002
	Year of study		
	First year	-	
	Second year	1.28 (0.79 – 2.08)	0.319
	Third year	2.09 (1.25 – 3.50)	0.005
	Self-care orientation		
	Low	-	
	High	2.82 (1.82 – 4.32)	<0.001
	Health insurance		
Anti-histamines	No	-	
	Yes	1.55 (1.02 – 2.36)	0.039
	Self-care orientation		
	Low	-	
	High	4.51 (2.90 – 7.02)	<0.001
	Living in close proximity to a pharmacy		
Lozenges	No	-	
	Yes	2.46 (1.12 – 5.37)	0.024
	Year of study		
	First year	-	
	Second year	1.70 (1.04 – 2.78)	0.036
	Third year	0.89 (0.53 – 1.50)	0.661
	Self-care orientation		
Combination cold and flu preparations	Low	-	
	High	6.17 (3.9 – 19.72)	<0.001
	Health insurance		
	No	-	
	Yes	2.10 (1.36 – 3.22)	<0.001
Cough medicine	Self-care orientation		
	Low	-	
	High	6.01 (3.81 – 9.46)	<0.001
	Living in close proximity to a pharmacy		
	No	-	
Sinus medication	Yes	0.37 (0.18 – 0.75)	0.005
	Self-care orientation		
	Low	-	
	High	3.84 (2.41 – 6.10)	<0.001
	Health insurance		
	No	-	
	Yes	1.75 (1.12 – 2.77)	0.016

Chapter Five

Discussion

5.1 Introduction

In the previous chapter, data collected through the study questionnaire was presented. In this chapter, in addition to summarising the main findings of this study, the study findings are examined and analysed in an attempt to fulfil the five research objectives. The literature review in Chapter Two discusses literature pertaining to SM and outlined the implications of SM in university students and other population groups. However, this chapter outlines and discusses the patterns drawn from the findings as supported by literature. Literature is vital in grounding the assumptions, results, and conclusions of the research in the broader context of professional inquiry (Phillips & Carr, 2010). The research findings are presented, guided by the five research objectives.

5.2 Demographics of the study population

The demographics of student population showed that the majority of the students were female (79%). This gender imbalance can be explained by the university statistics. According to the WITS website, female students make up 54.64% of the student body population, with the remaining percentage constituted by male students. A great proportion of the female students take up studies in the Commerce, Law, Health sciences and Humanities faculties while male students favour the Science and Engineering faculties. Our study population extracted students from the Humanities and Health sciences faculties and thus explains the gender disparities in the study population (The University of the Witwatersrand, 2019a).

The study demographics also showed that the majority of the surveyed student population (86.5%) lived in close proximity to a pharmacy. Moreover, a large proportion of the students that lived in close proximity to a pharmacy (80.7%) practised SM within the specified time. The practice of SM was prevalent in the surveyed students that had health insurance. A reported 55.4% of the study population had health insurance. A greater proportion of the study population that had health insurance (82.1%) practised SM within the specified time. The socio-demographic characteristics: health insurance and accessibility to pharmacy near residence were positively correlated to the frequency of SM practice among the study population.

The main findings of the study are outlined next through the research objectives.

5.3 The reasons, extent and prevalence of self-medication among the university students

5.3.1 The prevalence of self-medication

This study revealed that SM is a relatively common practice among university students across different schooling faculties. SM practices were reported by 77.8% of the surveyed students (inclusive of both medical and non-medical students). Due to this nature of study not being previously explored in South Africa, there is no data available on the SM practices of students from other universities or institutions of higher education, and there is no data on the SM practices of the general population. This made the comparison of SM practices among different population cohorts, at a national level, unachievable. However, from previous international studies, SM prevalence rates in medical and non-medical university students have been reported to be up to 98% in Palestinian students (Sawalha, 2008), 88% in Croatian students (Vucic et al., 2005), 81.3% in Bahrain university students (James et al., 2006) and 76% in the university students of Karachi, Pakistan (Zafar et al., 2008). Lower prevalence rates have reported by students in Germany (40%) (Du & Knopf, 2009) and the UK (20%) (Dengler & Roberts, 1996).

The SM prevalence rates reported for the medical and non-medical student groups were lower than SM prevalence rates reported in other. In Palestine, SM prevalence rates of 96.6% and 98.6% were reported for the medical and non-medical university students, respectively (Sawalha, 2008). This result is not similar to the findings of this study, where, medical students had a higher SM prevalence rate than the non-medical students. In south India, SM prevalence rates of 96% and 92% were reported for the medical and non-medical university students, respectively (Daniel, Prasanand, Joice & Rani, 2019). This result is consistent with the findings of this study, where, medical students had a higher SM prevalence rate than the non-medical students.

5.3.2 The extent (frequency) of self-medication

The extent of SM, i.e. the frequency of SM among the surveyed students was surprising and unexpected. Across all the year of study groups, the majority of pharmacy and psychology students reported to have self-medicated five or more times in the stipulated time period (60 days). This revealed that there was no significant

difference in SM practice between pharmacy (medical) students and psychology (non-medical) students, in terms of the frequency of SM.

The general assumption is that students in medical school have more knowledge and insight on the human body and medicines in comparison to non-medical students, thus self-medicating more frequently than their counterparts. This assumption is based on a previous study that reported high SM prevalence rates (76.9%) among first year medical students (James et al., 2006). From this previously conducted research study, the assumption would be that non-medical students would practice SM less frequently than medical students, but this was not evident in our study. However, our findings are in agreement and consistent with studies conducted in Pakistan (Zafar et al., 2008), Iran (Sarahroodi et al., 2012), Slovenia (Klemenc-Ketis et al., 2010) and Mozambique (Lucas et al., 2007), and in contrast with a study conducted in Palestine (Sawalha, 2008) that indicated that non-medical students had higher odds of practising SM than medical students.

5.3.3 The reasons for self-medication practice

The perceived reasons for SM reported by both the medical and non-medical student groups are consistent and comparable with results obtained from previous studies (James et al., 2006; Shankar et al., 2003), where, previous experience and mild illness were the most commonly reported reasons for SM. A Palestinian study on medical and non-medical students indicated that the majority (58%) of study population self-medicated because they perceived their illnesses to be simple, whilst 29% self-medicated because they had previously experienced the same illness (Sawalha, 2008). A study on the university students of Karachi, Pakistan stated *Previous experience with similar symptoms* (50.3%) and *Problem seeming to be too trivial* (48.3%) as the most reported reasons for SM among the respondents (Zafar et al., 2008). The results of the Palestine and Pakistan studies (Sawalha, 2008; Zafar et al., 2008) are also consistent with the results of this study, particularly the medical student group. As shown in Table 4.3, the medical students mainly self-medicated because they perceived their health condition as not serious, whereas the non-medical students mainly self-medicated for quick relief.

