Prevalence and predictors of naturopathic practitioners’ self-reported practice behaviours: results of an international survey

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A B S T R A C T
Background: The naturopath workforce spans over 108 countries and is estimated to provide care to over 5.5 million patients globally per month. Despite such demand, naturopathic practitioners are not well integrated into mainstream health systems, in part due to poor knowledge about naturopathy among policy makers and other health professionals. This study aims to describe naturopathic practitioners’ practice behaviours and examine the characteristics that predict the use of naturopathic treatments and practices around the world.

Methods: An international cross-sectional online survey was distributed through World Naturopathic Federation membership organisations and social media accounts. Multivariate reverse stepwise logistic regression was undertaken to examine potential predictors of practice behaviours, adjusting for the influence of demographic and practice characteristics.

Results: A response rate of 78.4% was achieved (n=478). Lifestyle modifications, dietary changes, nutritional products and herbal medicines were most consistently prescribed Always or Most of the time. At least one-half of participants discussed nine of the ten health topics during clinical practice Always or Most of the time. More than one-half (55.1%) of participants practiced in a location with statutory regulation/occupational certification. Compared to participants located in countries with voluntary certification/no regulation, those in countries with statutory registration/occupational licensing had higher odds of prescribing nutritional products (adjusted odds ratio (aOR)=2.5) or IV/injection therapies (aOR=18.4).

Conclusion: The findings of this study provide important insights into contemporary naturopathic practice behaviour, which may help to overcome misconceptions about such practice among other health professionals, policy makers and the community.

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1. Introduction

Naturopathy is a system of traditional and complementary medicine (T&CM) defined by core philosophies and principles and guided by distinct naturopathic theories.1-3 Naturopathic practice is complex and multi-modal and incorporates core naturopathic therapies, modalities and practices including applied nutrition, clinical nutrition, herbal medicine, lifestyle modifications, mind-body medicine techniques, naturopathic physical medicine, hydrotherapy and other therapies based on jurisdictional regulations and regional variation to curriculum.4 The naturopathic workforce spans over 108 countries, and provides care to an estimated 5.5 million patients globally per month.5

The naturopathic workforce treats patients across the lifespan, with naturopathic care largely focusing on disease prevention and non-communicable diseases (NCDs).6 NCDs are the leading cause of death and disability worldwide and are a considerable burden on the global healthcare system.7 The United Nations estimates that NCDs could cost the global economy USD547 trillion by 2030 if the rising prevalence of these conditions is not curtailed.8 The risk of NCDs is strongly associated with modifiable risk factors, such as physical inactivity, sedentariness, obesity, alcohol consumption, poor dietary choices, and adverse environmental exposures. As the global public health community responds to the challenges of NCDs, there is a pressing need to understand how the health workforce can be best employed to modify these
risks in the community. Concurrent to this need, the WHO Traditional Medicine Strategy and the Declaration of Astana highlight the value of appropriate integration of traditional medicine practitioners and practices into dominant health systems. However, such integration is constrained by poor knowledge about naturopathic practitioners and their practices among policy makers and other health professionals.

In response to this knowledge deficit, this study aims to provide the first international description of naturopathic practitioner practice behaviours, as well as the characteristics that predict the use of naturopathic treatments and practices around the world.

2. Methods

2.1. Study design

This study is an online, international, cross-sectional survey.

2.2. Participants and setting

Participants were self-selected naturopathic practitioners who reported being in active clinical practice within the previous 12 months. Participants from any country were included, providing they were able to complete the survey in one of the five available languages (as outlined below). A non-probabilistic sample of 385 participants was sought, based on standard descriptive survey research sampling calculations. As survey reach could not be ascertained, response rate was determined based on the number of participants who responded to the first survey item directly relevant to the analysis divided by the number of participants who accessed the information sheet.

2.3. Recruitment

Recruitment was facilitated by the World Naturopathic Federation (WNF) between 12th September and 20th November 2020. The online survey link was emailed directly to members of the associations that hold full membership with the WNF, as well as through social media accounts (e.g., LinkedIn, Twitter, Facebook) managed by the WNF office and by associations with full membership.

