



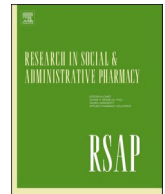
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Increased self-reported pharmacist prescribing during the COVID-19 pandemic: Using the Theoretical Domains Framework to identify barriers and facilitators to prescribing

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ABSTRACT

Background: Community pharmacists are positioned to improve access to medications through their ever-expanding role as prescribers, with this role becoming more pronounced during the COVID-19 pandemic.

Objectives: Our research aimed to determine the extent of self-reported pharmacist prescribing pre-COVID-19 and during the COVID-19 pandemic, to identify barriers and facilitators to pharmacist prescribing, and to explore the relationship between these factors and self-reported prescribing activity.

Methods: A questionnaire based on the Theoretical Domains Framework (TDFv2) assessing self-reported prescribing was electronically distributed to all direct patient care pharmacists in NS (N = 1338) in July 2020. Wilcoxon signed-rank tests were used to examine temporal differences in self-reported prescribing activity. TDFv2 responses were descriptively reported as positive (agree/strongly agree), neutral (uncertain), and negative (strongly disagree/disagree) based on the 5-point Likert scale assessing barriers and facilitators to prescribing from March 2020 onward (i.e., 'during' COVID-19). Simple logistic regression was used to measure the relationship between TDFv2 domain responses and self-reported prescribing activity.

Results: A total of 190 pharmacists (14.2%) completed the survey. Over 98% of respondents reported prescribing at least once per month in any of the approved prescribing categories, with renewals being the most common activity reported. Since the pandemic, activity in several categories of prescribing significantly increased, including diagnosis supported by protocol (29.0% vs. 58.9%, $p < 0.01$), minor and common ailments (25.3% vs 34.7%, $p = 0.03$), preventative medicine (22.1% vs. 33.2%, $p < 0.01$). Amongst the TDFv2 domains, Beliefs about Consequences domain had the largest influence on prescribing activity (OR = 3.13, 95% CI 1.41–6.97, $p < 0.01$), with Social Influences (OR = 2.85, 95% CI 1.42–5.70, $p < 0.01$) being the next most influential.

Conclusion: Self-reported prescribing by direct patient care community pharmacists in Nova Scotia increased during the COVID-19 pandemic, particularly for government-funded services. Key barriers to address, and facilitators to support pharmacist prescribing were identified and can be used to inform future interventions.

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1. Introduction

Internationally, the expansion of community pharmacist prescribing has resulted in benefits to patients and the healthcare system. Pharmacist prescribing has increased patient access to healthcare, with patients reporting satisfaction with their pharmacist prescribing experiences.¹⁻⁴ Increased pharmacist prescribing has also been associated with more appropriate referrals to physicians, better medication adherence, and improved symptom resolution compared to non-pharmacist prescribing (e.g., prescribing by a physician).^{1,3,5} This has also resulted in benefits to the healthcare system via cost savings in some studies.^{4,6} In the Canadian province of Saskatchewan, for example, the Pharmacists Prescribing for Minor Ailments (PPMA) program saved the province approximately \$546,832 in 2014.⁷ Further evidence of cost savings of pharmacist prescribing for minor ailments was identified in a recent modelling study from Ontario, Canada, that projected savings of \$4.08 to \$7.51 per patient depending on the minor ailment.⁸ Despite the well documented benefits of pharmacist prescribing, implementation has been lower than expected.⁹

Recognizing the benefits that pharmacist prescribing may offer, several studies have explored the factors that influence pharmacist prescribing from the perspectives of multiple stakeholders. Recent systematic and scoping reviews revealed positive assessments of pharmacist prescribing among patients due to the perceived benefits of increased ease of access to care and improved health outcomes that may result.^{2,10} Studies focused on pharmacist perspectives have revealed facilitators of pharmacist prescribing, including perceived improvements in patient care (continuity of care and more holistic approaches to care), job satisfaction, and perceptions that pharmacist prescribing reduced physician workload.¹¹⁻¹⁴ Conversely, the most common barriers to pharmacist prescribing pertained to training, liability, and funding.^{9,14-18} Previous literature has also identified that the uptake of pharmacist prescribing has been lower than expected and the rate of adoption of pharmacists' full scope of practice has been slower than anticipated.^{19,20}

The number of patients without a primary healthcare provider is high in many jurisdictions.²¹⁻²⁶ For example, one report found that 15% of patients in Canada are currently without a primary care provider whereas 19% of patients in the UK and 23% of patients in the US are considered to be without a primary care provider.²⁷ As the number of patients without a regular primary care provider remains high, it is important to understand how pharmacist prescribing is, and can be used to improve patient access to primary care. Further, the importance of the role of the pharmacist was made especially evident amid the COVID-19 pandemic,²⁸⁻³⁰ with pharmacists providing frontline care to patients, meeting immediate population health needs, and handling drug shortages – all of which aided the overloaded healthcare systems by increasing access to care.³¹⁻³⁸ The extent to which pharmacist prescribing was impacted by the pandemic, and the influence of the pandemic on perceived barriers and facilitators, has yet to be explored.

Despite the extensive literature about barriers and facilitators to pharmacist prescribing, most studies have explored the topic using descriptive techniques, with few studies conducting predictive analyses or connecting to implementation theory, with some notable exceptions.^{9,39-41} Use of behaviour change theory may improve implementation of practice changes like pharmacist prescribing.⁴²⁻⁴⁴ One framework developed to support the translation of theory into practice is the Theoretical Domains Framework version 2 (TDFv2), which was developed as a comprehensive, theory-informed approach to identifying determinants of behaviour in order to assess why an intervention failed and to better support the implementation of interventions. The TDFv2 consists of 14 domains (see Table 1) and was developed through collaboration between psychologists and implementation scientists as an integrative framework of 33 behaviour change theories. This validated framework has previously been used to study pharmacy practice, including pharmacist prescribing and may assist in developing strategies

to overcome barriers to practice change.^{9,10,42-44}

The aim of this study was to determine the contributions of pharmacist prescribing to improving access to primary care. The specific objectives were to: 1) determine the extent of self-reported pharmacist prescribing in Nova Scotia, Canada, 2) examine Nova Scotia pharmacists' perceptions of their prescribing role using the TDFv2, 3) identify barriers and facilitators to pharmacist prescribing in Nova Scotia using the TDFv2, and 4) determine the relationship between factors that may influence pharmacist prescribing (by TDFv2 domain) and self-reported prescribing activity.