The common trend indicated by these studies, including ours, poses the concern that most people self-medicate because they perceive their illness or ailment as not

serious, and that they have had previous experience with the illness. In an ideal setting, these would be unjustifiable reasons as this potentially puts many people at the risk of delaying the treatment of a serious health problem due to the masking of symptoms by use of OTC medicines (Hughes et al., 2001).

5.3.4 Indications for self-medication

The most popular health conditions reported by both the medical and non-medical students in the study were similar to the ailments frequently self-treated in other countries (James et al., 2006; Jaquier, Buclin & Diezi, 2006). In this study, both cohorts of students mostly treated pain, the headache, and colds, flu and sore throat. Similar results were published in Palestine (Sawalha, 2008) and Pakistan (Zafar et al., 2008). Palestinian medical and non-medical students were reported to have self-treated mainly the headache, flu, sore throat and menstrual pain (Sawalha, 2008). Additionally, the university students of Karachi, Pakistan mainly treated the headache (72.4%) and flu-like symptoms (65.5%) in their practice of SM (Zafar et al., 2008).

Research conducted in south India indicated that symptoms that led to SM in medical and non-medical students were the common cold, flu and cough, headache, sore throat, and body aches and pain (Daniel et al., 2019). These results are similar to this study. In south India, most medical students (90%) self-treated the common cold (Daniel et al., 2019). This result is not consistent with the results of this study which show that most medical students commonly treated pain (Table 4.4.). In south India, most non-medical students (80%) self-treated the headache (Daniel et al., 2019). This result is consistent with the results of this study, which show the headache as the most commonly treated health condition by the non-medical students (Table 4.4).

5.3.5 Factors influencing self-medication practice

The most commonly used sources of information for SM reported by both groups of students (medical and non-medical), in totality, are similar to the findings of an Iranian study (Sarahroodi et al., 2012), and a study conducted in the United Arab Emirates (UAE) that reported *Advice from family members and friends*, as the most commonly used source of information for SM (Sharif & Sharif, 2014). An interesting finding was that the medical students largely relied on self-knowledge/personal study, and advice from friends and family for information on SM. This is in comparison to the non-medical student group that largely relied on advice from friends and family, and pharmacist

recommendations for information on SM. The medical students did not have a larger dependency on the recommendations from a pharmacist, as compared to the non-medical students. This result was not anticipated. It was expected that medical students (who are pharmacy students) would value the recommendations of a pharmacist to a greater extent than the non-medical students. The reliance of the medical students on self-knowledge might be explained by the medical background this group possesses. The reliance of information obtained from friends and family, and self-study provides for a clear indication of the need for extensive public education on SM and OTC medicines.

The advertisement of OTC medicines by pharmaceutical companies plays an informative role on public education. Research has shown that advertisements for healthcare products constitute a large component of magazine advertising; in an investigation of eleven commonly read American magazines, 23% of the advertisements in the magazines were of health-related products (medicines included) (Burack & Damico, 2000). Recently, Rather, Byung-Chan, Park and Bajpai (2017) stated several sources of information used in SM to include advertisements on radio, television, printed media and advice from friends and family. In a study involving college students in the USA, Burak and Damico (2000) describe that 93% of the students read magazines, and that more than half of the surveyed students read magazines at least once a week. The results of this American study also indicated that the majority of students used at least one of the advertised health-related products or medicines (Burak & Damico, 2000). This shows that the youth are directly influenced to self-medicate by advertisements. Due to the increase in accessibility to the internet and cyberspace, and the growth of digital online media in today's world and the anticipated future; further research should be conducted in this regard.

The research findings of this study provided insight on the sources or places used by the study respondents to obtain medicines for SM. For both cohorts of the students, most medicines were purchased from pharmacies, while the use of available medication at home ranked second as a common source of medicines. These research findings were consistent with a similar study conducted in Karachi (Zafar et al., 2008), where, the students mostly obtained medicines from a pharmacy and used medicines stocked at home. The research findings of this study were in contrast with the results of a study conducted in south India, where, both medical and non-medical

students mentioned family (70% and 64% respectively) as the main source of medicines for SM (Daniel et al., 2019). The acquisition of medicines from friends/family was also reported, by both cohorts of this study, as a common source of medicines. The use of stocked or available medicine at home, and the use of medicine meant for another individual brings about the possibility of exposure to expired medicines, the misuse of medicine i.e. the use of medicine intended for use in different health ailments, and the increased risk of the occurrence of polypharmacy. This results in several undesirable health consequences (Hughes et al., 2001).

5.3.6 Therapeutic classes of medicines reported in self-medication practice

A high average number of medicines consumed for SM practices was reported in our study. This is a higher average than reported in similar literature (Sawalha, 2008) where the Palestinian university students reported an average consumption 2.63 ± 1.38 per study respondent. A possible reason for the high average medicine consumption in our study, could be that a considerable number of students self-medicated for quick relief (as shown in Table 4.3) and thus resorted to using multiple medicines in the case of one ailment. Another reason could be that due to economic reasons, students may consume several low-cost OTC medicines instead of obtaining a high-cost, effective medicine prescribed by a physician. This assumption is based on a proportion of the students that indicated that *High cost of medical consultation* is the reason they self-medicate (see Table 4.3).

In this study, analgesics and anti-inflammatory medicines were the most commonly consumed medicines in SM, by either student groups or cohorts. This finding is comparable to the medicines commonly reported in studies from different countries where analgesics were the most commonly used class of medicines in SM (Arrais et al., 1997; Drug Utilisation Research group, 1997; James et al., 2006; Lau et al., 2005; Stoelben et al., 2000). A similar result is demonstrated in Nepal (Gwayali, Shankar, Poudel & Saha, 2015) where the results find analgesics (73.2%) as the most dominant medicine used in SM by undergraduate medical students. The common use of anti-inflammatory medicines is similar to the results of a study conducted in Pokhara valley, where 54% of the study participants reported use of anti-inflammatory medicines (Shankar et al., 2003). The indiscriminate use of medicine for SM has detrimental effects. A high intake of analgesics and anti-inflammatory medicines is known to lead

to adverse gastrointestinal, renal (nephropathy) and hepatic (hepatotoxicity) effects (Borg & Scicluma, 2002; Hughes et al., 2001).

