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Original Article

Attitudes and self-reported practices of New Zealand osteopaths to exercise consultation

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ABSTRACT

Background: Exercise-based interventions are commonly utilised within many healthcare modalities, although their role in New Zealand (NZ) osteopathy is unclear.
Objectives: Investigate osteopaths' attitudes and practices of exercise consultation, in the context of general health and wellbeing (GH) and specific medical conditions (SMC); and identify factors associated with these practices and attitudes.
Methods: Cross-sectional survey of NZ practicing osteopaths.
Results: Response rate was 38% (n = 125/332). Degree of positive attitude towards advice for GH, 75 ± 9% (mean ± SD), and prescription for SMC, 73 ± 6%, were similar. The most commonly reported exercise consultation provided was advice for SMC (75 ± 24%), followed by advice for GH (63 ± 30%), prescription for SMC (63 ± 30%) and for GH (52 ± 32%). Practices of exercise consultation were associated with positive attitudes ($p < 0.05$ for all) and osteopathic training institution with attitudes towards exercise prescription ($p = 0.03$). Level of academic qualification was associated with practice of advice for SMC ($p < 0.001$) and osteopathic practice style with practice of prescription for SMC ($p = 0.03$). Increased personal exercise duration was weakly predictive of positive attitudes towards exercise advice ($r^2 = 0.04$ for regression model) and associated with practice of advice for GH ($p = 0.01$). Common forms of exercise delivery by osteopaths included verbal instruction (87%), physical demonstration by the practitioner (73%), or by the patient (62%).
Conclusions: These data suggest most respondents hold positive attitudes towards exercise consultation and incorporate exercise within their clinical practice. Whereas training and practice style appear more closely associated with therapeutic exercise, personal exercise behaviours appear to be more closely associated with exercise advice for general health and wellbeing.

Introduction

Compelling evidence for the extensive health benefits linked to maintaining a physically active lifestyle [1–3], and the substantial harms of physical inactivity [4,5], underscore the importance of public health promotion through physical activity [6]. The practice of osteopathy intersects with exercise and physical activity from several perspectives. Osteopaths play an important role in promoting physical activity for general health and, in addition, osteopaths frequently consult with people seeking care for injuries that inevitably arise through participation in physical activity. Further, osteopaths may employ exercise as a form of therapy, often as an adjunct to manual therapy. Despite these intersections, there is currently a near absence of data in relation to utilisation of exercise-based interventions within osteopathic clinical practice. One exploratory study investigating the use of therapeutic exercise in osteopathic practice in the United Kingdom (UK) found that osteopaths appear more comfortable providing general advice about physical activity rather than specific therapeutic exercises [7]. This may be a result of low-levels of therapeutic exercise training during osteopathic education, or that osteopaths conceptualise therapeutic exercises as a speciality associated with other providers [7].

Given the importance of physical activity and exercise in achieving both national [8], and international [9] health goals, it is important that research to improve understanding of the

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interactions between exercise, physical activity and osteopathy is undertaken. Practitioners' own attitudes and beliefs can strongly influence the beliefs of patients [10]. Moreover, the attitudes, beliefs and communication skills of practitioners strongly influence the types of treatments provided and their effectiveness in achieving positive clinical outcomes [11–13].

Therefore, the aims of this study were to: 1) survey New Zealand (NZ) osteopaths to investigate attitudes towards exercise consultation in the context of both general health and specific medical conditions, 2) determine the proportion of NZ osteopaths who practice exercise consultation for general health and specific medical conditions, and 3) identify factors influencing these attitudes and practices.

Materials and methods

Participants

A list of all NZ resident osteopaths registered with the Osteopathic Council of New Zealand and holding a current annual practising certificate as of April, 2011, was identified using the online public register from the Osteopathic Council of New Zealand website. The research was approved by the institutional research ethics committee (UREC-2010-1139) and data were collected between March and April, 2012.

Data collection

Eligible osteopaths with valid email addresses, obtained from public databases, websites and online directories, were offered the option of completing the questionnaire online (SurveyMonkey, Palo Alto, CA, USA) or in print. Osteopaths were given the option of identifying themselves for the purposes of clarifying any responses and/or for entry into a prize draw in consideration of their participation. Reminders were sent 4 weeks (via email and mail) and 6 weeks (via email only) following the initial invitation.

Questionnaire design

The questionnaire comprised three sections, Section 1: Demographics (including current practices related to exercise consultation); Section 2: Attitudes towards Exercise Advice Consultation (for general health and wellbeing); Section 3: Attitudes towards Exercise Prescription Consultation (for therapy or prevention of specific medical conditions). Sections 2 and 3 utilised items drawn from previous research that developed a preliminary questionnaire to investigate NZ osteopaths' attitudes to exercise [refer to Supplementary Materials for list of Section 2 and 3 questionnaire items] [14]. The phrasing of these items was modified to match the terminology and definitions for advice and prescription as forms of exercise consultation applied in the current study. Items in Sections 2 and 3, as well as items in Section 1 regarding the current practice of exercise consultation, methods of exercise consultation utilised and osteopathic practice style, were measured using 5-point Likert scales.