2. Methods

2.1. Design

The study used a mixed methods triangulation design wherein quantitative and qualitative data were collected simultaneously using a cross-sectional self-administered electronic survey of pharmacists.^{48,49} In this design, qualitative data was used to validate quantitative results at the interpretation stage of the study.

2.2. Setting

Nova Scotia is one of 10 provinces and 3 territories in Canada. At the time of the study, the population of the province was estimated to be just over 980,000 people⁵⁰ with approximately 1100 licensed pharmacists practicing in community pharmacy settings.⁵¹ Pharmacists' scope of practice in Nova Scotia expanded in 2011 to include prescribing for minor ailments, with additional authority added in 2019 to assess and prescribe for shingles, uncomplicated cystitis (bladder infections), and contraception management, as well as prescription renewals for up to 180 days (see Box 1 for the full list of prescribing categories).⁵² The number of Nova Scotians who reported not having a regular family practice provider (family doctor or nurse practitioner) was over 45,000 (4.9%)⁵³ at the time of the survey (July 2020), and has since increased to almost 95,000 as of June 2022 (over 9.5% of the population).⁵⁴

Pharmaceutical services provided in Nova Scotia community pharmacies, such as dispensed prescriptions and medication reviews, are funded through government insurance (mainly for those ≥ 65 years of age and families with low household incomes), private insurance, and individuals themselves.⁵⁸ Certain prescribing services, including renewals and prescribing for specific conditions (e.g., contraception

Table 1

Brief description of the 14 domains of the Theoretical Domains Framework version 2, adapted from Cane et al.^{46,47}

Domain	Brief Description
<i>Knowledge</i>	Awareness of something
<i>Skills</i>	Ability or proficiency attained through practice
<i>Social/Professional Role and Identity</i>	Behaviours or qualities of individuals in a work setting
<i>Beliefs about Capabilities</i>	Acceptance of ability, talent or facility that a person can act
<i>Optimism</i>	Confidence that things will happen for the best
<i>Beliefs about Consequences</i>	Acceptance of truth of outcomes of a behaviour
<i>Reinforcement</i>	Increase response through relation between response and stimulus
<i>Intentions</i>	A conscious decision or resolve in a certain way
<i>Goals</i>	Mental representation of end state
<i>Memory, Attention, and Decision Processes</i>	Ability to retain information and choose between alternatives
<i>Environmental Context and Resources</i>	Aspects of a person, situation, or environment that affects skill development, ability, competence
<i>Social Influences</i>	Interpersonal processes that cause individuals to change
<i>Emotion</i>	Reaction pattern of experiential, behavioural or psychological elements
<i>Behavioural Regulation</i>	Anything aimed at changing actions

management, shingles, uncomplicated cystitis) have recently been incorporated into provincial government funding coverage allowing all residents of Nova Scotia with a health card to receive those services as a publicly funded benefit.^{20,55,56} However, a number of pharmacist prescribing services are not covered and are paid for by individuals through out-of-pocket payment or as part of the health spending account of their private insurance plan. An exemption to the Controlled Drugs and Substances Act was also issued by Health Canada in March 2020, authorizing pharmacists to prescribe renewals for narcotics and other controlled and targeted drugs when appropriate.⁵⁷ Recent changes in provincial government reimbursement policy for pharmacist prescribing and Health Canada legislation led to increased access to pharmacy services for patients who may have had limited access in the past.

2.3. Questionnaire

The questionnaire (see Appendix) was adapted from a previously validated version (original questionnaire is available with the original publication) that used the TDFv2¹⁰ to study pharmacist prescribing.⁹ The questionnaire was revised to reflect advances in TDFv2 instrument development identified in the literature, changes to prescribing standards and practice, and assessments of face validity conducted by the research team.^{42,58–60} In addition, the original questionnaire was modified to include questions related to prescribing during the COVID-19 pandemic. The updated questionnaire consisted of sections addressing the following five categories, which were measured as described below.

- 1) Pharmacists' self-reported prescribing activities and frequency before and during the COVID-19 pandemic (defined as before March 2020 and since March 2020, respectively). Participants were asked to indicate on a 7-point Likert scale, "to the best of their recollection in a typical month", how often they prescribed for each indicated activity. The response anchors were: *Never and don't plan to, Never but would if opportunity arose, Less than once per month, 1 to 3 times per month, 4 to 14 times per month, 15 to 29 times per month, 30 or more times per month.*
- 2) Pharmacists' perceptions of their prescribing role within the healthcare system using the TDFv2, with each domain assessed through a series of questions. The number of questions per domain follows in brackets: *Knowledge (2), Skills (9), Social/Professional Role and Identity (3), Beliefs about Capabilities (2), Optimism (2), Beliefs about Consequences (13), Reinforcement (4), Intentions (9), Goals (2), Memory, Attention and Decision Processes (3), Environmental Context and Resources (9), Social Influences (4), Emotion (5), Behavioral*

Regulation (5). These questions were measured using a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree.

- 3) Pharmacists' perceptions of the relative importance of a list of barriers and facilitators to prescribing using the TDFv2. Participants were asked to rank the five listed items from highest to lowest importance and were also given the option of adding an additional factor.
- 4) Demographic information, including gender, age, education, and employment information such as pharmacy location identified only by the first three digits of the pharmacies' postal code, which only identifies rural or urban.
- 5) Open-ended questions that allowed participants to provide additional comments, particularly related to barriers to prescribing.

2.4. Participants and recruitment

An anonymous survey of Nova Scotia community pharmacists was conducted using the online survey software Opinio (<https://www.objecplanet.com/opinio/>). An email containing a link to the questionnaire was distributed on July 7, 2020, by the Nova Scotia College of Pharmacists (NSCP) to all pharmacists licensed to practice direct patient care (those who have certified that they have practiced sufficient direct patient care in pharmacy in the two preceding years to maintain competence) in the community setting in Nova Scotia (N = 1338). Three weekly email reminders with links to the questionnaire were distributed by the Pharmacy Association of Nova Scotia (PANS) through their weekly email to pharmacist members. An additional reminder email was sent by the NSCP at the end of July. All email messages were approved by the research ethics board and included the logo of the organization sending it, as well as the name and contact information of the lead researcher. The questionnaire link remained open until October 1, 2020. Prior to gaining access to the questionnaire, participants had to complete two screening questions to confirm that they had a direct patient care license and had worked in a community pharmacy in the last 12 months. Participants were then redirected to a consent form to complete prior to entering the questionnaire.