Some noteworthy medicines consumed by a considerable amount of medical and non-medical students are cough medicines, and combination cold and flu preparations. This is substantiated by Table 4.4 which shows that the cough, and colds, flu and sore throat are commonly treated conditions in SM. There is no relevant literature that addresses the use of these medicines in SM. However, in SA, many cough and cold remedies contain the ingredient Dextromethorphan (Pharmacopass, 2020). Dextromethorphan is a commonly misused cough suppressant. Another common ingredient found in cough medicines is codeine, which has a high abuse potential. The abuse of cough and cold preparations has been on the rise in the current decade (U.S. Department of Health, 2020). The rational use of these commonly used preparations is imperative. The rational use of OTC medicines, particularly codeine-based medicines, is expanded on in section 5.7.1.

There was notable use of anti-histamines by both cohorts of students, particularly the non-medical students. A similar result was found by Brazilian researchers, where 25% of the study population self-medicated using first-generation antihistamines (dos Santos, Nogueira & de Borja-Oliveira, 2018). Antihistamines are most commonly used in the treatment of allergies. Several antihistamine medicines are available on the pharmaceutical market, and their generic forms are widely available at low costs. As a result, this class of medicines is extensively used in the management of allergies.

5.4 Medication knowledge

For this study, the type of school attended (medical/non-medical) was the socio-demographic variable that was positively correlated to the level of medication knowledge (good/poor). As expected, a larger proportion of pharmacy students exhibited good medication knowledge in comparison to the psychology students. This is comparable to the Palestinian study conducted by Sawalha (2008). The analysis of the Palestinian study revealed that medication knowledge was significantly associated with the type of school (medical or non-medical) attended by an individual (Sawalha, 2008). The third year pharmacy group was the only year of study group where the majority of students showed good medication knowledge. This was expected and can be attributed to the pharmacy study curriculum, where third year students have a

substantial understanding of human pathology, certain diseases and medication knowledge gained through Pharmacotherapy (Clinical Pharmacy) and Pharmacology study modules.

Health insurance was also found to be a positive correlate of medication knowledge, as students with health insurance proved to have good medication knowledge, in comparison to those without. A plausible explanation for this finding could be that some health insurance companies send their subscribers e-mail and phone message notifications of relevant medical information. There is no published literature on the association between health insurance and the level of medication knowledge of an individual. Future research could investigate the possibility of a probable association between health insurance literacy i.e. the degree to which an individual has the knowledge to find and assess information about health plans, including the selection of the best health insurance plan for their health and financial circumstances, and medication knowledge.

5.5 Correlates of self-medication

Previous research has produced varying results on the effect of various factors such as the level of education, socioeconomic status, age, gender and marital status on SM practices (Beitz et al., 2004; Jaquier et al., 2006; Martins et al., 2002; Stoelben et al., 2000). In this study, sex, type of school and level of medication knowledge were found to be insignificant predictors of SM practises, whereas the level of self-care orientation was a significant predictor. This can be explained by the fact that self-care oriented people are more inclined to take on self-care activities in treating self-diagnosed ailments and restoring their health without professional assistance. This finding is slightly comparable to the study conducted in Palestine which reported medication knowledge, sex and self-care orientation as insignificant predictors of SM, but reported type of school as a significant predictor (Sawalha, 2008).

Additionally, our results indicated that respondents with health insurance and respondents who live within 5km radius proximity to a pharmacy, had greater odds of self-medicating. Studies in other parts of the world have shown conflicting results on the influence of health insurance on SM practice (French, Holdaway & Williams, 2009; Hoai & Dang, 2017; Sarahroodi et al., 2012). In a study conducted in the Vietnamese city, Ho Chi Minh City, Hoai and Dang (2017) proved that the possession of health

insurance was statistically insignificant in increasing the probability of an individual to self-medicate. In support of this, the results of an Iran-based study on the risk factors associated with SM among women showed that Iranian women without health insurance had increased chances of self-medicating (French et al., 2009). A possible explanation for this observation could be that patients without health insurance favour SM and obtaining medicines directly from pharmacies, in avoidance of the high consultation fees charged by doctors/physicians.

The ease of access to medication or the availability of medicines is a key factor in positively influencing SM practice. In our study, students who lived in close proximity to a pharmacy had higher odds of self-medicating. Table 4.3 illustrates that convenience and time-efficiency are substantial reasons why some students chose to self-treat their ailments. A study conducted in Hong Kong (Lau et al., 2005) also reported that a long distance from a person's residential place to a pharmacy was negatively associated or decreased the odds of SM.

5.6 Self-medication within therapeutic classes of medicines

The level of self-care orientation (high/low) was greatly influential in the study respondents' selection of the therapeutic class of medicine used in SM practices. As shown in Table 4.13, self-care orientation had significant association in the utilisation of the seven commonly reported therapeutic classes of medicines. Students with a high level of self-care orientation had higher odds of using any medicine therapeutic class compared to students with a low level of self-care orientation. This was anticipated as individuals with a high level of self-care orientation are usually more confident and self-assured, hence they find it easier to select medicine in any therapeutic class for SM, than their counterparts with low self-care orientation. This research finding is comparable to the findings reported by Sawalha (2008) in Palestine, where, students with a higher self-care orientation were more inclined to use headache relievers and decongestants.

Gender had a significant influence on the selection of one out of the seven therapeutic classes. The male students were less likely to self-medicate with analgesics compared to female students. However, the symptoms that led to SM with analgesics were different between the male students (headache, pain) and the female students (headache, pain and dysmenorrhoea). Data obtained from studies in Brazil (Sa et al.,

2007), Kuwait (Abahussain et al., 2005) and Spain (Figueiras et al., 2000) also indicated higher analgesic SM among females. On the contrary, Sarahroodi et al. (2012) found that there was no significant difference in SM with analgesics between male and female Iranian university students. This finding is in agreement with literature from a study conducted on Bahrain university students (James et al., 2006).