Attitude scores

Two attitude scores were calculated from the different items within the final two sections of the questionnaire, reflecting those towards 'advice for general health and wellbeing' and those towards 'prescription for specific medical conditions'. Each item was scored according to the Likert-scale (1 = 'Strongly Disagree' to '5 = Strongly Agree'). The valence of each item was determined to be 'positive' if it supported exercise consultation or 'negative' if it did not. Scoring was reversed for items defined as negative. Attitude scores for all items in each section (advice n = 18, prescription n = 40) were summed and expressed as a percentage of the maximum possible scores (90 and 200 respectively) most favourable to exercise consultation.

Practice scores for type of exercise consultation

In addition to attitudes, four practice scores were analysed for each type of exercise consultation practiced, consisting of exercise advice and prescription in the contexts of both specific medical conditions (SMC) and general health and wellbeing (GH). Practice was determined by asking practitioners to estimate the proportion of patients in the last 12-months to whom these interventions were applied at some point during their management. Options provided were: 'None or hardly any of my patients', 'About 25% of my patients', 'About 50% of my patients' 'About 75% of my patients' and 'All or most of my patients'.

Practice style

A measure of 'practice style' was calculated based on preliminary work by Wittwer-Blaser [15] who, using principal-component analysis, identified two main styles of practice amongst NZ osteopaths: Practice Style 1 and Practice Style 2. These practice styles have colloquially become known as 'structural' and 'functional' [16]. The frequency scores for six osteopathic technique approaches, operationally defined as Practice Style 1: high-velocity low-amplitude manipulation, muscle energy technique, articulation; or Practice Style 2: visceral technique, osteopathy in the cranial field, balanced-ligamentous tension, were summed to create two variables, each scored out of 15. To represent the balance between Practice Style 1 (structural) and Practice Style 2 (functional) techniques applied by each practitioner as a single variable a 'Preferred Practice Style' score was calculated by subtracting Practice Style 2 from 1, so that a higher score indicated greater frequency of structural compared to non-structural (functional) techniques.

Statistical analysis

Associations between attitudes towards, and practices of, exercise consultation were analysed using one-way analysis of variance (ANOVA) and post-hoc Bonferroni tests. Associations between independent variables and attitudes and practices were identified using backward stepwise regression and ANOVA models. Level of significance was set at $p < 0.05$ throughout, including for entry and removal from regression models. Data are expressed as (mean ± SD) for descriptive data or as (mean; [95% CIs]) unless otherwise stated. Effect sizes of univariate correlations and group differences were reported using descriptors for scale of magnitude as suggested by Hopkins [17]. Statistical analyses were undertaken using IBM SPSS Statistics v18-24 [IBM Corporation, Armonk, NY].

Results

Survey response

Of the 332 NZ registered osteopaths, contact details were invalid for 17 (5%) (n = 9 email, n = 8 postal). Of the remaining 315, a total of 130 (41%) osteopaths responded. Data from a further 5 questionnaires were removed from analysis because of the extent of omitted responses, including no data about the use of or attitudes towards exercise consultation. This resulted in a total of 125 valid returns and an overall response of 38% of all eligible NZ osteopaths.

A total of 81 respondents completed the survey online, from 217 who were emailed this link (37%) and 44 of 115 respondents who were posted paper questionnaires (38%) returned these by mail.

Respondent demographics

More male (n = 71, 57%) than female (n = 54, 43%) osteopaths responded, but this gender imbalance was not significantly different from that expected from the population of NZ osteopaths (48% female, n = 158 and 52% male, n = 174, p = 0.3). Respondents gained their osteopathic qualification from 17 different institutions, predominantly located in the United Kingdom and Australasia (Table 1).

The highest qualification for 95% (n = 119) of respondents was the osteopathy qualification awarded by their institution, however 5%, (n = 6) of respondents had been awarded a higher qualification in another field (Table 1). One third of respondents (n = 40 of 122 valid responses) held tertiary or postgraduate qualifications in therapeutic exercise which ranged from certificates (n = 12) (in exercise therapy, sports massage, fitness management, personal training, rehabilitation Pilates); to diplomas (n = 7) (in fitness training, sports therapy, sports, personal training, sports science) and undergraduate degrees (n = 11) (in exercise physiology, exercise prescription, physical education, physical therapy, sport and recreation, occupation therapy and sports science). Respondents also reported other exercise training including instructor of Pilates (n = 3), Yoga (n = 4) or Tai Chi (n = 1).