3. Ethics

Ethics approval was received from the Dalhousie Health Sciences Research Ethics Board, REB # 2020–5083 on April 7, 2020, with renewals approved annually.

Box 1

Pharmacist Prescribing Categories in Nova Scotia.⁴⁵

1. Approved Conditions
 - o Prescribing for minor and common ailments (e.g., allergic rhinitis), preventative medicines (e.g., vaccines, contraception management), a diagnosis provided by a primary care provider or specialist, or a diagnosis supported by a protocol (e.g., shingles).
2. Prescribing in an Emergency
 - o Prescribing when the patient has an immediate, urgent, and high-risk medical requirement for the drug to avoid significant deterioration to their health.
3. Prescribing Renewals
 - o Prescribing to provide a patient with an additional supply of a previously prescribed medication.
4. Prescribing Adaptations
 - o Prescribing to modify the dose, formulation, regimen and/or duration of therapy.
5. Prescribing Therapeutic Substitutions
 - o Prescribing to substitute with a therapeutically equivalent medication.
6. Prescribing Schedule II, III, and Unscheduled Drugs
 - o Prescribing any drugs that fall in Schedules II or III or that are unscheduled

3.1. Data analysis

3.1.1. Quantitative analysis

Data was exported from the online survey software and subsequently coded and analyzed using SPSS V26.0.⁵¹ Likert scale (5-point) responses of questions using the TDFv2 were converted to a numerical scale (-2 to 2, where -2 = strongly disagree, -1 = disagree, 0 = uncertain, +1 = agree and +2 = strongly agree) for analysis, and then collapsed to create three categories (negative = disagree and strongly disagree, neutral = uncertain, positive = agree and strongly agree). Reverse axis questions (e.g., where a response of strongly agree (normally +2) represents a negative opinion, for example, "I fear taking legal liability when I prescribe") were reverse coded to transform all positive opinions to be represented on the negative end of the numerical scale.

Definitions of 'high' and 'low' frequency prescribers were developed based on how often pharmacists reported prescribing across multiple categories (e.g., in an emergency, renewal, adaptation). In previous research, prescribing frequency was defined as 'active' when prescribing one of the prescribing categories at least once a week.⁹ However, given that prescribing frequency changed significantly since the time of this previous publication, a new definition was developed for the current study. 'Low' frequency prescribers were defined as those who reported prescribing anywhere between 0 and 14 times per month while 'high' frequency prescribers were those who reported prescribing 15 or more times per month. For high frequency prescribers, this equates to performing one prescribing assessment about once a day (working four days a week). This created both an understandable definition and divided the participants well across groups – both qualities of the original definition but updated to better represent the current data after exploration of different cutoffs.

Demographic information and questionnaire responses were summarized using descriptive statistics. Demographic data from survey participants was compared to the Canadian Institute for Health Information (CIHI) and Nova Scotia College of Pharmacists (NSCP) data on pharmacist demographics.⁵¹ Any cell counts less than five were rounded up to five for presentation purposes. Internal consistency of responses on each of the TDFv2 domains was analyzed using Cronbach's alpha. Values of Cronbach's alpha greater than 0.7 were considered acceptable for the purpose of this research. Values greater than 0.8 indicated good reliability, and values greater than 0.9 indicated excellent reliability.^{62,63} Differences in prescribing pre-COVID-19 versus during COVID-19 were compared using Wilcoxon signed-rank tests, McNemar's tests, paired t-tests, and Chi-square tests, as appropriate. Simple logistic regression was carried out to examine the relationship between prescribing behaviour using the TDFv2 domains and prescribing frequency of low versus high frequency prescribers.

3.1.2. Qualitative analysis

Responses to the three open-ended questions were initially analyzed using deductive content analysis and the 14 domains of the TDFv2 as the guiding coding framework.⁶⁴ Four research team members (AB, JI, JK, NKK) comprised the qualitative analysis team.

The qualitative analysis team prepared an agreed upon codebook prior to coding. Two team members (AB, NKK) independently coded the three open-ended questions, which were then reviewed by the two other team members. Discrepancies were resolved by group consensus. Inductive-content analysis was then completed by one team member (JK) to identify themes within each of the domains using NVivo 12 qualitative software to organize and classify the data.⁶⁵ The full qualitative analysis team reviewed and agreed upon the themes. The analysis was then presented to the full research team for discussion and final interpretation.

4. Results

There were 321 unique accesses to the electronic questionnaire, of

which all partial (n = 34) and completed (n = 156) responses were included for analysis (n = 190) (see Table 2). This sample represents 14.2% of the direct patient care community pharmacist population in Nova Scotia per the Nova Scotia College of Pharmacists (N = 1338). Of the 190 respondents, 37 completed the demographics section. Of those who responded to the demographic questions, more identified as male, as owner/managers, and worked at chain stores (fewer banner stores – independently-owned pharmacies under an overarching brand to aid in marketing, etc.) compared to the proportion in the NS pharmacist population per the Canadian Institute for Health Information (CIHI) definition of community pharmacist.⁵¹ However, the age of respondents was similar to the demographic information available for this population. Participants were able to report the first three digits of the postal code in which their pharmacy was located, which indicated that of those who responded 37% (n = 27) worked in rural areas of the province. The total sample size for each question differs slightly based on the number of responses received; thus, the sample size is reported for each analysis that follows.

4.1. Prescribing patterns

More than 98% of pharmacists reported prescribing at least once per month in any of the approved prescribing categories both pre-COVID-19 and during COVID-19. Pre-COVID-19, there was a similar distribution of low and high frequency prescribers (n = 96 and 94 for each group, respectively). The proportion of low frequency prescribers decreased from 50.5% pre-COVID-19 to 20.1% during COVID-19 whereas the proportion of high-frequency prescribers increased from 49.5% pre-COVID-19 to 79.9% during COVID-19 (see Fig. 1). There was a significant change in the proportion of pharmacists identified as low and high prescribers pre-versus during-COVID (p < 0.001).