2.4. Instrument

The survey was administered via the Qualtrics online survey platform in English, French, Portuguese, Spanish and German. The questionnaire consisted of 122 core questions and six adaptive questions that repeated up to nine times depending on how many responses were selected for the following item: Which of the following types of information sources do you employ when providing care to patients? Survey items covered seven domains: demographic and practice characteristics (10 items), practice behaviours (21 items), use of knowledge and information sources (4 items), use of, and attitudes towards, specific knowledge and information sources (6 items, adaptively repeated), perceptions about knowledge and information sources (36 items), perceived stakeholder influence of knowledge use (3 items), and barriers to the use of different knowledge types (48 items). This paper examines data from the demographic and practice characteristics, and practice behaviours items only.

2.1.1. Demographic and practice characteristics

Demographic items included participant age, gender, country of practice, country where naturopathic qualifications were obtained, time since naturopathic qualification was obtained, average hours spent in practice per week, average number of patients consulted per week, and clinic practice environment (if shared with other health professionals).

2.1.2. Practice behaviours

Practice behaviours included prescribing patterns (treatments and modalities prescribed or recommended) and topics discussed with patients. Practice behaviour items were presented as five-point Likert scales, with the response options: Always, Most of the time, About half of the time, Sometimes and Never.

2.1.3. Instrument validation, function and translation

The online questionnaire was pilot tested for face validity and functionality by three volunteers reflective of the target population who were not part of the research team. Feedback from the pilot testing resulted in minor amendments to the structure of items and flow of the survey.

Translation of the questionnaire was coordinated by the WNF. The survey invitation email, participant information sheet and questionnaire were initially drafted in English and translated in the other four languages using the Qualtrics automatic translation feature. Native speakers of each language assessed the English and translated documents to cross-check the accuracy of translations and ensure meaning was not lost. The changes recommended by translators were then cross-checked by the research team (AS and LL) using Google Translate. When it was unclear whether changes were applicable, a second translator provided feedback until consensus was achieved.

2.2. Data handling and analysis

Data were exported from the Qualtrics platform into Stata 17 (StataCorp LLC) statistical analysis software. Continuous variables were recoded into categorical variables for analysis (i.e., age, hours spent in practice per week, patients seen per week). Country of practice location was used to categorise responses by World Health Organization world regions, and to generate a variable outlining the regulatory status of naturopathy in that country (i.e., statutory registration, voluntary certification, no regulation), as identified by the WNF health technology assessment for naturopathy. Descriptive statistics were tabulated as frequencies and percentages or means/medians and standard deviations. Country of practice location was compared against available global workforce data for the naturopathic profession, as reported by Lloyd and Hauser, to provide context for understanding generalisability of the data.

Multivariate reverse stepwise logistic regression was undertaken to examine potential predictors of practice behaviours, adjusting for the influence of demographic and practice characteristics. For the purposes of the regression analysis, binary variables were generated for prescribing pattern items and discussion topic items (Always/Most of the time vs. About half the time/Sometimes/Never). Due to small cell sizes, gender required recoding to a binary variable (male/female; the single non-binary response was recoded as missing). Also recoded was the clinic environment variable (combining I am in a hospital setting with Other), and regulatory status variable (combining Voluntary certification with no regulation). Statistical significance was set at p < 0.05. Missing data were excluded from analyses.

2.3. Ethics

This study was granted ethical approval by the Human Research Ethics Committee of the University of Technology Sydney (#ETH20-5273).

3. Results

3.1. Participant and practice characteristics

A response rate of 78.4% was achieved (n=478) (see Fig. 1). Full details of participant and practice characteristics are presented in
Individuals accessing the information sheet (n=609)

Individuals consenting to participate and meeting the inclusion criteria (n=559)

Individuals responding to sufficient items to be retained for any analysis arising from the survey data (n=548)

Individuals responding to items included in this analysis (n=478)

Fig. 1. Study participation and response rate.