When investigating age groups typically treated by osteopaths, all 125 surveyed osteopaths reported treating adults aged 21–65 years. Over half of the osteopaths stated that they treat infants <3 months (54%) and/or infants aged 4 months to 2 years (51%). Approximately 66% of osteopaths reported treating children aged 3–13 years, 79% treated adolescents aged 14–20 years and 77% treated adults over 66 years. Six osteopaths (5%) reported both regular smoking for a period of at least 6 months and current smoking of 1.5 ± 13 cigarettes per week.

Table 1
Respondent demographics.

	Mean	SD	n	Proportion
Age	43.2	10.6	–	–
Region of osteopathic qualification				
Europe[a]	–	–	62	50%
Australia	–	–	16	13%
New Zealand	–	–	46	37%
Years since graduation	13.9	9.3	–	–
Highest qualification				
Diploma	–	–	28	22%
Bachelor degree	–	–	16	13%
Enhanced bachelor degree[b]	–	–	33	26%
Master degree	–	–	45	36%
Doctorate	–	–	2	2%
Consultation time (hours/week)	32.3	10.3	–	–
Preferred practice style				
Practice style 1 (structural)	10.3	3.0		
Practice style 2 (non-structural)	6.62	3.6	–	–
Preferred practice style score	3.7	4.9	–	–
Exercise content in osteopathic training[c]				
None	–	–	13	11%
Minimal	–	–	74	60%
Adequate	–	–	29	23%
Good	–	–	6	5%
Excellent	–	–	1	1%
Personal exercise (hours/week)	9.0	3.4	–	–
Participation in competitive sport				
Yes	–	–	31	25%
No	–	–	92	74%
Location of practice (population)				
Rural	–	–	8	6%
Small Town (<10,000)	–	–	14	11%
Large Town (10–20,000)	–	–	14	11%
City (>20,000)	–	–	89	71%

[a] All except one person completed training in the United Kingdom.
[b] Bachelor degree with honours or graduate diploma.
[c] Perceived level of exercise-related instruction within osteopathic training.

Attitudes to exercise consultation

Respondents' total attitude scores, expressed as percentages of maximum 'positive attitude', towards exercise advice for general health and wellbeing (GH) and exercise prescription for specific medical conditions (SMC) were 75 ± 9% (range 46–96%) and 73 ± 6% (52–88%) respectively (Fig. 1). Attitudes towards exercise advice for GH and prescription for SMC were correlated with a 'large' effect size [17] (r = 0.56; p < 0.001).

Two pairs of items in the exercise advice for GH section: *Typically I provide physical exercise advice to all my patients* (#4), *Overall, I have found patients follow advice regarding physical exercise* (#8); and *Therapeutic outcomes of osteopathic treatment are mostly dependent in people with acute pain adhering to lifestyle modifications such as physical exercise modifications* (#11) *Therapeutic outcomes of osteopathic treatment are mostly dependent on people with persistent pain adhering to lifestyle modifications such as physical exercise modifications* (#12) and one pair of items in the exercise prescription for SMC: *Performing exercise prescription for people with acute pain is usually more important to patients recovery than osteopathic manual therapy* (#32), *Performing exercise prescription for people with persistent pain is usually more important to patients recovery than osteopathic manual therapy* (#33) demonstrated paradoxical (inconsistent or contrasting) views. The majority (83 of 124; 67%) respondents agreed or strongly agreed that they typically provided exercise advice to all their patients (#4), which might be considered surprising given that 83 of 125 (66%) respondents also disagreed or strongly disagreed that overall they found patients to

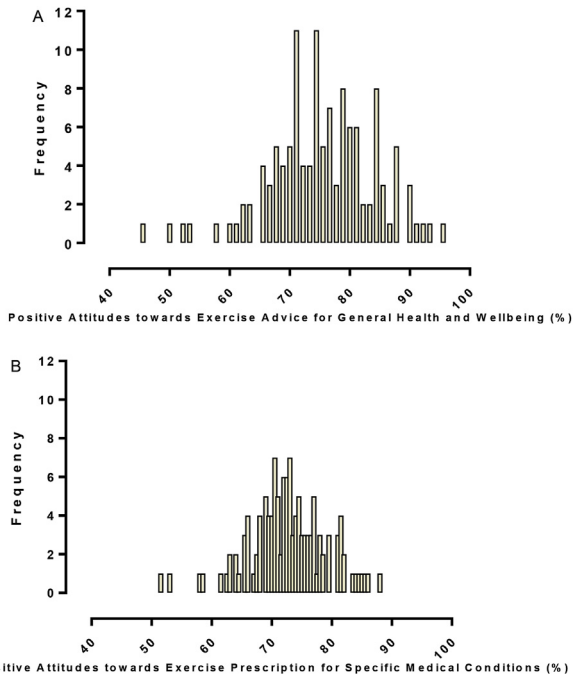

Fig. 1. Percentage of maximum positive attitude scores for attitudes towards exercise advice for general health and wellbeing (A) and exercise prescription for specific medical conditions (B) (n = = 125).