Pharmacists were asked to self-report the percentage of services they provided that were covered by government insurance (e.g., provincial

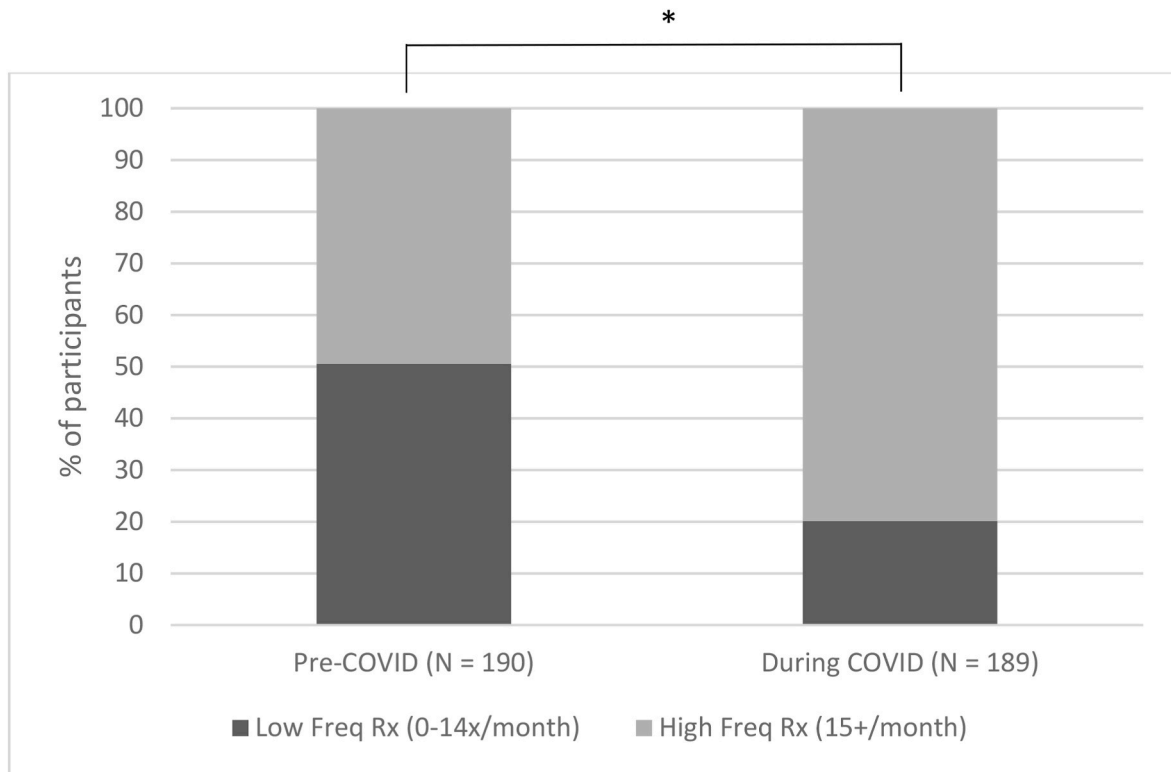
Table 2

Comparison of respondent demographics to Canadian Institute for Health Information (CIHI) human resources data for pharmacists in Nova Scotia in 2020.⁵¹

	Study N (%) ^a	Nova Scotia Community Pharmacist Population as per CIHI/NSCP ^b
# Responses completed	190	1003 (75.6)
# Demographics responses completed	37	n/a
Gender, female	19 (51.4)	722 (72.0)
Primary Position, Staff pharmacist	13 (35.1)	603 (60.1)
Owner/Manager	19 (51.4)	331 (33.0)
Other	5 (13.5)	69 (6.9)
Pharmacy Setting ^b , Chain/ Franchise	16 (43.3)	76 (24.5)
Banner	11 (29.7)	133 (42.9)
Other (Independent, Food/ Mass/Dept)	10 (27.0)	101 (32.6)
	Mean ±SD	Median
Age, years	45.7 ± 10.8	40–44
Years Practicing	20.2 ± 11.7	n/a

^a Percentages are calculated for the number of respondents who provided demographic information (N = 37) to facilitate comparison to CIHI comparative demographic data.

^b Pharmacy setting comparative data attained from NSCP, remainder of comparative data attained from CIHI. Study data is from respondents who held direct patient care licenses, while CIHI data is based on all community pharmacists in Nova Scotia regardless of license type.



*p<0.001, Related-samples McNemar Test

Fig. 1. Distribution of low and high frequency pharmacist prescribers in Nova Scotia pre- and during-COVID-19. *p < 0.001, Related-samples McNemar Test.