Table 1 and Supplementary Table S1. Participants were predominantly female (n=388, 73.2%), and fell within the 35-44 years (n=146, 28.1%) or 45-54 years (n=129, 24.8%). The most reported primary practice locations were in the North American (n=193, 36.8%), Western Pacific (n=122, 23.2%) and European (n=97, 18.5%) regions, as were the locations where naturopathic qualifications were first obtained (n=201, 38.4% and n=124, 23.7%, respectively). This may differ from the geographic spread of the naturopathic profession internationally and further details of practitioner location by country including comparison to the global spread of the profession are provided in Supplementary Table S2. The time since participants completed their qualification ranged across all time periods with the greatest proportion of participants reporting 5 to 10 years (n=122, 25.1%) and the lowest proportion reporting 16 to 20 years (n=70, 14.4%).

Most participants reported working between 11 and 40 practice hours per week (11-20 hrs: 31.3%; 21-30 hrs: 22.1%; 31-40 hrs: 16.8%) and consulting with up to 20 patients per week (up to 10: 40.5%; 11-20: 29.1%). More than one-third of participants worked alone in their clinical practice (n=180, 37.2%), while others commonly shared their clinic environment with both naturopathic practitioners and other health professionals (n=119, 24.6%) or only other health professionals (n=110, 22.7%). More than one-half of participants practiced in a location with statutory regulation/occupational certification (n=289, 55.1%), while voluntary certification/co-regulation was also common (n=228, 43.4%). Practicing in a location with no licensure or regulation at all was rarely reported (n=8, 1.5%).

3.2. Practice behaviours

Table 2 provides details of participant prescribing patterns and topics typically discussed with patients. The most consistently reported prescription/recommendation by participants was lifestyle modifications, with more than one-half prescribing/recommending this Always (n=271, 56.7%) and one-third Most of the time (n=166, 34.7%). A similar pattern of prescribing was reported for dietary changes (Always n=267, 55.9%; Most of the time n=162, 33.9%). Nutritional products were also frequently prescribed (Always n=91, 19.0%; Most of the time n=217, 45.5%), as were herbal medicines (Always n=69, 14.4%; Most of the time n=218, 45.6%). The least frequently prescribed/recommended treatments were injection/intravenous therapies (Never n=259, 54.2%) and homeopathy (Never n=151, 31.7%). Participants reported prescribing an average of four treatment categories Always or Most of the time (n=469; median 4; SD 1.8).

Nine of the ten discussion topics were reported as being discussed with patients during clinical practice Always or Most of the time by at least one-half of participants (Table 2). The exception being environmental health and toxins, which was reported by just under one-half of participants Always (n=108, 22.7%) or Most of the time (n=126, 26.5%). The most frequently discussed topics were diet and nutrition (Always n=327, 68.7%; Most of the time n=102, 21.4%), stress management (Always n=293, 61.6%; Most of the time n=139, 29.2%) and sleep (Always n=290, 60.9%; Most of the time n=132, 27.7%). Participants reported discussing an average of seven health topics with patients Always or Most of the time (n=464; median 7; SD 2.2).

3.3. Predictors of prescribing patterns

Logistic regression was undertaken to examine the predictors of prescribing patterns, with the results presented in Table 3. Compared to male participants, female participants were more likely to prescribe nutritional products (aOR 1.8) Always or Most of the time. Compared to participants in the 18-34 years age group, there was a reduced likelihood of prescribing or recommending manual therapies Always or Most of the time among the 45-54 years age group (aOR 0.4) but not for other ages. Age was also a predictor for hydrotherapy prescription, with reduced odds seen for all age groups (aOR 0.1-0.4) compared with the 18-34 years age bracket. A similar pattern was seen for the prescription/recommendation of other traditional medicine systems (35-44 years: aOR 0.4; 45-54 years: aOR 0.3; 55-64 years: aOR 0.2).