follow instructions around physical exercises (#8). Similarly, respondents expressed differing views about the therapeutic role of exercise advice in the context of persistent versus acute pain. Although most respondents agreed or strongly agreed (74 of 124; 59%) that outcomes of osteopathic treatment depend on adherence to such lifestyle modifications for persistent pain (#12), this was not the case in context of acute pain (#11) for which only 25 of 125 (20%) agreed or strongly agreed, and 63 (50%) disagreed or strongly disagreed, with the equivalently phrased item. Similarly, respondents held stronger views against the use of exercise prescription for SMC in the treatment of acute pain (#32), than persistent pain (#33). For instance, 94 of 125 (75%) respondents disagreed or strongly disagreed that exercise prescription is more important for patient recovery than osteopathic manual therapy in situations of acute pain. In contrast, when the same statement was applied in the context of persistent pain, only 59 of 125 (47%) respondents disagreed or strongly disagreed, with 47 (38%) remaining neutral and 19 (15%) agreeing or strongly agreeing.

Four items (#1, #2, #3 and #20) in the exercise prescription for SMC section elicited a mixture of attitudes amongst all 125 participants with valid responses. Three of these items covered topics regarding training and osteopathic competence for exercise prescription: *Osteopaths should only prescribe exercise if they have undertaken appropriate training* (#1), 32 (26%) agree or strongly agreed whilst 52 (42%) disagreed or strongly disagreed; *Other health care practitioners are better placed to prescribe exercise than osteopaths* (#3), 49 (39%) agree or strongly agreed whilst 28 (22%) disagreed or strongly disagreed; and *My knowledge about exercise prescription is based on my empirical clinical experience* (#20), 46 (37%) agreed or strongly agreed whilst 41 (33%) disagreed or strongly disagreed. The fourth item *Exercise advice is more important than exercise prescription for improving function, relieving symptoms, or slowing deterioration of health* (#2) was agreed or strongly agreed by 31 (25%) whilst being disagreed or strongly disagreed by 33 (26%).

Regarding the origin of osteopaths' current attitudes to exercise prescription for SMC, a majority of the 125 respondents disagreed or strongly disagreed that either *general societal attitudes to exercise at the time I trained* (76 [61%]; #21), *opinions of my teachers during my osteopathic training* (83 [66%]; #22) or *curriculum of the school at which I studied* (76 [61%]; #23) most strongly influenced their thinking about exercise prescription.

Practice of exercise consultation

Results for each of the four categories of exercise consultation (exercise prescription for specific medical conditions [SMC], exercise prescription for general health and wellbeing [GH], exercise advice for SMC, and exercise advice for GH) are presented in Table 2. On average, the most practiced form of exercise consultation reported by osteopaths was exercise advice for SMC ($75 \pm 24\%$ [mean $\pm$ SD] of patients receiving any exercise consultation received this). Exercise advice for GH and exercise prescription for SMC were both equally practiced by respondents ($63 \pm 30\%$). The least practiced form of consultation reported was exercise prescription for GH ($52 \pm 32\%$).

Association of attitudes with practices

Associations between the two attitude and four practice categories of exercise consultation generally showed a positive trend between increasingly positive attitudes and the reported proportion of patients receiving exercise consultation: prescription (Fig. 2A–D) and advice (Fig. 3A–D). All eight one-way ANOVAs attained statistical significance ($p = 0.03$ for the association between practice of exercise prescription for GH and attitude towards exercise advice for SMC; $p < 0.01$ for all others; Figs. 2 and 3). Post-hoc tests for all eight associations showed that osteopaths providing exercise consultation to none, or few, of their patients ($\leq$5%) held less positive attitudes towards exercise consultation (practice and advice) compared to those providing these services to greater proportions of their patients. For six of the eight associations, osteopaths providing exercise consultation to only 25% of their patients also held less positive attitudes towards exercise consultation compared to those exercise-consulting greater proportions of patients (Fig. 2A–C and Fig. 3A–C).

Variables influencing attitudes to exercise consultation

Relationships with total attitude scores were explored using correlational analysis for continuous independent variables, or using t-tests or ANOVA models for categorical independent variables. Relationships between attitudes towards exercise advice for GH, or exercise prescription for SMC and independent variables: age, years of practice and preferred practice style score (structural minus non-structural) showed 'trivial' effect sizes [17] and no statistically significant correlations (Table 3). One exception to this was a 'small' positive correlation between weekly duration of personal exercise and attitudes to exercise advice for GH ($r = 0.14$, $p = 0.03$; Table 3). No differences in attitudes to exercise advice for GH and exercise prescription for SMC were shown between genders, by current smoking status, between levels of academic qualification, or between institutions at which osteopathic qualification was obtained.

Table 2
Respondent-reported proportion of patients provided with exercise consultation (prescription or advice) for specific medical conditions and for general health and wellbeing.