Health insurance was found to have a significant influence in the selection of three out of the seven therapeutic classes i.e. anti-inflammatory medicine, flu and cold preparations, and cough medicines. Most of the medical aid plans and schemes reported by the students have day to day benefits and medical savings accounts that cater for claims on certain classes of OTC medicines, which are commonly flu, cold and cough preparations. There is no published literature on the effects of health insurance on the selection of medicines in certain therapeutic classes, hence, there is no basis for comparison with the findings of this study.

5.7 Attitude towards self-medication

5.7.1 The rational use of OTC medicines

A greater number of pharmacy students than psychology students disagreed to the statement that “*Self-medication can be harmful*”. This result was not anticipated as it was expected that pharmacy students would have a greater appreciation of the adverse effects and the potential dangers of OTC medicine use in SM. Attitudes like this are unfavourable as this is an indication that the educated youth underestimate the gravity of irrational OTC medicine use and the related risks of SM. This could also serve as explanation for the high SM prevalence rates among the surveyed students.

There seems to be the common misconception that OTC medicines are safer than prescription medicines. It has been reported that patients do not always classify OTC medicines as medicinal products (Hughes et al., 2001). This could be attributable to OTC medicines being available for purchase in supermarkets/retail outlets, other than pharmacies (French et al., 2009). As a result, research has shown that patients do not report OTC medicines currently being taken/ taken in the past, to pharmacists or doctors, and equally, doctors do not ask about them (Stone et al., 2017).

In our study, a considerable number of students were in slight agreement with the statement “*Because OTC medicines are available for purchase without prescription, they are very safe*”. Medical literature has shown that commonly used or popular OTC

medicines are associated with adverse health effects (Kiyong & Lauwo, 1999; Schabitz, Berger, Knauth, Meinck & Steiner, 2001; Stevenson, MacWalter, Harmse & Wilson, 2001). This debunks the common misconception that OTC medicines are very safe. Although the appropriate use of the medicines for SM can be advantageous, it may lead to tragic consequences when there is no adequate education of the public (Hughes et al., 2001). Emphasis should be put on public education on the dangers of SM.

In SA, there is concern on the risks that may arise with OTC analgesic use. In 2019, through the SA National Department of Health (NDoH), SAHPRA issued out a public warning on the safe use of NSAIDs and the potential dangers and counter-interactions that may occur with irresponsible use of NSAIDs (SAHPRA, 2019b). In the notice, South African health professionals were urged to report adverse reactions to the National Adverse Drug Event Monitoring Centre or the SAHPRA pharmacovigilance office.

Additionally, an Australian study revealed that due to the wide availability of ibuprofen in different concentrations, the irrational use of the medicine has been on the rise, where patients take ibuprofen despite potential drug to drug interactions and contra-indications (Stosic, Dunagan, Palmer, Fowler & Adams, 2012). Stosic et al. (2012) suggested that the increased availability of OTC NSAIDs may have led to a more relaxed or care-free attitude in the use of these medicines. The main concern with a relaxed attitude with medicines is that self-care choices may not be optimal in SM and there will always be an under-appreciation of the potential risks/harm that can be incurred through SM (Stosic et al., 2012). This remains a challenge in optimising responsible SM.

Strategies can, however, be implemented to reduce the potential danger and abuse of OTC medicines. For example, if the safety margin of a drug is too narrow, and if the self-diagnosis by a patient is unreliable, regulatory laws can be enforced that specify the dosage or pack size and the concentration of a medicine that a pharmacist can dispense without prescription. For example, in the UK, the proton pump inhibitor Omeprazole can be dispensed OTC in 10mg tablets with a specified maximum daily dose of 20mg, and paracetamol can only be bought in larger pack sizes in pharmacies, while smaller packs can be obtained in supermarkets (Sankalp & Gautam, 2015).

Fewer patients have been hospitalised or died from paracetamol toxicity since the pack size was reduced (Sankalp & Gautam, 2015).

In SA, the misuse of codeine-based OTC medicines has been prevalent. This problem can be attributed to the ease of access to the medicine and its availability. Initially, codeine-combination medicinal products were sold OTC at unit doses of up to 20mg of active ingredient i.e. codeine. The highly abused codeine linctus was also sold OTC containing up to 10mg of codeine phosphate per 5mL of syrup (Foley et al., 2018). Recently, national-based initiatives were developed and aimed at reducing harm associated with codeine consumption. The Codeine Care Project was designed to assist in monitoring purchases and individuals misusing codeine (Foley et al., 2018). The South African NDoH and SAHPRA regulatory body positively responded to the increase in OTC codeine consumption by amending the scheduling status of specified concentrations and quantities of codeine-based medicinal preparations as a means of governing and controlling OTC codeine sales. This is illustrated in Tables 2.5 and 2.6.

5.7.1.1 Patient information leaflets

Although most students, in both cohorts, were in agreement with the statement: *“It is important to always read the medicine information leaflet before taking an OTC medicine”*, a small number of students were in opposition and strongly disagreed to the statement. A larger proportion of the medical students, in comparison to the non-medical students, did not appreciate the importance of reading medicine information leaflets. Medicine manufacturers play a pivotal role in the provision of information to consumers. Patient information leaflets (PILs), enclosed in every medicine packaging, guide and inform patients on the administration, potential adverse effects and precautions of the medicine, in a clear, understandable and easily readable way (Auta et al., 2012). There is no literature published on the use of PILs among university students (for both medical and non-medical students). However, a study conducted in New York, reported patients’ use and perception of PILs. The results of that study indicated that 26.4% of the study participants seldom read PILs, while 38.2% of the study participants never read PILs (Nathan, Zerilli, Cicero & Rosenberg, 2007). The reasons for these low percentages was attributed to 34.5% and 8.5% of the participants who reported that PILs were somewhat difficult and very difficult to understand, respectively (Nathan et al., 2007).

Medicine manufacturers produce PILs in accordance to a regulated and standardised template to ensure that the same type of information is provided for every medication (Herber, Gies & Wilm, 2014). Despite substantial efforts made by regulatory authorities to improve the readability of PILs over-time, patients are still confronted by long texts written in small font with non-comprehensible medical jargon. As a result, most patients do not read PILs. This leads to poor decision-making in their behavioural patterns in taking medicines. The use of pictorials, animations and layman terms in PILs may encourage patients or consumers to read the PILs, thus making the patient knowledgeable in making rational and informed decisions when taking their medicines for SM (Herber et al., 2014). The future design process of PILs should be developed to convey medicine information in a way that is perceived less frightening by patients and consumers, but still provide essential information necessary to promote rational drug usage.