Compared to those in solo clinical practice, participants in clinical practice environments based in hospitals or “other” settings had an increased likelihood of prescribing or recommending manual therapies (aOR 2.3). Participants in clinics shared only with other types of health professionals had a greater likelihood of prescribing or recommending intravenous or injection therapies (aOR 8.7).

Compared to participants in countries with voluntary certification or no regulation, those in countries with statutory registration or occupational licensing had higher odds of prescribing nutritional products (aOR 2.5), substantially higher odds of prescribing intravenous/injection therapies (aOR 18.4), and a reduced likelihood of prescribing energetic medicines (aOR 0.2). No statistically significant predictors were identified for prescriptions of dietary changes, lifestyle modifications, homeopathy, or counselling/psychotherapy.

3.4. Predictors of discussion topics

Table 4 displays the results of the logistic regression regarding predictors of topics discussed with patients. Compared to male participants, female participants had a significantly greater likelihood of discussing sleep (aOR 4.6) or stress (aOR 4.9) with their patients Always or Most of the time. Participants aged 55-64 years (aOR 0.1) and 65 years and over (aOR 0.1) had substantially lower odds of discussing diet and nutrition when compared to those aged
Participants in the 65 years and over age group also had substantially lower odds of discussing sleep (aOR 0.3) when compared to those aged 18-34 years. There was a reduced likelihood of discussing mental health and counselling with patients among participants aged 55-64 years (aOR 0.3) and 65 years and over (aOR 0.2).

Compared to participants who completed their naturopathic qualification less than five years ago, those who had been qualified for 11-15 years had a significantly greater likelihood of discussing relationships and support with their patients (aOR 1.9). Practitioners who shared a clinical practice with naturopathic practitioners and other health professionals were more likely to discuss sleep with their patients (aOR 2.9) than participants in solo practice. When compared to participants practicing in locations with voluntary certification, co-regulation or no regulation, participants who practiced in a jurisdiction with occupational licensing or statutory registration were less likely to discuss environmental health with their patients (aOR 0.6). There were no statistically significant predictors for discussing physical activity or substance use with patients.

4. Discussion

This paper reveals for the first time, important insights into international naturopathic practitioners’ practice behaviours, and the characteristics predicting those behaviours. The findings suggest that naturopathic practitioner prescribing/recommendations, and main topics discussed with patients, are generally consistent.
Table 2
Frequency of naturopathic practitioners’ prescribing behaviours and topic discussion with patients.

| Prescription/ recommendation                  | Always n (%) | Most of the time n (%) | About half the time n (%) | Sometimes n (%) | Never n (%) |
|-----------------------------------------------|--------------|------------------------|---------------------------|-----------------|-------------|
| Lifestyle modification (n=478)                | 271 (56.7)   | 166 (34.7)             | 24 (5.0)                  | 16 (3.4)        | 1 (0.2)     |
| Dietary changes (n=478)                       | 267 (55.9)   | 162 (33.9)             | 21 (4.4)                  | 26 (5.4)        | 2 (0.4)     |
| Nutritional products (n=478)                  | 91 (19.0)    | 217 (45.4)             | 69 (14.4)                 | 72 (15.1)       | 29 (6.1)    |
| Herbal medicines (n=478)                      | 69 (14.4)    | 218 (45.6)             | 109 (22.8)                | 77 (16.1)       | 5 (1.1)     |
| Manual therapies (n=477)                      | 39 (8.2)     | 88 (18.5)              | 84 (17.6)                 | 237 (40.7)      | 29 (6.1)    |
| Counselling and psychotherapy (n=477)         | 34 (7.1)     | 98 (20.6)              | 98 (20.6)                 | 232 (48.6)      | 15 (3.1)    |
| Hydrotherapy (n=478)                          | 33 (6.9)     | 39 (8.2)               | 46 (9.6)                  | 256 (53.56)     | 104 (21.8)  |
| Other traditional medicine systems (n=476)    | 28 (5.9)     | 41 (8.6)               | 45 (9.5)                  | 255 (53.6)      | 107 (22.5)  |
| Acupuncture (n=478)                           | 20 (4.2)     | 58 (12.1)              | 67 (14.0)                 | 255 (53.4)      | 78 (16.3)   |
| Homeopathy (n=476)                            | 17 (3.6)     | 50 (10.5)              | 43 (9.0)                  | 215 (45.2)      | 151 (31.7)  |
| Other energetic medicines (n=476)             | 34 (7.1)     | 52 (10.9)              | 51 (10.7)                 | 222 (46.5)      | 118 (24.7)  |
| Injection/intravenous therapies (n=478)       | 5 (1.1)      | 23 (4.8)               | 46 (9.6)                  | 145 (30.3)      | 259 (54.2)  |