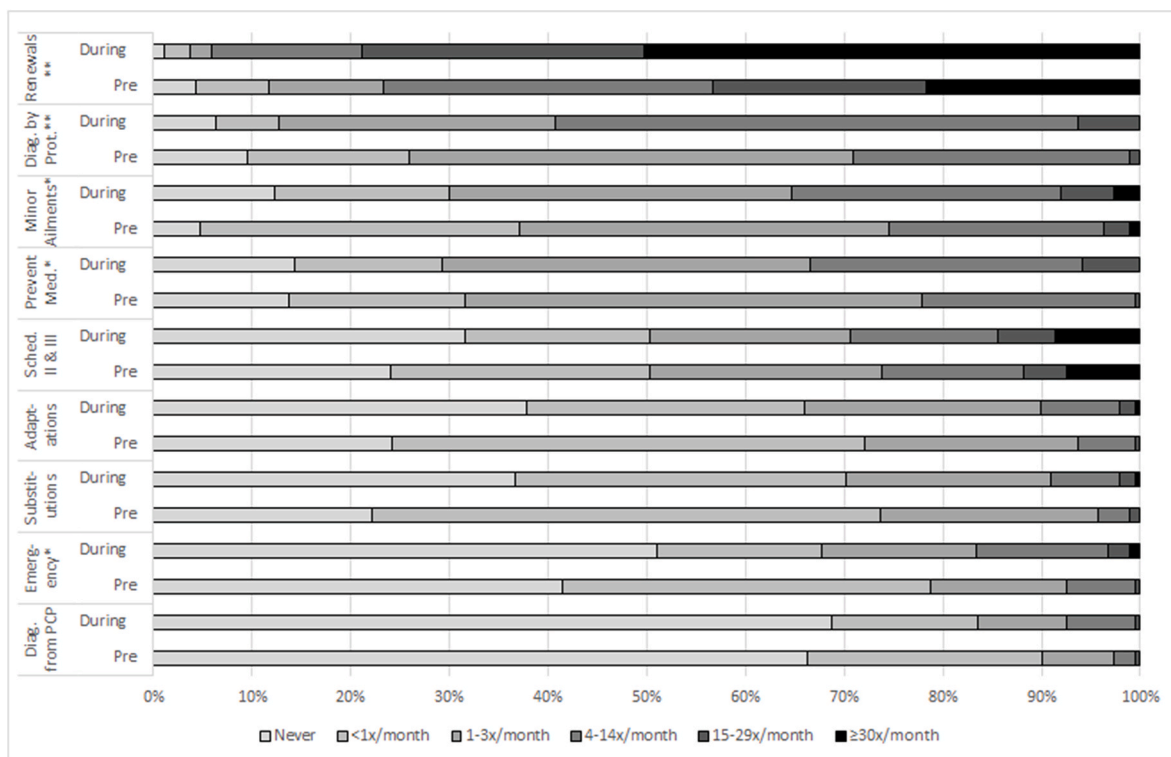


Fig. 2. Frequency of self-reported pharmacist prescribing in Nova Scotia (per month) pre- and during COVID-19 across prescribing categories. Notes. Diagnosis by protocol (Diag. by Prot.); Minor and Common Ailments (Minor Ailments); Preventative Medicine (Prevent. Med); Schedule II & III drugs (Sched. II & III); Diagnosis from Primary Care Provider (Diagnosis from PCP). Wilcoxon Signed-Rank Test, pre-vs. during-COVID-19.*p < 0.05, **p < 0.001.

Pharmacare, government plans, etc.), private insurance, or none, which were compared via paired samples t-tests. Pharmacists reported a significant increase in prescription payment by government insurance from 27.8% pre-COVID compared to 79.6% during COVID ($p < 0.01$).

Pharmacists reported the frequency of their prescribing activity both pre- ($N = 189$) and during-COVID-19 ($N = 188$) across various prescribing categories (Fig. 2). Prescription renewals were the most reported prescribing activity, followed by diagnoses supported by protocol, and minor and common ailments. There was a significant increase during COVID-19 compared to pre-COVID-19 for prescribing for minor and common ailments ($p = 0.03$), preventative medicine ($p < 0.01$), diagnosis supported by protocol ($p < 0.01$), and renewals ($p < 0.01$). However, there was a decrease in the frequency of prescribing for emergencies during-COVID-19 compared to pre-COVID-19 ($p < 0.01$).

Pharmacists were also asked to report which conditions they prescribed for pre- and during-COVID-19. The top 10 conditions prescribed for in both the pre-COVID-19 time period and the during COVID-19 time period are presented in Table 3. The rank order of the number of pharmacists who reported prescribing for each indication was compared between time periods. The conditions most commonly prescribed for pre-COVID-19 were herpes simplex virus (83% of pharmacists prescribed for this indication), followed by uncomplicated cystitis (81%) and travel vaccines (78%). The rank order of these items changed during COVID-19, with uncomplicated cystitis prescribed for by the largest percentage of pharmacists (92%), followed by contraceptive management (73%), and herpes simplex (64%). There was a reduction in prescribing for travel vaccines during-COVID-19 compared to pre-COVID-19.

4.2. Perceptions about prescribing role and facilitators and barriers

The responses to questionnaire items pertaining to the Theoretical Domains Framework, version 2 (TDFv2) were categorized as either positive (i.e., agree or strongly agree on a 5-point Likert scale), neutral,

Table 3

Top 10 conditions prescribed for by Nova Scotia Ppharmacist respondents pre-compared to during COVID-19.

Conditions Approved by Council	PRE-COVID-19 ^a N = 182		DURING-COVID-19 ^b N = 178		p-value ^c
	Rank	N (%)	Rank	N (%)	
Herpes simplex (cold sores)	1	151 (83.0)	3	114 (64.0)	<0.001
Uncomplicated cystitis (bladder infections)	2	147 (80.8)	1	164 (92.1)	0.005
Travel Vaccines	3	142 (78.0)	19	40 (22.5)	<0.001
Oral fungal infection (thrush)	4	120 (65.9)	4	87 (48.9)	<0.001
Allergic rhinitis	5	116 (63.7)	7	74 (41.6)	<0.001
Smoking cessation	6	113 (62.1)	8	66 (37.1)	<0.001
Contraceptive management	7	107 (58.8)	2	130 (73.0)	<0.001
Gastroesophageal reflux disease	8	103 (56.6)	5	81 (45.5)	0.001
Non-Travel Vaccines	9	102 (56.0)	9	65 (36.5)	<0.001
Mild acne	10	79 (43.4)	12	47 (26.4)	<0.001
Herpes zoster treatment	12	70 (38.5)	6	79 (44.4)	Ns
Dyspepsia	13	68 (37.4)	10	60 (33.7)	Ns

^a Pre-COVID-19 was any time prior to March 2020.

^b During COVID-19 was any time since March 2020.

^c McNemar test.

or negative (i.e., disagree or strongly disagree on a 5-point Likert scale) and summed by TDFv2 domain. Given the variable number of items per TDFv2 domain, the number of responses is higher for domains with more questions. Given this, the percentages of responses (which is equivalent to the percentage of respondents) within each domain were calculated to permit comparability between domains. Results were sorted by positivity of responses (Table 4), with more positive responses indicating a facilitator and more negative responses indicating a barrier to pharmacist prescribing. Eighty-four percent (84%) of respondents indicated positive responses (i.e., agree or strongly agree on a 5-point Likert scale) in the *Knowledge* domain, 83% in *Reinforcement*, 82% in *Social/Professional Role and Identity*, and 76% in *Memory, Attention and Decision Processes*. At the other end of the spectrum, 35% of respondents were positive about *Behavioral Regulation* and 43% were positive about *Goals*.

4.3. Prescribing behaviour

A series of simple logistic regressions were used to understand the relationship between individual TDFv2 domains (scored on a 5-point Likert scale) and the frequency of prescribing during-COVID-19 (low versus high frequency prescribers), the most current indicator of

Table 4

Perceptions of facilitators and barriers to prescribing among Nova Scotia pharmacist respondents by most positive to least positive responses as grouped by the domains of the TDFv2^{b, 46} and domain reliability.