5.7.2 The provision of advice and information by pharmacy staff for self-medication

In our study, most students positively responded and agreed to the statement: *“I feel comfortable telling my pharmacist about my use of OTC medicines”*. A few students disagreed with this statement. This raises concern as, with reference to Figure 4.1 and Figure 4.2, a substantial number of students obtained medicines from pharmacies and used a pharmacist’s recommendations as a source of information in SM.

Most students disagreed to the statement: *“My pharmacist encourages questions about OTC medicines”*. This was also a concerning response, as pharmacists have the crucial duty in the provision of healthcare information including medicine information to patients (Brata, Gudka, Schneider & Clifford, 2015). There was an unsatisfactory response to the statement: *“My pharmacist provides useful information about OTC medicines”* as most students seemed dissatisfied with the information obtained from pharmacists. Most students were of the opinion that *“I think it is important for a herbalist/natural medicine practitioner to be located in a pharmacy where they sell OTC medicines”*. Additionally, a small portion of the study population obtained medicines from herbal/health store/ traditional healer. This is a clear indication that the use of herbal medicines and their possible interactions with other medicines should be investigated. Scientific approaches should be developed and implemented for traditional medicines.

Most students disagreed to the statement *“Pharmacists’ assistants give me more advice and information about OTC medicines than my pharmacist”*. The provision of medicines for SM is considered a core activity conducted by community pharmacies (Brata et al., 2015). The procedure of SM in community pharmacies involves 2 main stages: the assessment of the patient and the provision of advice to the patient (Berardi, Ferreri, Hume, Brown & Isetts, 2009; Blenkinsopp, Paxton & Blenkinsopp, 2009; Rantucci, 2007; Schneider, 2010). Based on the patient assessment, the pharmacy staff are to provide information and advice to the patient, on the chosen treatment option (Blenkinsopp et al., 2009). In most community pharmacy settings, pharmacists’ assistants are usually the ‘designated dispensers’ of OTC medicines whilst pharmacists focus on dispensing prescription medicines. Brata et al. (2013) concluded that there was a wide variation in the proportion of pharmacy staff who provided adequate information, and only a minority of the pharmacy staff provided adequate information and advice. This review found that the majority of pharmacy staff did not provide adequate advice when handling SM requests in developing countries.

This brings forth the issue of adequate training on SM for both pharmacists and pharmacists’ assistants. Sanz, Silveira, Diaz and Alonso (2000) reported on the application of telematics systems in European community pharmacies, which were intended to provide community pharmacy professionals with information and training on SM and OTC medicines. A similar approach could be adopted for the education of pharmacy professionals, particularly pharmacists’ assistants, on SM.

Chapter six

Conclusions and recommendations

6.1 Introduction

The following chapter concludes this research report by summarising the findings of this study. In this chapter, the conclusions drawn from the findings of this research study are described. The conclusions are based on the research objectives and the results of the study. The implications of these findings and the resultant recommendations are also explained.

6.2 Main findings of the study

A descriptive and quantitative study design was employed to achieve the objectives of the study. The study's main aim was to determine the prevalence, knowledge and attitudes pertaining to the practice of SM among undergraduate medical and non-medical university students. The five research objectives were derived and generated from the main aim of the study.

These research objectives stated at the beginning of the research report (Chapter One) were re-examined. After reviewing the data presented in Chapter Four, and the analysis of the research findings in Chapter Five, evaluation showed that the research objectives had been achieved.

In accordance to the first research objective, the practice of SM was reported by 77.8% of the study respondents. The SM prevalence rates reported for the medical and non-medical student groups were 84.9% and 73.5%, respectively. Thus, the medical student group had a higher SM prevalence rate. The third year pharmacy student group reported the highest SM prevalence rate across all year of study groups in both medical and non-medical students. An in-depth analysis on the frequency of SM practices among the medical and non-medical students revealed that there was no significant difference between the SM practices of medical and non-medical students.

With reference to the second research objective, the knowledge on SM practice was assessed and evaluated as a respondent's level of medication knowledge (good/poor). Most (60.5%) of the medical students exhibited a good level of medication knowledge. On the contrary, most (73.9%) of the non-medical students exhibited a poor level of medication knowledge. The type of school attended (medical/non-medical) had a

significant association with medication knowledge. Thus, a greater proportion of medical students had a good level of medication knowledge, in comparison to the non-medical students. The majority of third year students, in both the medical and non-medical student groups, displayed good medication knowledge, in comparison to the other year of study groups. Furthermore, health insurance had a positive correlation with a good level of medication knowledge in a study respondent.

With regard to the third research objective, the majority of the study respondents presented a positive attitude towards SM. A larger proportion of the medical students had a positive attitude towards OTC medicines and displayed awareness of the potential adverse effects and drug-drug interactions that may occur with the use of these medicines. A substantial number of non-medical students did not perceive the awareness of the potential adverse effects a medicine may cause, as important. Most of the study respondents were comfortable with informing a pharmacist on their use of medicines, however, a substantial number of respondents were not satisfied with the information provided by pharmacists on OTC medicines.

In relation to the fourth research objective, the results of the study confirmed that the level of self-care orientation was the only variable that significantly influenced the frequency of SM practices. Hence, sex, type of school (medical/non-medical) and medication knowledge were insignificant predictors or influencers of the practice and frequency of SM. Alternatively, health insurance and the use of available medications at home were found to have a significant influence on the frequency of SM by increasing an individual's frequency of self-medicating.

Lastly, regarding the fifth research objective, the results of the study showed that the level of self-care orientation was significantly associated with an individual's selection of a therapeutic class of medicine for SM. Respondents with a high level of self-care orientation were more inclined to use all the seven commonly reported therapeutic classes of medicines used in SM. The variable "sex" had a significant correlation with the use of analgesics, where male respondents were less likely to self-medicate with analgesic than the females. Additionally, health insurance and the accessibility of a pharmacy near the place of residence were variables that also influenced the use of certain medicines for SM.

The overall results of the study provide evidence of the highly prevalent and common practice of SM among educated university students. The results also reveal that there are no behavioural differences in SM practices between the medical university students and non-medical university students.