**Discussion topic**

**Diet and nutrition (n=476)**

| Characteristic | Nutritional aOR(95% CI) | Acupuncture aOR(95% CI) | Manual therapies aOR(95% CI) | Energetics aOR(95% CI) | Hydrotherapy aOR(95% CI) | Other Traditional medicine systems aOR(95% CI) | IV/Injection therapies aOR(95% CI) |
|----------------|-------------------------|-------------------------|-------------------------------|-----------------------|-------------------------|-----------------------------------------------|-----------------------------------|
| Gender Male    | Ref                     | -                       | -                             | -                     | -                       | -                                             | -                                 |
| Female         | 1.6                     | -                       | -                             | -                     | -                       | -                                             | -                                 |
| [1.1-2.5]†     |                         |                         |                               |                       |                         |                                               |                                   |
| Age (years)    |                         |                         |                               |                       |                         |                                               |                                   |
| 18-34          | -                       | Ref                     | -                             | Ref                   | Ref                     | -                                             | -                                 |
| 35-44          | -                       | 0.6                     | -                             | 0.2                   | 0.4                     | -                                             | -                                 |
| Physical activity and fitness (n=476)         | 250 (32.5)              | 172 (36.1)              | 35 (7.4)                    | 19 (4.0)              | 0 (0.0)                  | -                                             | -                                 |
| Pharmaceuticals and other medication (n=475)   | 169 (35.6)              | 133 (28.0)              | 68 (14.3)                   | 91 (19.2)             | 14 (3.0)                 | -                                             | -                                 |
| Substance use (n=475)                         | 145 (30.5)              | 127 (26.7)              | 74 (15.6)                   | 125 (26.3)            | 4 (0.8)                  | -                                             | -                                 |
| Counselling and mental health (n=476)         | 143 (30.0)              | 159 (33.4)              | 80 (16.8)                   | 90 (18.9)             | 4 (0.8)                  | -                                             | -                                 |
| Relationships and support (n=475)             | 124 (26.1)              | 162 (34.1)              | 92 (19.4)                   | 94 (19.8)             | 3 (0.6)                  | -                                             | -                                 |
| Environmental health and toxins (n=476)       | 108 (22.7)              | 126 (26.5)              | 112 (23.5)                  | 122 (25.6)            | 8 (1.7)                  | -                                             | -                                 |

**Clinic environment**

| Solo practice | -                       | -                       | -                             | -                     | -                       | -                                             | -                                 |
| Shared with naturopaths                          | -                       | -                       | 1.1                           | -                     | -                       | -                                             | -                                 |
| and others                                       | -                       | -                       | [0.6-1.9]                     | -                     | -                       | -                                             | -                                 |
| Shared with others but not naturopaths           | -                       | -                       | 0.6                           | -                     | -                       | -                                             | -                                 |
| and others                                       | -                       | -                       | [0.2-1.5]                     | -                     | -                       | -                                             | -                                 |
| Shared with naturopaths only                     | -                       | -                       | 0.7                           | -                     | -                       | -                                             | -                                 |
| Hospital and other settings                      | -                       | -                       | [0.4-1.3]                     | -                     | -                       | -                                             | -                                 |
| Regulatory status of naturopathy                 | -                       | -                       | [1.1-4.9]                     | -                     | -                       | -                                             | -                                 |