	Number of practitioners (% in category)				
	None or ≤5% of patients	About 25% of patients	About 50% of patients	About 75% of patients	All or ≥95% of patients
Practice of Exercise Prescription					
To treat or prevent a specific medical condition (SMC)	10 (8)	18 (14)	28 (22)	30 (24)	39 (31)
For general health and wellbeing (GH)	19 (16)	30 (25)	23 (19)	23 (19)	27 (22)
Practice of Exercise Advice					
To treat or prevent a specific medical condition (SMC)	7 (6)	5 (4)	11 (9)	53 (42)	49 (39)
For general health and wellbeing (GH)	9 (7)	19 (16)	29 (24)	23 (19)	41 (34)

Data represent responses to the question "In the last 12 months, for what proportion of your patients have you provided (prescription or advice) for (specific medical conditions or general health) at some point during their management?" Frequencies are shown for response categories: None or hardly any of my patients (≤5%); About 25% of my patients; About 50% of my patients; About 75% of my patients; All of most of my patients (≥95%).

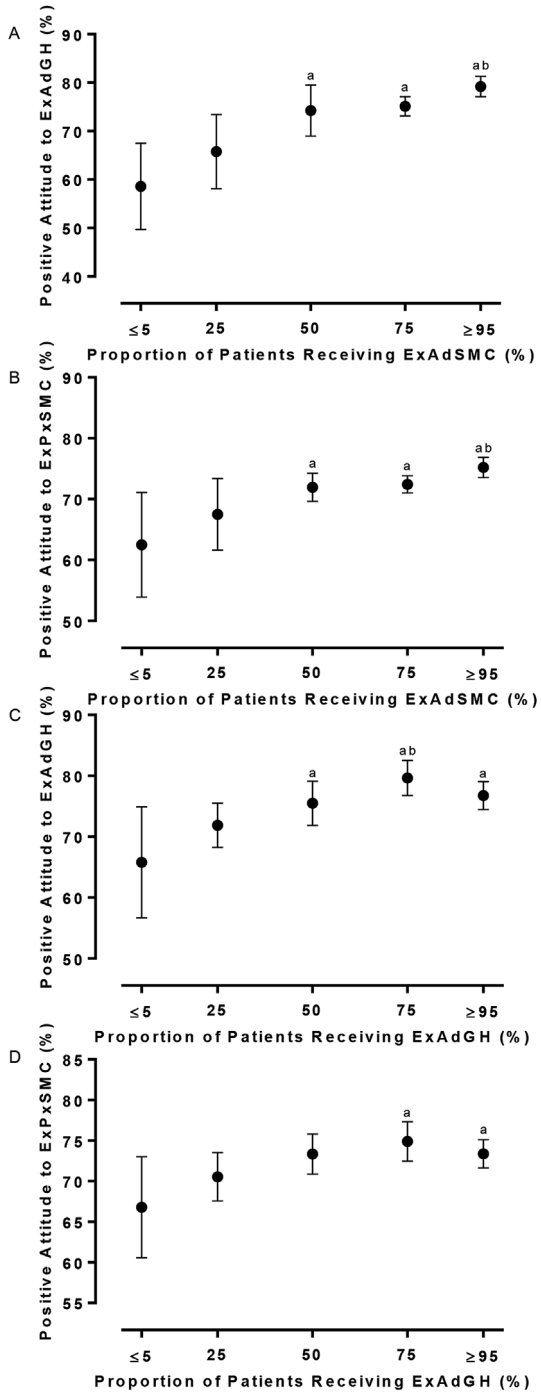

Fig. 2. Associations of attitude towards exercise consultation with practice of exercise prescription.
Graph A: Association of attitude to exercise advice for general health and wellbeing (ExAdGH) with practice of exercise prescription for specific medical conditions (ExPxSMC) ($p < 0.001$ for ANOVA); Graph B: Association of attitude to ExPxSMC with practice of ExPxSMC ($p < 0.001$); Graph C: Association of attitude to ExAdGH with practice of exercise prescription for general health and wellbeing (ExPxGH) ($p = 0.008$); Graph D: Association of attitude to ExPxSMC with practice of ExPxGH ($p = 0.03$).
[a]differs from group reporting to provide exercise consultation to ≤5% of patients.
[b]differs from group reporting to provide exercise consultation to = 25% of patients.
[c]differs from group reporting to provide exercise consultation to = 50% of patients.
Error bars show 95% confidence intervals.