TDF Domain (N = 190 participants)	Negative	Neutral	Positive	Missing	Cronbach's alpha ^a
	Number of Responses (%)				
<i>Knowledge</i> ^a	6 (1.6)	27 (7.1)	321 (84.5)	26 (6.8)	-
<i>Reinforcement</i>	36 (4.7)	41 (5.4)	631 (83.0)	52 (6.8)	0.67
<i>Social/Professional Role and Identity</i>	35 (6.1)	25 (4.4)	468 (82.1)	42 (7.4)	0.90
<i>Memory, Attention and Decision Processes</i>	37 (6.5)	51 (8.9)	431 (75.6)	51 (8.9)	0.66
<i>Skills</i>	92 (5.3)	218 (12.7)	1271 (74.1)	129 (7.5)	0.88
<i>Social Influences</i>	76 (10.0)	59 (7.8)	555 (73.0)	70 (9.2)	0.60
<i>Intentions</i>	78 (4.6)	252 (14.7)	1224 (71.6)	156 (9.1)	0.88
<i>Beliefs about Capabilities</i> ^a	56 (14.7)	54 (14.2)	242 (63.7)	28 (7.4)	-
<i>Emotion</i>	232 (24.4)	136 (14.3)	497 (52.3)	85 (8.9)	0.81
<i>Environmental Context and Resources</i>	475 (27.8)	243 (14.2)	839 (49.0)	153 (9.0)	0.70
<i>Optimism</i> ^a	96 (25.3)	74 (19.5)	182 (47.9)	28 (7.4)	-
<i>Beliefs about Consequences</i>	801 (32.4)	324 (13.1)	1170 (47.4)	175 (7.1)	0.80
<i>Goals</i> ^a	94 (24.7)	85 (22.4)	165 (43.4)	36 (9.5)	-
<i>Behavioural Regulation</i>	248 (26.1)	283 (29.8)	333 (35.0)	86 (9.0)	0.84
TOTAL (N = 13,875 question responses)	2400 (17.3)	1898 (13.7)	8443 (60.9)	1134 (8.2)	-

#Domains contained more than one question and number of questions varied between domains, so totals between domains differ and are greater than 190.

^a Cronbach's alpha not calculated for domains with ≤ 2 questions.

^b Theoretical Domains Framework version 2.⁴⁶

prescribing frequency ascertained from the survey results (Fig. 3). The *Beliefs about Consequences* domain had the largest influence on prescribing activity, where a 1-point increase in the TDFv2 score (e.g., an increase from agree [+1] to strongly agree [+2]) is related to higher odds (OR = 3.13, 95% CI 1.41–6.97, $p < 0.01$) of being classified as a high frequency prescriber ($p < 0.01$). Other domains that had a significant influence on prescribing activity (in descending order) included *Social Influences* (OR = 2.85, 95% CI 1.42–5.70, $p < 0.01$); *Intentions* (OR = 2.45, 95% CI 1.24–4.84, $p = 0.01$); *Reinforcement* (OR = 2.38, 95% CI 1.21–4.71, $p = 0.01$); *Skills* (OR = 2.32, 95% CI 1.19–4.49, $p = 0.01$); *Emotional* (OR = 2.16, 95% CI 1.34–3.48, $p < 0.01$); *Beliefs about Capabilities* (OR = 2.10, 95% CI 1.32–3.33, $p < 0.01$); *Social/Professional Role and Identity* (OR = 2.00, 95% CI 1.27–3.14, $p < 0.01$); and *Environmental Context and Resources* (OR = 1.98, 95% CI 1.09–3.60, $p = 0.02$).

4.4. Qualitative results

Of the 190 pharmacists who completed the survey, 100 of these respondents (53%) completed at least one of the three open-ended questions. All responses were related to barriers to prescribing. Table 5 outlines the total number of codes identified by domain and representative quotes.

Environmental Context and Resources, *Reinforcement*, and *Social Influences* were the most commonly coded domains. Barriers to prescribing reported by participants included 12 of the 14 domains of the TDFv2. Commonly identified barriers and associated domains of the TDFv2 identified included a lack of reimbursement for pharmacists ([negative] *Reinforcement*), patient cost for prescriptions (*Social Influences*), lack of staff (*Environmental Context and Resources*), challenges to integrate prescribing in an already overloaded workflow (*Environmental Context and Resources*), unclear rules, processes and requirements (*Behavioral Regulation*), negative and positive beliefs about capability as a pharmacist (*Beliefs about Capabilities*), and difficulty recalling the information required for certain services (*Memory, Attention, Decision Processes*).

5. Discussion

This study found that self-reported prescribing by pharmacists increased compared to an earlier survey conducted in the province in 2014 and that there was also an increase in prescribing since the start of the COVID-19 pandemic. Certain categories of prescribing also increased over the course of the pandemic, including prescription renewals, diagnoses supported by protocol, and minor and common ailments. Facilitators related to *Beliefs about Consequences* and *Social Influences* had the largest positive impact on prescribing activity, while the *Goals* and *Optimism* domains had the least impact on prescribing activity. Pharmacists described ongoing barriers regarding lack of reimbursement for pharmacists, and lack of staff and related workflow challenges through open-ended qualitatively coded TDFv2 responses.

Most pharmacist respondents (98%) reported prescribing at least once per month in any of the approved prescribing categories, an increase from a previous study completed in 2014 that found 77% of pharmacists reported prescribing at least once ever in any of the approved categories.⁹ In the current study, the definition of frequency was modified to better differentiate between pharmacists based on prescribing activity level. Given this, we found that over 79% of pharmacists were prescribing more than 15 times a month during the COVID-19 pandemic, which is markedly more than the 47% of pharmacists who were prescribing at least 4 times a month in 2014. Self-reported prescribing was further increased during the COVID-19 pandemic (pre-COVID-19 vs. during COVID-19).⁹ Prior to the pandemic, pharmacists were roughly evenly divided between low (0-14x/month) and high (15x/month) frequency prescribing groups. However, during the COVID-19 pandemic the percentage of high frequency prescribers increased to almost 80% of surveyed pharmacists. Specifically, there was an increase in prescribing for minor and common ailments, preventative medicine, diagnosis supported by protocol, and renewals. This finding is similar to research which found an increased number of patients seeking pharmacists' care during COVID-19, due to both a reduction of in-person services provided by other community-based healthcare providers and patient avoidance of other healthcare settings due to fear of COVID-19 infection.⁶⁶ While many primary care providers in Nova Scotia shifted to virtual delivery of care,