**Voluntary/co-regulation or no regulation**

| Voluntary/co-regulation                           | Ref                     | Ref                     | -                             | -                     | 18.4                    | -                                             | -                                 |
| Statutory registration/occupational licensing    | 2.5                     | 0.2                     | -                             | -                     | [2.5-138.2]             | -                                             | -                                 |
| [1.7-3.7]†                                       |                         |                         |                               |                       |                         |                                               |                                   |

‖ regression models for prescription of dietary changes, lifestyle modifications, homeopathy or counselling/psychotherapy found no significant predictors.

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across the globe. However, some inconsistencies in naturopathic practice were observed, for which significant predictors were identified. The implications of these findings are discussed below.

Survey participants reported prescribing or recommending dietary change, lifestyle modifications, nutritional supplements and herbal medicines most frequently. This finding aligns with other national and international research investigating naturopathic practice behaviours, highlighting that some therapeutics are more prominent in the naturopathic therapeutic toolkit. Most notably, nine out of ten naturopathic practitioners reported prescribing or recommending dietary or lifestyle modifications ‘always’ or ‘most of the time’. Also notable was that no significant predictors...
were identified for the prescription or recommendation of dietary change and lifestyle modifications, suggesting there may be little variation in this practice amongst naturopathic practitioners globally. The dominant focus on dietary and lifestyle management in naturopathic practice has significant implications for global public health as both dietary and lifestyle behaviours are acknowledged as contributing to the onset, progression and severity of health conditions causing the greatest burden to health systems internationally (e.g., cardiometabolic conditions,15-18 cancer,15-21 infectious disease,22,23 mental health,24,25 etc.). The fact that these interventions appear central to naturopathic practice presents both opportunities and challenges to public health policy and practice that warrants immediate and close examination. For instance, further research is needed to better understand the dietary and lifestyle prescriptions and recommendations provided by naturopathic practitioners to ascertain their alignment with best practice guidelines.

While there is an immense and growing body of evidence demonstrating the effectiveness of diverse dietary and lifestyle interventions for many of the abovementioned conditions – some of which has been conducted by naturopathic researchers26-28 – the specific details of the dietary and lifestyle modifications naturopathic practitioners recommend to their patients, and the extent to which naturopathic practitioners are able to support patients to implement and sustain such dietary and lifestyle changes, is largely unknown. While some indication of the nature and content of naturopathic practitioners’ dietary prescriptions may be inferred from naturopathic curricula, extracting information on lifestyle modifications may be somewhat problematic given the lack of explicit detail on lifestyle prescription available for most naturopathic curricula internationally.2 Without such granularity, it is difficult to ascertain the degree of consistency of naturopathic practitioner training in lifestyle prescription and the impact this may have on their prescribing behaviours.

Our study findings indicate that naturopathic practitioners discuss a wide range of contemporary public health topics with their patients. Previous research has similarly demonstrated the central role of health promotion and community education in the activities of the naturopathic workforce. In one international survey, 98% of naturopathic practitioners reported engaging in at least one health promotion activity per year such as publishing health information materials online and in print media, giving talks to the community, and providing information handouts to patients in the clinic waiting room and during consultations.29 This earlier inter-

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Table 4
Characteristics predicting the topics that naturopathic practitioners discuss with their patients.