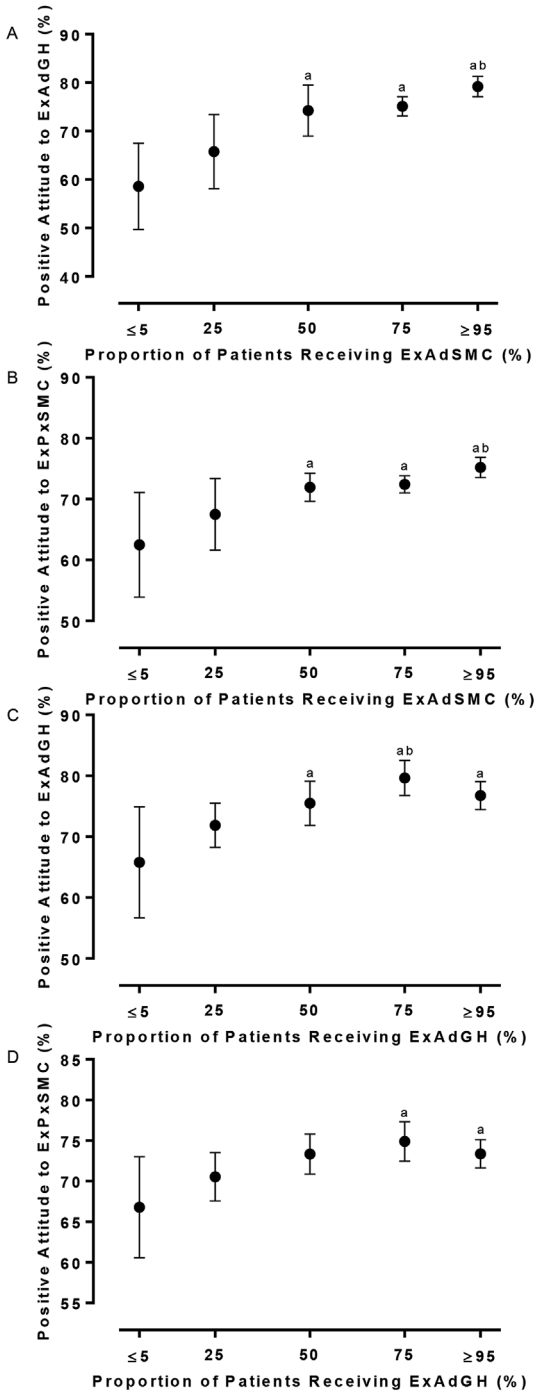

Fig. 3. Associations of attitude towards exercise consultation with practice of exercise advice.
Graph A: Association of attitude to exercise advice for general health and wellbeing (ExAdGH) with practice of exercise advice for specific medical conditions (ExAdSMC) ($p < 0.001$ for ANOVA); Graph B: Association of attitude to ExPxSMC with practice of ExAdSMC ($p < 0.001$); Graph C: Association of attitude to ExAdGH with practice of exercise advice for general health and wellbeing (ExAdGH) ($p < 0.001$); Graph D: Association of attitude to ExPxSMC with practice of ExAdGH ($p = 0.008$).
[a]differs from group reporting to provide exercise consultation to ≤5% of patients.
[b]differs from group reporting to provide exercise consultation to = 25% of patients.
[c]differs from group reporting to provide exercise consultation to = 50% of patients.
Error bars show 95% confidence intervals.

Table 3
Correlation of independent variables with attitudes to exercise advice for general health and wellbeing and to exercise prescription for specific medical conditions.

	n	r	p
Attitudes to Exercise Advice for General Health and Wellbeing			
Age	107	−0.01	0.86
Years of Practice	124	−0.01	0.83
Weekly Duration of Personal Exercise[a]	125	0.14	0.03
Practice Style	125	−0.02	0.70
Attitudes to Exercise Prescription for Specific Medical Conditions			
Age	107	−0.04	0.52
Years of Practice	124	−0.03	0.58
Weekly Duration of Personal Exercise	125	0.06	0.36
Practice Style	125	0.09	0.18

[a] Weekly duration of personal exercise shows a 'small' positive correlation with attitudes to exercise advice for general health and wellbeing ($r = 0.14$; $p = 0.03$).

A regression model that included all continuous and categorical predictor variables from the univariate analyses using both attitude variables as dependent variables showed that only weekly duration of personal exercise entered the model as a significant positive predictor of attitudes to exercise advice for GH, explaining 4% of the variance in attitudes. No variables entered a similar model for attitude to exercise prescription for SMC.

Variables influencing practices of exercise consultation

Scoring of practices of exercise consultation were in categories relating to the proportion of patients who received the specific type of consultation, therefore ANOVA models were applied to analyse their associations with continuous independent variables, with chi-squared analyses for associations with categorical variables reduced to fewer categories. Practice of exercise advice for GH was positively associated with personal exercise duration ($p = 0.01$) whilst practice of exercise prescription for SMC was positively associated with preferred practice style (structural minus non-structural) ($p = 0.03$) and tended to be positively associated with personal exercise duration ($p = 0.07$). No other continuous variables, including age and years of practice, were associated with these two dependent practice variables, and no continuous variables were associated with practices of advice for SMC or with prescription for GH.