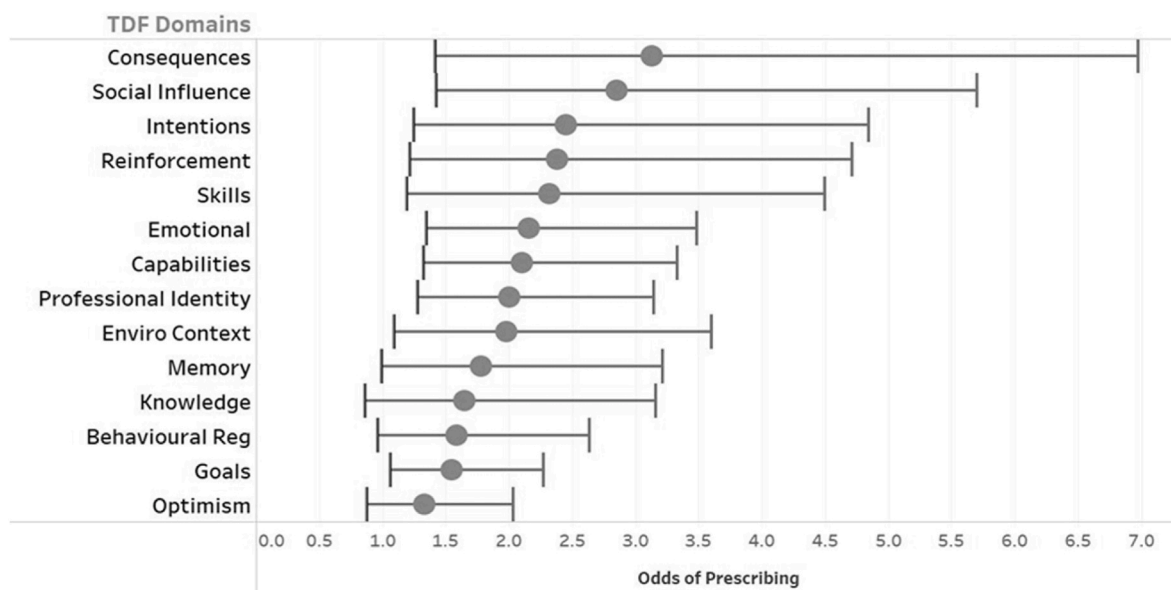


Fig. 3. Predictors* of Nova Scotia pharmacist prescribing activity based on positivity of response by Theoretical Domains Framework version 2 domain*⁴⁶

*Simple Logistic Regression analyses.

*TDFv2 Abbreviations used in the Figure: Consequences = Beliefs about Consequences; Capabilities = Beliefs about Capabilities; Professional Identity = Social/Professional Role and Identity; Enviro Context = Environmental Context and Resources; Memory = Memory, Attention and Decision Processes; Behavioural Reg = Behavioural Regulation.

Table 5

Total number of TDFv2³ codes by greatest to least and representative quotes for open-ended responses about barriers to prescribing by Nova Scotia pharmacist respondents.

TDFv2 Domain	Total # of Times a Statement was Coded within the TDFv2 Domain	Representative Quotes
Environmental Context and Resources	59	"... while we may be the most accessible health care professionals, we are probably LEAST on the amount of 1-to-1 time I can afford my patients due to time constraints imposed by staffing (and the staffing IS more or less appropriate from a business perspective for the amount of money being made)"
Reinforcement	39	"lack of pharmacist reimbursement – that is the greatest barrier"
Social Influences	35	"... the media was blasted with ads that we could now provide these services however many patients did not meet the criteria or they do not want to make appointments and want the service NOW ... expect a pharmacist to be available at their beck and call."
Behavioral Regulation	20	"Crystal clear training protocols, educational materials, CE [continuing education] events, etc. should have been put in place ... so that pharmacists were all on the same page instead of stumbling around in the dark with obstacles put in place by our governing bodies."
Emotion	18	"The reality is that as the 'most accessible health care' we are

Table 5 (continued)

TDFv2 Domain	Total # of Times a Statement was Coded within the TDFv2 Domain	Representative Quotes
		stressed and overworked."
Memory, Attention, Decision Processes	15	"I would also be more comfortable if every prescribing category had an algorithm so that I could double check I'm not missing anything/documentation paperwork to go along with it so I don't forget anything."
Beliefs about Consequences	14	"I haven't felt comfortable with prescribing in certain situations because I couldn't access a patient's lab values."
Beliefs about Capabilities	11	"my comfort is growing, but it feels very inconsistent at times."
Social/Professional Role and Identity	10	"... pharmacists should be required to take additional training to provide these services ... I would have no problem going back to school to take additional courses to update my skills and become a prescribing pharmacist."
Knowledge	7	"It is difficult for pharmacists to offer prescribing services when we have no formal training on how to do an assessment like a physician ... there is no consistency from pharmacy to pharmacy. We were given very little notice ... to do additional prescribing services (contraceptives, UTI, Shingles) and were never offered any additional training or help to take on these roles. If

(continued on next page)

Table 5 (continued)

TDFv2 Domain	Total # of Times a Statement was Coded within the TDFv2 Domain	Representative Quotes
Optimism	5	I want training I have to try to find courses to take on my days off and pay for it out of pocket." " ... it has been an uphill climb ... I am feeling more comfortable ... but it hasn't been a simple process."
Skills	3	"We need more clinical experience. Would have been good to do clinical rotation ... in clinic situation - role playing is not real life ... "
Intentions	0	N/A
Goals	0	N/A

^a Theoretical Domains Framework version 2.⁴⁶

community pharmacies remained open for in-person visits, likely contributing to an increase in public demand for care in these settings. In addition, provincial government funding policy changes in both January and March 2020, which included coverage of pharmacist prescribing for uncomplicated cystitis, shingles, contraception management, and renewals, ultimately increased public access to these services. However, since those funding policy changes occurred just prior to the pandemic, it is difficult to attribute the impact of COVID-19-related healthcare access challenges directly to the increased prescribing services provided by pharmacists.