| Characteristic | Diet and nutrition aOR| CI | Sleep aOR| CI | Stress aOR| CI | Physical activity aOR| CI | Substance use aOR| CI | Mental health and counselling aOR| CI | Environmental health aOR| CI | Relationships and support aOR| CI |
|---------------|------------------------|---|---------|---|----------|---|----------------------|---|---------------------|---|----------------------|---|----------------------|---|----------------------|---|
| Gender        |                        |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Male          | Ref                    |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Female        | 4.6                    | [2.4 - 9.0] | 4.9  |         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Age           |                        |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 18-34         | Ref                    |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 35-44         | 0.3                    | [0.1-1.2] | 1.2  |         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 45-54         | 0.5                    | [0.1-2.0] | 0.6  |         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 55-64         | 0.1                    | [0.1-0.4] | 0.9  |         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 65 and over   | 0.1                    | [0.1 - 0.5] | 0.3  |         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Time since completing naturopathic qualification |                        |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Less than 5 years | -                 | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 5 to 10 years | -                      | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 11 to 15 years | -                      | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 16 to 20 years | -                      | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| 21 years or more | -                 | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Clinic environment |                        |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Solo practice | -                      | -         | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Shared with naturopaths | -    | 2.9       | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| and others    | -                      | [1.0-8.2] | 3.0  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Shared with others but not naturopaths | -    | 3.0       | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| only          | -                      | [0.8-11.2] | 1.8  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Hospital and other settings | -    | 1.5       | -  | -         | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Regulatory status of naturopathy |                        |   |         |   |          |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Voluntary/co-regulation | -   | -         | -  | Ref      | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| or no regulation | -    | -         | -  | 0.8      | Ref      |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |
| Statutory registration/occupational licensing | -    | -         | -  | [0.4 - 1.6] | -         |   |                      |   |                     |   |                      |   |                      |   |                      |   |                      |   |

aOR: adjusted odds ratio.

† p < 0.05

‡ regression models for discussions with patients about physical activity or substance use identified no predictors.
national study reported a range of health promotion topics covered in naturopathic practitioners’ community education activities, which targeted diverse populations and conditions. Our study findings build on this work, by highlighting specific topics discussed with patients, including stress management, sleep, diet and nutrition, physical activity, and others.

Our study findings suggest naturopathic practitioners’ efforts to educate patients may be more discursive than didactic; that is, they are not just giving patients information, but discussing these topics with patients. Such an approach reflects recommended shared decision-making practices, which are particularly relevant for individuals with chronic illness, who represent a substantial proportion of patients consulting naturopathic practitioners. This approach to patient care may be influenced to some extent by the core principles of naturopathic medicine, which not only promote an individualised treatment approach, but also effective patient education. Australian research has found individuals consulting with a naturopathic practitioner report a higher rate of person-centred care and empowerment from their naturopathic practitioner compared to other health professionals, including medical doctors.

While our study does not draw a definitive relationship between patient experience and naturopathic practitioner-reported practice behaviour, it is possible that the emphasis on patient education and personalised care in naturopathic medicine may underpin the frequency with which health topics are discussed, as well as the patient experience of naturopathic care. However, it is important to note that the details of those discussions, and therefore their alignment with the existing evidence-base and overall benefit to public health, are unknown. Either way, this finding is relevant in the context of the recently endorsed Declaration of Astana, which acknowledges the needs for patients to be more informed and educated so they are empowered to be more responsible for their health.

It is interesting to note that environmental health was the least common discussion topic reported by participants in our study but was still discussed with patients ‘always’ or ‘most of the time’ by almost half of participants. Environmental health is a topic of growing concern in primary care and public health. The field encompasses physical, chemical, biological, social and psychosocial factors in the environment, and aims to promote health and well-being through environmental strategies, and by controlling and preventing environmental hazards. Unfortunately, environmental health is not a core feature of conventional primary care except among clinicians engaged in specialist occupational medicine practice. Yet, environmental factors are a major contributor of disease burden, internationally. Environmental medicine is an emerging field that has not been fully adopted by any single health profession beyond some specialisations, and as such, the clinical significance of environmental toxins is largely siloed outside of routine healthcare. However, there is a growing understanding that environmental health and medicine needs to be integrated into patient care at all levels. Naturopathic principles and the leading international naturopathic organisations emphasise the importance of the environment on health and healing, and this is reflected in the large proportion of respondents discussing this topic with their patients. It is also worth noting that discussions about environmental health were less likely to be reported by naturopathic practitioners in our study that practiced in jurisdictions with statutory registration or occupational licensing. The global health community is grappling with the challenges of implementing environmental health into primary care and a closer examination of naturopathic practitioners’ practice behaviours may offer valuable insights to assist public health and primary care practitioners in addressing these challenges. Such insights may identify useful processes for initiating and maintaining patient conversations about environmental health and toxins; and using knowledge generated from such discussions to inform clinical care.