6.3 Conclusion

Literature has reported that 70% to 90% of all illness encountered by an individual is managed through self-treatment (Hughes et al., 2001; Segall, 2005). The global practice of self-care has become a primary resource in health organisations and systems worldwide (Hughes et al., 2001). Self-medication by use of OTC medicines has become a key component in this self-care treatment strategy, which reaps benefits for the patient, pharmacist and the physician. However, SM may pose as a health hazard in the case of a misdiagnosis of signs and symptoms experienced, or if the treatment leads to irrational medicine usage in the form of incorrect dosage patterns. In improving the effectiveness of SM, physicians and pharmacists must take charge in monitoring SM practices and providing appropriate information to their patients. The pharmacist, however, can play a major role in assisting people to make informed decisions on self-care and SM (WHO, 2019). This involves great focus from the pharmacist on illness/disease management and the conservation of health, rather than mainly focusing on product or medicine sales (WHO, 2019). The increasing rates of self-care through the practice of SM, ought to be supported by means of the extension of the roles and duties of a pharmacist, particularly in the implementation of pharmacovigilance and drug safety monitoring programmes.

The findings of this study also provide implications for public policy in the management of SM, especially in a developing country like SA. Firstly, a stringent quality control process of medicines and medicinal products is of paramount importance to minimise the adverse effects of SM, as SM is an unavoidable convenient approach for society in the treatment of ailments. Secondly, the public provision of information to citizens that will serve as a guide in SM practice is important in ensuring rational medicine usage.

The general population needs to gain an appreciation of the fact that OTC medicines are to be used in accordance to the individual product instructions and recommendations (Hughes et al., 2001). The universal access to adequate health-

related information, specifically about medicines and the associated adverse effects is therefore crucial to all communities. The provision of health and medicine-related information to health-care professionals and the general population, particularly in developing countries, serves as a major contribution towards attaining the Sustainable Development Goal (SDG) 3, i.e. to ensure healthy lives and promote well-being for all at all ages by year 2030 (United Nations, 2020). Ultimately, a close alliance between patients, physicians and pharmacists should be developed and strengthened, with the fundamental objective of maximising the benefits and minimising the risks associated with SM.

6.3 Study limitations and reflections

This research study had three main limitations. Firstly, the use of a self-reported questionnaire as the only data collection tool could have led to the study respondents under-reporting their SM experiences. Some studies have shown that respondents tend to underestimate their medicine usage (Meding & Barregard, 2001), whilst other studies related to disease and health conditions have indicated that respondents' answers can be validated and used in epidemiological studies (Andersen et al., 2007). Due to the lack of a qualitative research component in the study, it was not possible to follow up with respondents and gain a better understanding of the answers they gave. Relative qualitative research, in the form of interviews and focus groups could have shed light on possible OTC medicine abuse among the university students. The relationship between SM and OTC medicine abuse constitutes a key research area which is crucial in informing and assisting the relevant regulatory authorities in implementing methods to avoid harm in OTC medicine users that might be liable to abuse. This is a gateway for future research.

The second limitation relates to the cut-off points used in the methodology for the determining both the level of medication knowledge and self-care orientation. The cut-off points used were adopted from a Swedish study (Isacson & Bingeors, 2002) which might not be perfectly suited to the South African setting. However, to be comparable with a similar Palestinian study conducted by Sawalha (2008), it was necessary to use the same tools. The third limitation relates to the further research developments of this study. This study employed a cross-sectional design which provided insight into the current SM practices, which might differ in other seasons. As a result, the study is

unable to produce findings for long-term trends of SM practices of university students in South Africa.

6.4 Future recommendations and research

Based on the research findings, the following recommendations were made.

6.4.1 The use of traditional, alternative and complementary medicines

The results of this study revealed that a small portion of the study population used traditional herbal medicines, and obtained these medicines from herbal stores and traditional practitioners. Traditional medicines and plant-based remedies are extensively used in Africa. It has been estimated that 80% of the African population relies on traditional forms of medicine to meet their healthcare needs through the practice of SM (WHO, 2004). In SA an effective regulatory framework has been established for this category of medicines. However, there is no statistical data present on the usage of traditional medicines in SM, in the country. The following recommendations are made:

- Extensive research on the use of traditional medicines in the practice of SM, in SA. The research would provide statistical data on the usage of these medicines on a national scale, and most importantly would provide information on the different herbal remedies the population uses or consumes. This research would allow for scientific evidence of safety, efficacy and pharmaceutical quality of a wide range of traditional medicines. This would provide insight on the possible interactions between traditional medicines and OTC medicines used in SM.
- National surveillance systems at different levels of the health sector should be implemented in order to monitor and evaluate any reported adverse effects of traditional medicine. This can be done by enhancing the existing national safety monitoring and pharmacovigilance systems to include a wide range of traditional medicines. The objective of the surveillance system will be to provide assurance and consumer confidence in the safety and quality of traditional medicines. This will also promote the rational use of traditional medicines.

6.4.2 The practice of self-medication within the South African population

There is no data presented or research conducted on the SM practices within the South African population. The rational use of OTC medicines, at a national scale, can

be improved through strategies implemented from research on the use of these medicines in SM practices. The findings of this study introduce interesting questions for further research in other cohorts, institutions and disciplines. The following recommendations are made:

- Cross-sectional studies with a standardised methodological approach should be conducted to gain better comparative understanding of SM prevalence and practices among different populations in SA. For example, the investigation of SM practices within the geriatric population. This would give comprehensive yet comparative understanding of the national trends of SM among various population groups. This would result in the well-founded understanding of the use of OTC medicines in the nation, and will also allow for the planning of future interventions in the SM practices of specific cohorts or targeted populations.
- Community-based cross-sectional studies should be conducted in the different communities of the country. This will serve as an effective assessment of the knowledge of lay people in SM, and would give insight on the various socio-economic factors that influence SM practices within different communities. Community awareness on SM practices would also be strengthened.
- The government should improve on providing adequate and affordable public access to healthcare services. This is based on the assumption that, an efficiently-run healthcare system would result in less people self-medicating without the consultation of a healthcare professional, thus reducing the irrational use of medicines in SM.
- The practice of SM should be considered as an important public health issue. National-based initiatives should implement public health programs to increase awareness on the benefits and risks of SM, as well as the safe practice of SM.

6.4.3 The education of university students on self-medication

The practice of SM among university students is highly prevalent globally. A holistic approach must be implemented to curb the high SM prevalence rates and to promote rational drug usage among university students. The following recommendations are made:

- Health education on SM should be introduced into the undergraduate curriculum. This would be especially advantageous in the undergraduate

curriculum for medical students. The future medical practice of the medical students may be influenced by their SM behavioural patterns. Curriculum education on SM would enlighten the students on the risks and benefits of SM.