Pharmacists were overall very positive in their perceptions of *Knowledge, Reinforcement, Social/Professional Role and Identity, Memory, Attention and Decision Processes*, as well as *Skills*, as it related to their prescribing behaviours. Similarly, in the qualitative findings, very few participants mentioned *Knowledge* or *Skills* as a barrier to prescribing, suggesting that pharmacists perceive themselves to be competent providers of prescribing activities. Compared with similar data collected in 2014, these findings suggest an improvement in the *Skills* domain over time.⁹ Given that pharmacist prescribing has been enabled in Nova Scotia since 2011, many barriers related to *Knowledge* and *Skills* may have been adequately addressed through an increased integration of prescribing education and training within continuing professional development programs for pharmacists (e.g., programs were offered on contraceptive management, shingles, etc.) and the pharmacy undergraduate curriculum. Likewise, it may be encouraging to stakeholders to see that findings indicate a positive perception of prescribing being part of a pharmacist's *Social/Professional Role and Identity*. Again, this may be due, in part, to prescribing being a longstanding role of pharmacists in Nova Scotia. However, the literature suggests there is still significant work to be done to fully engrain the professional identity of a 'clinician' within the pharmacy profession.⁶⁷⁻⁶⁹ This was found to be the case in a recent study also utilizing the TDFv2 that explored adoption of full scope of pharmacy practice, indicating that not all pharmacists see prescribing as part of their core professional role.^{40,68}

A high percentage of respondents indicated a positive perception of *Reinforcement* from the TDFv2 Likert scale questions; however, this was

the most commonly referenced barrier in the open-ended comments. Responses typically reflected a perception of pharmacists not being remunerated appropriately for the time and effort required to engage in prescribing services, although it was not clear whether it was respondents who felt they should be paid more for the service or whether the pharmacy should be paid more for the pharmacist-provided service. This finding may be surprising given that many pharmacist prescribing services are now paid for by the government, removing a frequently cited barrier in the literature; however, not all services are funded and the remuneration of individual pharmacists is not directly tied to this new government reimbursement, which may account for this barrier. In addition, some argue that prescribing is likely still viewed by some pharmacists as an "expanded scope" service and something that pharmacists should be remunerated for above and beyond their traditional dispensing roles.⁴⁴ This illuminates an important distinction between pharmacy reimbursement and individual remuneration for providers.

The highest percentage of negative participant responses were within the *Environmental Context and Resources, Beliefs about Consequences*, and *Behavioral Regulation* domains. *Environmental Context and Resources* was negatively perceived in both the quantitative and qualitative findings, as well as in the previous study completed in 2014.⁴⁰ Workplace environment issues and workload challenges are commonly referenced barriers to the provision of quality care and prescribing services in the community pharmacy setting.^{40,44,70} Challenges related to inadequate time and staffing were highlighted by respondents, indicating that existing time pressures and workloads to complete dispensing activities may not leave adequate time for them to engage in prescribing. However, *Environmental Context and Resources*, while found to be a positive predictor for prescribing, was not as significant a predictor compared to other domains of the TDFv2. This may indicate that although a barrier, practitioners have been able to overcome environmental challenges in the workplace. As the only externally located domain within the TDFv2, this could potentially be seen as a barrier for those who do not have adequate internal motivation, or a strong professional identity tied to prescribing. This domain may become a larger area of concern in the future, as risk of healthcare professional burnout appears to be increasing with the COVID-19 pandemic.⁷¹⁻⁷³

The TDFv2 domain most predictive of increased prescribing frequency was *Beliefs about Consequences*, which had fewer barriers identified in the qualitative analysis and was less predictive of prescribing in 2014 compared to 2020.⁴⁰ Although the reason for this is unknown, we expect it may be related to the expanded provincial government coverage of additional prescribing activities, with conditions (e.g., uncomplicated cystitis, shingles, contraception management) that have more immediate beneficial impacts ("consequences"). Pharmacists may feel they are better meeting patient needs in relation to improving access and outcomes of care. For example, pharmacists may have been unsure how patients would otherwise obtain an assessment and prescribing services during the pandemic. It is also possible that more experience with prescribing has increased self-efficacy for prescribing and minimized the perceptions of negative consequences. Although *Social Influences* was the second highest domain for predicting increased prescribing frequency, it was one of the most commonly coded barriers to prescribing. Many respondents indicated that they had issues with asking patients to pay for unfunded services. Additionally, the general lack of public knowledge around prescribing assessment services available, as well as the eligibility for and limitations to those services, further contributed to barriers perceived. Some respondents indicated that patients were not willing to wait or book appointments and expected pharmacists to always be available "at their beck and call". An additional barrier noted was pressure from employers to assess for prescribing at greater frequency than possible and a perception of feeling pressured to provide "quantity over quality".

6. Limitations

Our research has several limitations related to potential response bias. Few respondents (37 of 190) completed the demographics section of the questionnaire. This made it difficult to determine how well the sample represents the population of pharmacists in Nova Scotia. The reason for such low response rate to demographic questions remains unclear, though technical issues were ruled out as a potential cause. Almost all respondents were reported to be active prescribers, with the majority (almost 80%) being classified as high frequency prescribers during-COVID-19. Therefore, it is possible that our sample may have a nonresponse bias with pharmacists who experience disproportionately higher individual and system level barriers to prescribing compared to the rest of the population. Another potential limitation is social desirability bias. Respondents may have been concerned about who would gain access to the results such as the provincial regulatory body who was an acting partner on the project. Despite the potential for social desirability bias, many barriers and concerns around prescribing were indicated by respondents, including the large number (100/190) shared in the optional open-ended questions. In addition, the psychometric properties of the questionnaire have not been studied; however, it was adapted from a previously validated tool, and reliability was reported and found to be acceptable. Another limitation is the timing of the survey, which took place early in the COVID-19 pandemic, at a time when additional services were being funded and before pharmacists began administering COVID-19 vaccines in the spring of 2021. It is possible that prescribing may have increased further with the additional government funded services or may have decreased due to other workload constraints related to COVID-19 vaccinations. It is an area for further study. Finally, the findings may not be generalizable to other jurisdictions where pharmacists have different scopes of practice, or healthcare systems differ in how easily accessible primary care is through family practice providers; however, the findings from this study may provide insight as to what prescribing activity looks like when the environment is similar.

7. Conclusions

This study found that self-reported prescribing activity by direct patient care community pharmacists in Nova Scotia increased since a 2014 study and from pre-COVID-19 to during COVID-19.⁹ The highest frequency of prescribing was noted for services that were funded by the government (e.g., prescription renewals). Future research and policy work to enhance community pharmacist prescribing should include a focus on supporting the top facilitators (e.g., *Knowledge and Reinforcement*) and reducing the top barriers (e.g., *Goals and Behavioural Regulation*) to prescribing as identified using the TDFv2. Using the TDFv2 enabled the identification of facilitators and barriers using a behaviour change framework that guides theory-based intervention design and supports implementation by policymakers and other stakeholders. Additional work should also explore pharmacist prescribing from the perspective of the patient to determine impact on patient care and outcomes, including whether patient needs and expectations are being met, and appropriateness and cost-effectiveness of the care provided.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.sapharm.2022.08.014>.

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