Our analysis found regulatory frameworks in the jurisdiction in which the naturopathic practices predict a range of practice behaviours, however the details of these findings are complex. Regulatory status is known to influence permitted practice behaviours of the healthcare workforce, but it may also influence the content of health practitioner education, which will also affect practice behaviours. Interestingly, regulation of the naturopathic workforce was found to predict most practice behaviours, showing an increased likelihood of prescribing nutritional products or IV/injection therapies, and reduced odds of prescribing energetic medicine. The reasons for these findings are unclear but may relate to ‘reservation of practice’, which is a model of statutory regulation used in jurisdictions affecting naturopathic practitioners that prohibits unregistered persons from providing certain types of clinical services. Another explanation may be that regulation of the naturopathic workforce provides an environment conducive to longer naturopathic training programs, thereby permitting a wider range of therapeutics or more advanced training in higher risk therapeutics to be included in the curriculum. As such, the specific associations identified in our analysis may simply be an artifact of the locations with statutory regulation (Canada, United States) and the results should be interpreted only as evidence that regulation of the health workforce and practice are linked. Similarly, the link between regulatory status and practice behaviours will be further impacted by the direct regulation of natural health products (as distinct from the naturopathic workforce) in some of these locations, which was not assessed in our analysis. Either way, this is the first time the link between regulation and practice of the naturopathic workforce has been reported and closer examination of the relationship between regulation, education and practice for the naturopathic profession is warranted.

4.1. Limitations

This study presents the results of a self-reported survey, which may be susceptible to self-selection bias and participant recall bias. The study also includes higher proportional representation from some countries (i.e., Canada and Australia) and little or no responses from other countries with a substantial proportion of the known global naturopathic workforce (i.e., Spain), however it is important to note that exact workforce figures for the naturopathic profession are constrained by absence of statutory registration in many countries where naturopathy is practiced. Either way, the difference between the study population and the target population may raise the risk of responder bias and limit the generalisability of the findings. The regression analysis has offset this bias somewhat, by examining the data by world region rather than focusing solely on the global trends. Further, the triangulation of the results with other existing data suggests that despite the non-probability sampling the patterns identified through this study are still likely valid. Regardless of these limitations, this is the largest study of its type – both in number of respondents and in international representation – and provides novel insights into the practice behaviours of the global naturopathic community.

4.2. Conclusion

Naturopathic practitioners reported the use of a diverse mix of therapies and practices within their clinical care. However, these practice behaviours were generally globally consistent, with most reflecting a core group of practices such as lifestyle modification, dietary change, nutritional supplementation, and herbal medicine. Practitioners also discussed with patients a range of top-
ics that reflected contemporary global public health priorities. One of the strongest predictors of variations in practice behaviour was the regulatory frameworks that naturopathic practitioners operate within. For this reason, a robust evaluation of current naturopathic medicine regulatory models is urgently needed to optimise the contribution of the naturopathic workforce to the health of the population, and to ensure public safety and consistency of care.

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Author contributions

AS, IL and ML conceived the study. AS and IL developed the analysis plan. HF undertook the analysis. All authors contributed to drafting the manuscript and approved the final version.

Conflict of interests

The authors have no competing interests to declare.

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Ethical statement

This study was evaluated by the University of Technology Human Research Ethics Committee and was confirmed to meet the National Health and Medical Research Council National Statement on the Ethical Conduct of Research, and the expectations of the Declaration of Helsinki (#ETH20-5272). Participants were provided with an information sheet and required to confirm their consent to participate prior to study participation. All responses were anonymous.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: 10.1016/j.imjr.2022.100897.

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