- Pharmaceutical companies should consider making PILs or medicine information leaflets more readable and easier to understand and interpret. This would positively change the attitude of university students and encourage them to read PILs. This ultimately promotes the rational use of medicines in SM.
- The student health and wellness departments of universities in SA, in collaboration with pharmacists and physicians, could greatly contribute in raising and promoting awareness on SM by use of visual aids and multimedia campaigns. Using available technology, cell phone applications could be designed and developed to provide information on the use of various OTC medicines and recommended treatments for various ailments. This would be great progress towards improving the students' knowledge and attitudes on SM and OTC medicines.

6.4.4 The role of the pharmacist in self-medication

The pharmacist is often termed “the guardian of medicines”. If, however, there is a need for SM in self-care, then there is a need for the extension of the role of the pharmacist. The WHO recognised the need for growth and extension of the pharmacy profession in relation to SM. To address this, the WHO made recommendations on the extension of the pharmacist's role with regards to communication, evaluation, quality, screening, training and supervision, collaboration and performance review (WHO, 1998). The specific recommendations are described in Table 6.1 below.

Table 6.1 Recommendations on the extension of the pharmacist's role (WHO, 1998)

Recommendation	Implementation
Education of pharmacists	• The pharmacy curriculum for undergraduates or pharmacy students should be reviewed to include relevant teaching areas including the study of behavioural sciences, patient communication and counselling, and health problem-solving in healthcare. • Universities or institutions offering pharmacy studies should facilitate for the joint training of pharmacy students with other healthcare professionals, for example physicians, dentists etc. • Participation in operational research should be encouraged to improve knowledge and decision-making on the care of patients and the public.

Training of pharmacists	• The training of pharmacists should involve the use of an official and stipulated procedure to investigate and solve practice-related problems. • Continuing education and professional development for pharmacists should be encouraged and undertaken to make certain that pharmacists remain competent in their practice and in catering to the changing health needs of the population.
The implementation of self-assessments and peer review audits	International pharmaceutical associations should develop and implement performance standards, which mainly focus on the provision of quality pharmaceutical care. This would facilitate for practising pharmacists to carry out self-assessments as well as peer review audits.
The ethical obligations in the practice of a pharmacist	The principal focus in the practice of a pharmacist should not be product-related. The product or medicine selected should be appropriate for the patient, in relation to the needs of the patient. The patient must be referred to a physician, in circumstances where physician referral is indicated.

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Appendices

Appendix A: Participant information sheet



INFORMATION SHEET AND CONSENT TO ACT AS A PARTICIPANT

Self-Medication practices among medical and non-medical university students: The Prevalence, Knowledge and Attitudes

You are invited to participate in a research study conducted by a Masters Candidate from the University of Witwatersrand. You must be 18 years or older to participate in the research study. Your participation is voluntary. Please take as much time as you need to read the information sheet. You will be given a copy of this form.

PURPOSE OF THE STUDY

This study is about self-medication among university students. By asking you to take part in this research study, we are hoping to learn more about self-medication practices among medical and non-medical university students, particularly undergraduate students (first, second and third years). Self-medication is defined as the use or consumption of medicines to treat one's own minor illness, without the advice of a physician or without medical supervision. More than 200 respondents will take part in the study.

Completion and return of the questionnaire will constitute consent to participate in this research project.

PROCEDURE

You will be asked to complete a questionnaire. The questionnaire will approximately 10-15 minutes to complete. It will be completed during one of your lecture classes. The questionnaire will ask questions regarding your use of over the counter medicines and how you perceive self-medication.

POTENTIAL RISKS AND DISCOMFORTS

There are no anticipated risks to your participation. If you feel some discomfort when responding to some questions, please feel free to skip the question.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

You will not directly benefit from your participation in this research study. However, this research may give you an outlook to self-medication practices.

PAYMENT/COMPENSATION FOR PARTICIPATION

You will not receive any payment for your participation in this research study.

CONFIDENTIALITY

All information that will be collected in connection with this research study will be anonymous. The information collected about you will be coded using a number, for example, Respondent #22. The information will be stored in the principal investigator's office in a locked cabinet and a password protected computer. The data will be stored for about 5 years after the study has been completed and then destroyed.

When the results of the research are published or discussed, no information will be included that could possibly reveal your identity.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be part of this study or not. If you volunteer to be in this study, you may withdraw at any time without any consequences that will be faced. If significant new information relating to the study becomes available which may influence your willingness to continue to participate, this information will be provided to you.

RIGHTS OF RESEARCH RESPONDENTS

If you have any questions or concerns about the research, please feel free to contact the principal investigator, Rumbidzai Murahwa who may be contacted on 078 057 8282 or by email at murahwaa@yahoo.com. If you have any question concerning your rights as a research participant or if you have any concern over the way the study is being conducted, please contact the Chairperson of the Human Ethics Research Committee who is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

Please make sure you have read and understood this information sheet before completing the questionnaire. Please DO NOT write your name on the questionnaire.

Appendix B: Study questionnaire



Part A: Demographic Information

Directions: Please answer each question by ticking (✓) the appropriate box.

Age:	18 – 23 years	>24 years
------	---------------	-----------

Sex:	Male	Female
------	------	--------

What degree are you currently enrolled for/ studying? _____

What year of study are you currently in?

1 st Year	2 nd Year	3 rd Year
----------------------	----------------------	----------------------

Do you have any other degrees/ qualifications? If so, please specify: _____

Do you have part-time employment?

Yes	No
-----	----

If yes, are you employed (part-time) within the pharmacy/ pharmaceutical field?

Yes	No
-----	----

Do you currently have health insurance?

Yes	No
-----	----

If you currently have health insurance, please state:

Medical aid scheme: _____

Medical aid plan: _____

Within 5km radius proximity to your place of residence, which of the following do you have access to? **(Tick✓ more than one if applicable)**

Pharmacy	Hospital	Clinic	Health care centre
----------	----------	--------	--------------------

Have you self-medicated in the last 2 months (60 days)?

Yes	No
-----	----

Approximately, how many times have you self-medicated in the past 60 days?

Once	2 times	3 times	4 times	> 5 times
------	---------	---------	---------	-----------

Part B: Indications for self-medication

Which of the following health conditions did you treat with OTC medication?