The highest level of qualification was positively associated with practice of exercise advice for SMC ($p = 0.001$), although 67% of cells contained an expected count of less than 5, substantially more than the 20% deemed acceptable [15]. In general, osteopaths with masters or honours degrees in any field, compared to diploma or undergraduate qualifications, were more highly represented in the more frequent categories of this type of exercise advice. Similar patterns of associations with other forms of exercise consultation were not statistically significant. Training institution was not associated with any practice of exercise consultation. Other categorical variables, gender, level of academic qualification and smoking, were not associated with practices of exercise consultation.

Methods by which exercise advice and prescription are applied

Methods by which exercise advice and prescription have been applied in clinical practice are illustrated in Table 4. The majority of respondents reported providing verbal instructions (87%) and physical demonstrations of exercises by themselves (73%) or by the patient (62%), to at least 75% of their patients who received exercise interventions. Written handouts (6%) with exercise instructions, referrals to an exercise specialist (4%) or website/books (2%) and other (3%) were the least reported forms of exercise consultation provided.

Discussion

The main aim of this study was to investigate the attitudes and practices of NZ osteopaths to exercise consultation and its use within osteopathy. The main finding is that respondents generally held positive attitudes towards exercise consultation, with similar attitudes towards exercise advice for general health and exercise prescription for specific medical conditions. Respondents incorporated exercise consultation into their clinical practices, for the purposes of improving general health and specific medical conditions, using various methods of delivery.

The attitudes of NZ osteopaths regarding physical activity match those of other health practitioners. In this study, respondents appear to agree that physical activity at the recommended levels (equivalent to 30 min of moderate intensity exercise, five days per week [18]) is necessary for good health and that people who participate in physical activity at these levels are less likely to have musculoskeletal problems. Similar beliefs have been reported amongst general practitioners [19–21], physiotherapists [22], and chiropractors [23,24].

Although healthcare practitioners agree that physical activity is beneficial to health, it cannot be assumed that all health practitioners believe it is their role to provide exercise consultation and lifestyle modifications. Nevertheless, our findings demonstrate that most NZ osteopaths do believe that it is part of their professional responsibility to provide lifestyle modifications and exercise consultations, perhaps because the osteopathic consultation provides an excellent opportunity to address a patient's lifestyle. Whilst the majority of respondents disagreed that osteopaths should only prescribe exercise if they have undergone specific training (#1), a

Table 4
Self-reported methods for practice of exercise consultation.

Method of Exercise Consultation	n[a]	Percentage of practitioners frequently providing method[b]
Verbal Instructions	109	87%
Physical demonstration of exercises *by practitioner*	91	73%
Supervised demonstration of exercises *by patient*	78	62%
Exercises *completed under supervision* of practitioner	43	34%
Written handout with *instructions & illustrations*	25	20%
Written handout with *instructions only*	8	6%
Referral to exercise specialist	5	4%
Referral to website/books	2	2%
Other	4	3%

[a] n = number of respondents who report using specific method of exercise consultation.
[b] Total percentage of practitioners who report providing specific methods of exercise consultation to 75% or more of their patients who received any exercise consultation.

majority also conceded that other healthcare practitioners were better placed to prescribe exercise (#3). The former might suggest a view that there is a place for exercise prescription within osteopathic scope of practice in NZ; the latter might imply a perceived lack of training in this area. Similarly, in a survey of US chiropractors' attitudes towards health promotion and prevention, Rupert found that although respondents (n = 658) reported spinal manipulation to be an essential component of patient care (97%), they also agreed that exercise (96%), nutrition (93%) and lifestyle advice are equally important therapeutic components of chiropractic care, despite speculation of limited research identifying these components in the past [23].

Respondents who engaged in more personal exercise time also displayed a more positive total score in attitude towards exercise advice for general health and reported more frequent practice of exercise advice for general health. These results are comparable with other literature. A review of literature by Lobelo et al. [25] suggests that personal physical activity habits of healthcare practitioners influence their attitudes and practices relating to physical activity, and that this association is strong and independent of many demographic, training and practice factors [25]. The personal health of practitioners may be important because they serve as role models who are more likely to counsel their patients about healthy behaviours if they practice good health habits themselves [26–28].

There were strong associations between respondent's attitude scores (for both attitudes towards exercise advice for general health and exercise prescription for specific medical conditions) and reported practices of exercise consultation. These associations suggest that osteopaths with stronger positive attitudes in favour of exercise consultation provide all four categories of exercise consultation to a greater extent in their practice. The relationship between health-related attitudes of clinicians and their clinical practice has been studied in other contexts. For example, Bishop et al. [29] found that the attitudes of 1022 health practitioners treating patients with non-specific low back pain (LBP) were linked to their clinical practice and the recommendations they provided to their patients. Health practitioners with stronger attitudes towards specific biomedical causes of LBP and weaker attitudes towards biopsychosocial causes of LBP (28% of the sample) actually recommended further time off work to patients who had been off work since the onset of their LBP (at least four weeks ago) [29], despite guidelines suggesting patients with non-specific LBP remain at work or return to work if possible [30].

A pilot survey of NZ osteopaths (n = 62/250) by Wittwer-Blaser [15] has provided preliminary evidence of two distinct practice styles amongst osteopaths in NZ. Techniques such as muscle energy technique, articulation and high-velocity low-amplitude (HVLA) manipulations were found to group together forming a 'structural' practice style, whereas functional technique, osteopathy in the cranial field and balance-ligamentous tension appeared to group together to form a 'non-structural' practice style. In the current study, practice style of respondents was positively associated with the reported practices of exercise consultation. Although this association is small in magnitude, it appears that osteopaths who provide more 'structural' treatments may be more likely to incorporate exercise prescription for specific medical conditions into their practices. No associations were found between the practice style of osteopaths and their attitudes to exercise consultation. Relationships between practice style and practitioner attitudes may be complex. Wittwer-Blaser [15] noted that practitioners more inclined to provide 'non-structural' treatments displayed less positive attitudes towards evidence-based practice (EBP). However, no association was identified between 'structural' practice style and attitudes to EBP [15]. Measures of practice style in osteopathy are not well validated, and consequently these findings should be interpreted cautiously. Further research to explore different styles of practice in osteopathy and their association with other clinical behaviours or practitioner attitudes should be undertaken.

Practitioners with professional qualifications at the honours or masters level practiced exercise advice for specific medical conditions with greater reported frequency than those with a diploma or undergraduate degree. Conversely, the number of years spent in practice and the institutions where respondents received their osteopathic training did not appear to significantly influence attitudes towards or practices of exercise consultation. Furthermore, osteopaths did not attribute their current attitudes about exercise prescription to teacher or curriculum influences within their training.

No similar studies are available making it difficult to compare these findings. However, results from a content analysis of seven osteopathic institutions in the UK investigating undergraduate exercise training suggest not all osteopathic institutions address exercise consultation as an intervention that can be applied within osteopathic practice, explaining why some practitioners may be less likely to provide exercise interventions [31]. Since 2004, a master's degree is the minimum level of academic qualification required to register as an osteopath in NZ, and in recent years the promotion of physical activity and exercise through public health initiatives has substantially increased [18], potentially explaining why osteopaths with higher academic qualifications may be more likely to practice exercise consultation.

Results from this study show that age, gender and current smoking are not associated with attitudes and practices of exercise consultation. However, this may be a result of response bias, especially relating to smoking status. In a survey of nurse students' attitudes towards smoking health promotion, McCann et al. [27] found that although smoking status is associated with attitudes to health promotion, gender and age do not appear to have an influence. Nurses who were non-smokers demonstrated consistency between their personal beliefs and professional values and were more likely to have a stronger positive attitude to smoking health promotion than smokers. In contrast, smokers demonstrated conflict between their personal and professional beliefs and their role as health practitioner, with a less positive attitude towards smoking health promotion [27]. Frank et al. [32] found non-smoking to be a predictor of actual health promotion practices, however only female physicians were surveyed and therefore the finding lacks generalisability.

Caution should be taken when interpreting the results of surveys: self-reported measures are always vulnerable to response bias, and self-reported behaviours may not accurately represent actual behaviours [32]. For example, respondents here may have had greater than average interest in exercise consultation, likely to be more favourable and resulting in potential response bias. It is noteworthy that a greater number of respondents reported following a more 'structural' than 'non-structural' practice style; perhaps again indicating a level of response bias. The observed response rate of 38% is modest, but somewhat of an improvement compared with previous response rates in surveys of this population. Authors of previous surveys of NZ osteopaths have reported lower response rates, with 20% by Friedlander [33] and 25% by Wittwer-Blaser [14]. One exception to this is a 46% response rate by Carrington [34]. Some anecdotal feedback from respondents indicated the questionnaire was slightly longer than expected, which may have negatively impacted the response rate [32]. Given the central role of physical activity and exercise in public health, we recommend further investigation of the role of physical activity and exercise within osteopathic practice, and within osteopathic educational curriculum.

Conclusion

This study has identified that NZ osteopaths generally have a positive attitude towards exercise and are incorporating exercise consultation into their clinical practice using a variety of methods. Although effect sizes are small, it appears that NZ osteopaths who spend more time personally engaged in exercise were more likely to have higher positive attitudes towards exercise. Also, practitioners with a higher positive attitude to exercise; higher level of academic qualification; and who utilise more structural techniques in practice are more likely to provide exercise-based interventions. Finally, attitudes and practices of respondents to exercise consultation do not appear to be influenced by age, gender, years of practice, or smoking.

Conflicts of interest

RM is an Executive Editor of the journal but was not involved in decisions regarding this manuscript. No other conflicts of interest declared.

Ethical statement

This study was approved by Unitec Research Ethics Committee (Approval No: 2010-1139).

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ijosm.2018.04.001.

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