Directions: Please indicate your answer by ticking the appropriate box. You may choose more than one health condition.

Health Condition	Tick (✓) if applicable
Headache	
Fever	
Colds, flu and sore throat	
Cough	
Pain	
Constipation/diarrhoea	
Allergy	

Skin symptoms	
Heartburn/indigestion	
Menstrual symptoms (dysmenorrhoea)	
Ocular (eye) symptoms	
Ear symptoms	
Inability to sleep	
Insufficient vitamins and minerals	

Other (please specify): _____

Part C: Medicines used for self-medication

Which of the following therapeutic class/ classes of medicines did you use to self-medicate?

Directions: Please indicate your answer by ticking the appropriate box. You may choose more than one class of medicines.

Therapeutic Class of Medicine	Tick (✓) if applicable
Analgesics(painkillers) e.g. Panado®	
Anti-inflammatory medicine e.g. Nurofen®	
Multi-vitamins e.g. Centrum®	
Antacids/indigestion treatment e.g. ENO®	
Eye drops e.g. eye gene®	
Anti-histamines e.g. Allergex®	
Sleeping pills e.g. Somnil ®	
Herbal remedies	
Lozenges e.g. Strepsils®	
Ear drops e.g. WAXSOL®	
Topical or skin treatments e.g. Covarex cream	
Combination cold and flu preparations e.g. Corenza C ®	
Cough medicine e.g. Benylin® cough syrups	
Sinus medication e.g. Sinutab®	
Laxatives/ anti-diarrhoeal agents e.g. Dulcolax®/ Imodium®	
Homeopathic medicines e.g. A.Vogel/ Natura	
Traditional medicines	

Other (please specify _____)

Part D: Factors influencing self-medication

What sources of information do you use to acquire information on self-medication?

Sources of Information	Tick (✓) if applicable
TV	
Advertisements	
Friends/family	
Pharmacist recommendation	
Self-knowledge/ personal study	

Please select reason(s) for practising self-medication. You may choose more than one reason.

Perceived reasons for self-medication	Tick (✓) if applicable
Health problem is not serious	
Quick relief	
Personal convenience	
Avoidance of long waiting at clinics (lack of time)	
High cost of medical consultation	
Suggestion by a relative/friend	
Physician's advice of self-management	
Previous experience with same illness	

Other (please specify _____)

Where do you obtain medicines for self-medication?

	Tick (✓) if applicable
Pharmacy (Independent/ Chain) e.g. Clicks	
Friends/family	
Supermarket/other stores	
Available medication at home	
Herbal/ Health store	
Traditional healer/ practitioner	

Part E: Medication knowledge

Directions: Please answer (**true/false/I don't know**) to all of the following statements by ticking (✓) the appropriate box to indicate the answer you consider to be correct. Tick one box only for each statement.

Statement	True	False	I don't know
-----------	------	-------	--------------

Part F: Attitude towards self-medication

OTC medicines can potentially mask the signs and symptoms of a disease such that the physician can overlook them easily			
The nose may be blocked up if nasal spray is used for more than 10 days in a row			
Advil® and Nurofen® both contain the same active ingredient			
If the dosage instruction is “Take 1 tablet, 2 times a day”, it means that the tablets ought to be taken at 8 hour intervals			
Taking anti-inflammatory medicine e.g. Ibuprofen, on an empty stomach can irritate the stomach lining and might cause bleeding/ ulcers.			
Brand-name medicines work better than their generic equivalents because they are more expensive			

Directions: Please tick (✓) the box under the opinion that most closely represents your own for each of the following statements.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
Self-medication can be harmful						
OTC medicines may have a drug-drug interactions with chronic medicines or any other medicines being taken						
It is important to always read the medicine information leaflet before taking an OTC medicine						
In the case of adverse/side effects, physician help must be sought						
Because OTC medicines are available for purchase without prescription, they are very safe						
It is important to be aware of possible side effects that the medicine you are taking may potentially cause						

Directions: Please tick (✓) the box under the opinion that most closely represents your own for each of the following statements

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
I feel comfortable telling my pharmacist about my use of OTC medicines						
It is important for pharmacists to be aware of OTC medicines people use						
My pharmacist encourages questions about OTC medicines						
My pharmacist provides useful information about OTC medicines						
I think it is important for a herbalist/ natural medicine practitioner to be located in a pharmacy where they sell OTC medicines						
I trust my pharmacists' advice on OTC medicines						
Pharmacists' assistants give me more advice and information about OTC medicines than my pharmacist						

Principal Investigator: Rumbidzai Murahwa **Pharmacy Council Number:** P47756

Thank you for taking the time to complete this questionnaire. I sincerely value the important contribution that you have made to knowledge development in this research study.

Appendix C: Ethical clearance certificate

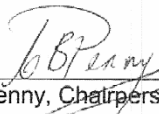
UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG



R14/49 Miss Rumbidzai Murahwa et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

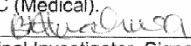
CLEARANCE CERTIFICATE NO. M180740

NAME: Miss Rumbidzai Murahwa et al
(Principal Investigator)
DEPARTMENT: Pharmacy and Pharmacology
PROJECT TITLE: Self-medication practices among medical and non-medical university students: the prevalence, knowledge and attitudes
DATE CONSIDERED: 27/07/2018
DECISION: Approved unconditionally
CONDITIONS:
SUPERVISOR: Neelaveni Padayachee
APPROVED BY: 
Dr C Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL: 09/11/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed July and will therefore be due in the month of July each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).


Principal Investigator Signature

20/11/2018
Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix D: Approval of title



Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

11 September 2018
Person No: 792124
PAG

Ms RA Murahwa
2 Promenade
250 Main Street
Brooklyn
0181
South Africa

Dear Ms Rumbidzai Murahwa

Master of Pharmacy: Approval of Title

We have pleasure in advising that your proposal entitled *Self-medication practices among medical and non-medical university students: The prevalence, knowledge and attitudes* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

A handwritten signature in black ink, appearing to read "S. Benn".

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

Appendix E: Plagiarism detection report (Turnitin)

ORIGINALITY REPORT

6%

SIMILARITY INDEX

1%

INTERNET SOURCES

1%

PUBLICATIONS

5%

STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

5%

★ Submitted to University of Witwatersrand

Student Paper

Exclude quotes ☒ On

Exclude matches ☐ Off

Exclude bibliography ☒ On

Signature of the supervisor:

