BMJ Open Do final-year medical students in Scotland have the knowledge and confidence to deliver the physical activity guidelines? A cross-sectional online survey to evaluate changes over a decade

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Objectives This study assessed knowledge of physical

across current final-year medical students in Scotland.

This follows a 2013 survey finding that this cohort

Design A cross-sectional online survey.

years old and 69% met the PA guidelines.

adequately trained to give PA advice.

lacked this knowledge and confidence; thus, authors

activity (PA) guidelines and confidence to deliver PA advice,

recommended improvements to undergraduate medical PA

education and re-evaluation of these measures thereafter.

Setting The survey was distributed across four Scottish

Participants Final-year undergraduate medical students;

n=166 completed the survey. 69% women, 23.3±1.8

Results 27% correctly identified the UK PA guidelines,

reported receiving PA education, only 20% felt adequately

study highlights that compared with 2013, more students were aware of PA guidelines and had received training,

but fewer could identify the guidelines, and they felt less

Conclusion This study highlights the ongoing need to improve PA in the undergraduate medical curriculum.

Future studies should continue to evaluate students'

PA training is implemented across UK universities.

confidence and ability to deliver PA advice to patients as

trained to give PA advice to the general population. This

despite 52% stating awareness of these. While 80%

ABSTRACT

universities.

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INTRODUCTION

Physical activity (PA) has significant benefits to multiple dimensions of health, the economy and society worldwide.¹ Current UK estimates suggest that one in three men and one in twowomen do not do enough PA for improved health.² In 2019, the most current PA guidelines were released in the UK with recommendations as to how much movement should be achieved by the general population. Healthcare professionals play a key role in the delivery of PA advice with the Public Health England 2016 consensus statement

STRENGTHS AND LIMITATIONS OF THIS STUDY

- \Rightarrow The methods for this study closely replicated that of the previous study on this topic in 2013 with an aim to increase the comparability of the two studies.
- \Rightarrow Replicating this study means that only Scottish universities were included, limiting the wider generalisability of the findings: however, education systems in the UK and globally are very different, with recommendations made for repeating similar studies by country.
- \Rightarrow Participant demographic data (age, gender, university and self-reported physical activity (PA) levels) were collected to facilitate more detailed analysis of these factors on survey responses.
- \Rightarrow Non-probability, convenience sampling increases the likelihood of bias and students volunteering who are more likely to be interested in PA.

'Making Every Contact Count' encouraging healthcare professionals to use existing inter-actions with patients to talk about healthy lifestyles such as PA.^{3 4} Evidence presented in National Institute of Clinical Excellence guidsimi ance on promotion of PA in primary care also suggests that even very brief or brief advice by frontline healthcare professionals can be both an effective and cost-effective means of increasing PA.⁵ It has also been demonstrated that doctors who are physically active are **G** more likely to perceive PA as an important **3** topic to discuss with patients than less active colleagues,⁶⁷ highlighting the importance of a well-trained healthcare workforce.

However, a study by Dunlop and Murray in 2013 suggested that medical students might be ill-prepared to deliver such advice.⁸ In a survey of 177 final-year medical students in Scotland, the number of students who could correctly identify PA guidelines was

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profoundly lower compared with knowledge of other key health behaviours such as alcohol guidelines. Additionally, many reported feeling inadequately trained to deliver PA advice. The authors discussed a lack of PA education for medical students as an obstacle to their effective promotion of PA with other studies also supporting this as a barrier.⁹ Recommendations to improve undergraduate medical PA education in Scotland were made in this paper, highlighting the need for a multiagencycoordinated approach. This can be seen as an ongoing issue given that 30 years before this Young et al reported 'important deficiencies' in final-year UK medical students knowledge and beliefs of the medical aspects of exercise.¹⁰

Continued efforts are being made to elicit positive changes to undergraduate medical curriculums by universities and national organisations in the UK with regard to improving the teaching of PA.¹¹⁻¹³ These are reported to include lectures on PA and signposting to online learning resources such as the Exercise is Medicine global initiative.¹¹⁻¹⁴ However, there is still some evidence which indicates the concerns raised since 1983 might still be present¹² and an acknowledgement that PA and sport and exercise medicine are under-represented in undergraduate medical curriculum.¹⁵ This study will assess current knowledge of PA guidelines, confidence in their ability to discuss PA with patients and perceived adequacy of their training to deliver PA advice to patients across current final-year medical students in Scotland, 10 years after the original study by Dunlop and Murray.

METHODS

Study design

This cross-sectional study design collected data by an anonymous, online survey. This study replicated Dunlop and Murray's 2013 methods and survey questions with some modifications (detailed further below) with written permission from Dunlop and Murray, to maximise the validity of data comparison between studies.⁸ The original survey was designed in collaboration with clinicians and university lecturers with two of four universities contacted willing to take part. The current study followed the Checklist for Reporting Results of Internet E-Surveys guidelines for reporting the results of internet e-surveys where appropriate.

Participants

Participants were recruited from final-year undergraduate medical student cohorts at four universities in Scotland expanding on the two cohorts surveyed by Dunlop and Murray in 2013.⁸ The total final-year undergraduate medical student cohorts at these universities were approximately n=1105; Aberdeen (n=300), 16 Dundee (n=220), 17 Edinburgh $(n=265)^{18}$ and Glasgow $(n=320)^{19}$. In the original study, students were invited by email and electronic notice boards to attend a presentation on preventative medicine with a focus on PA, and the survey was administered at the start of the presentation. In the current study,

the researchers contacted each university medical school by email to ask for their administrative support in distributing the survey. Each university shared the study advertisement to students on their university online message boards on multiple occasions between 3 November 2022 and 14 March 2023. The study was also shared on social media by the principal researcher as part of a multimodal study advertisement approach. This was also intended to reduce the frequency of requesting university administrative staff to disseminate the study advertisement, thereby reducing their workload. Data collection spanned the same period. There was no upper limit to sample size; it was only limited by the number of final-year medical Š students in Scotland. No formal sample size calculations copyright, incl were conducted, but the aim was to reach the same sample size as the original study (n=177).

Survey

The outcome measures were self-reported responses to modified versions of Dunlop and Murray's survey questions.⁸ Modifications were made to the survey to reflect changes to the PA guidelines and global mortality risk of factors. Participant demographic data (age, gender, university and their own self-reported PA levels) were also collected, which were not included in the original lated study. The full survey is available in online supplemental material.

ç Data were collected by an open, voluntary, anonymous online survey (Qualtrics), accessed by a survey link or QR code. The landing page displayed the participant information sheet, and participants had to consent before completing the survey. The survey comprised only ten questions and took less than 5 min to complete. Given the survey question order aimed to replicate Dunlop and Murray's survey, questions were not randomised or B alternated. Selection of one response to each question > was enforced except for some personal data (participant age, gender and university) which had a 'prefer not to say' answer option. After opening the survey in a browser, participants had 1 week to complete the survey and could change their answers until submitting their similar tech response.

Data analysis

Data handling fulfils the Checklist for statistical Assessment of Medical Papers checklist criteria.²⁰ Reproducing Dunlop and Murray's analytical methodology, the frequency (percentage) of responses for each question $\overline{\mathbf{g}}$ was reported. The relationship between demographic factors, university attended and outcome measures was investigated using cross tabulation and χ^2 test. Participants reporting gender as 'other' (n=1) or 'prefer not to say' (n=1) were inappropriately small sample sizes for quantitative analysis, thus were excluded from demographic analysis. Results are presented alongside those of Dunlop and Murray's findings in 2013, but no direct statistical comparisons were made.

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Figure 1 Participant flowchart depicting survey responses in relation to webpages of the online survey reached by participants.

Equity, diversity and inclusion statement

This study was advertised to final-year medical students in Scotland, aiming to recruit participants of all genders, ethnicities, socioeconomic and marginalised groups in the medical student population. The authors are two women from different disciplines (medicine and sports science), one of whom is a junior researcher. This research follows on from a study conducted by two male doctors in 2013. The survey was distributed by social media and universities' online platforms, to which all potential participants had access on personal or university devices. Online data collection removed geographical and temporal barriers to survey access. Our study analyses the impact of gender and age on participant responses; however, we acknowledge that ethnicity and socioeconomic status are not similarly investigated.

RESULTS

Participants

Of 221 participants who consented to take part, 55 did not start the survey and 166 participants fully completed the survey (15% of potential sample) and were included otected in analysis (figure 1). While the survey completion rate after consenting to participation was 75%, 100% of participants answering the first survey question completed the by copyright, survey. Therefore, all survey responses analysed were fully completed, and there were no missing data.

Survey responses

Participants were 69% women (30% men and 1% other); the mean age was 23.3±1.8 years old. One university represents 62% of participants in the sample . Gender distribution for the total sample was reflected by university except one which had fewer men (14% men). The \mathbf{Q} UK adult PA guidelines were met by 69% of students who participated in the survey.

The full survey responses for the 2023 and 2013 samples are shown in table 1, with a summary of the key findings reported in figure 2. Of the 2023 sample, 52% stated they were aware of the UK PA guidelines (40% in 2013)

Table 1 Comparison of survey results between Dunlop and Murray ⁸ and this study			
Торіс		2013 (Dunlop and Murray)	2013 (Dunlop and Murray)
Aware of the UK physical activity (PA) guidelines for PA	Yes	40.00%	52.00%
	no	60.00%	48.00%
Ranked order of risk factors for global mortality (1 being most common to 5 being least common)	Tobacco	1	1
	Obesity	2	2
	Diabetes	3	3
	High blood pressure	4	4
	Physical inactivity	5	5
Correctly identified the current UK guidelines for adults (19–64 years)	All-yes	68.00%	27.00%
	(a) if stated 'yes' for awareness of the guidelines	81.00%	41.00%
	(b) if stated 'no' for awareness of the guidelines	57.00%	11.00%
Correctly identify the UK recommended maximum units of alcohol	Correctly identified	97.00%	87.00%
Received teaching about the benefits of PA	Yes	74.00%	80.00%
	No	26.00%	20.00%
If received training, confident about discussing PA with patients (2023 only)	Yes	-	23.00% confident
	No	-	57.00% not confident
Feeling adequately trained to give PA advice	Yes	52.00%	20.00%
	No	48.00%	80.00%



Figure 2 Summary of the key findings between 2013 and 2023. PA, physical activity.

with 27% able to correctly identify these (68% in 2013). In comparison, 87% were able to correctly identify UK alcohol guidelines in 2023 compared with 97% in 2013. Of the 52% who stated they were aware of the PA guidelines, 41% correctly identified the guidelines (81% in 2013), whereas 11% could not correctly identified them (57% in 2013). As with the 2013 data, PA was perceived to be the least important risk factor to global mortality, ranked behind tobacco, diabetes, obesity and high blood pressure. More of the 2023 sample reported receiving PA teaching in their undergraduate medical education compared with 2013 (80% in 2023 and 74% in 2013); however, only 23% of those who received training in the 2023 sample felt confident 'discussing' PA with patients. Although this question was only asked in 2023, question 5 on confidence in their training to 'deliver' PA advice indicated that 20% of the 2023 sample felt adequately trained compared with 52% in 2013.

Survey responses by demographic factors

The influence of participant age, gender, university and participant self-reported PA on survey responses was analysed. Neither participant age nor gender made a notable difference to survey responses. Of those who self-reported meeting the UK PA guidelines themselves, 31% correctly identified the guidelines, compared with 15% of those who self-reported not meeting the guidelines.

There were variations between universities regarding how much training they received about PA (range 71-100%). Due to difference sample sizes between each university, it is difficult to make comparisons between universities. However, the results follow a similar trend at each university to that of the pooled data with regard to being more aware of the PA guidelines, less able to

identify these, more educated in PA but less confident in advising patients.

DISCUSSION

text Given the benefits of PA for the population, on qualifying, doctors should be able to provide patients with advice on healthy lifestyle such as PA. This study assessed 0 knowledge of PA guidelines across current final-year đ medical students in Scotland, confidence in their ability and adequacy of their training to deliver PA advice to patients. A decade since Dunlop and Murray's survey ≥ and their recommendation that PA education across medical schools be improved; this study's findings suggest that there has been some improvement since 2013. The ğ current study suggests that more medical students are aware of the existence of PA guidelines, and more have received education on PA in their curriculum. However, this study also found that fewer students were able to correctly identify the current PA guidelines and fewer felt adequately trained to deliver PA advice than in the 2013 study.

o It is important to first acknowledge that while more students in the current study were aware of the guidelines $\mathbf{\hat{G}}$ compared with 2013, fewer students were able to correctly **8** identify the guidelines. A potential explanation could be the increase in the complexity of PA guidelines over this time period. In 2013, the PA guidelines stated that the general adult population should gain 30 min of moderate to vigorous PA five times per week. The most recent 2019 guidelines are more detailed and state 150min of moderate or 75 min of vigorous intensity activity per week, plus 2 days of strength training and reducing sedentary time.²¹ These additions make the guidelines more

complex and potentially harder to recall and correctly identify.²¹ A similar survey of final-year medical students at English medical schools in 2018,²² before the change in guidelines, also reported that a higher percentage of participants were correctly able to identify the PA guidelines (52%) than the current study, with these findings more similar to Dunlop and Murray's study in 2013. This suggests that while efforts to improve undergraduate medical training on PA have been undertaken, there might be a need to review how PA guidelines can be easily messaged by health professionals. This could, for example, include further engagement in the guidelines process from active medical health professional to ensure that they are usable in clinical practice.

A second key finding is that while more students in 2023 had received training, fewer felt adequately trained to deliver PA advice to patients. It is encouraging that more students received training than in 2013; however, their lack of confidence suggests that simply including PA in the curriculum might not be sufficient. Providing lectures on PA promotion can be effective at improving the confidence of medical students to promote PA,²³ but there is a need to also consider the frequency, method, amount and quality of content that is delivered. The current study did not investigate these factors, and the role they could play in undergraduate medical students' confidence to deliver PA advice srequires further research. However, increasing the frequency and improving the quality of training will likely come with increased time commitment, which should be considered within an already tightly scheduled curriculum. Signposting to pre-existing online resources relevant to medical students is already provided by some universities but should be further explored as an option to overcome this issue.¹³ It is not yet known whether signposting to existing resources is a sufficient level of training to improve confidence in delivering PA advice. There is also a need to ensure consistent PA advice at a population level, and PA quantity and quality in the undergraduate curriculum should be reviewed as part of General Medical Council academic standards.

Given curriculum constraints, another area to explore with regard to student confidence in their ability to promote PA is assessing it as a practical skill. Medical students understandably prioritise learning examinable content; hence, PA knowledge and clinical competency should be formally assessed.^{9 II} Assessing exercise as medicine as part of the undergraduate curriculum in the UK was recommended over 40 years ago now.¹⁰ However, the new nationwide Medical Licensing Assessment for finalyear medical students does not incorporate PA or sport and exercise medicine in its curriculum.²⁴ Incorporation of PA into this and other formal assessments such as Objective Structured Clinical Examination may encourage medical students to revise their PA teaching, enabling students to become more confident in the PA competencies required of them.⁹ Assessing for these competencies may also ensure effectiveness of any training delivered, even if a minimal level is provided within the curriculum.

Strengths and limitations

The methods for this study replicated that of Dunlop and Murray's study design and methods with an aim to increase the comparability of the two studies. It furthered this original research by expanding to a larger number of universities and updating and modifying the pre-existing survey questions, particularly collecting participant demographic data to provide useful insight into potential influences of these factors on responses. Aiming to replicate this study led to several limitations including a Scottish only sample limiting the wider generalisability of the study findings. However, given the differences in university systems both in the UK and globally, it would be recommended that similar surveys should be replicated by country regardless. This study only collected students views on this topic and did not include an audit as to what was actually delivered to them during their studies. More research to assess both students' knowledge and confidence in additon to delivery methods and curricular content would lead to a better understanding of what is needed in undergraduate medical teaching. Replicating the previous study also meant that **9** non-probability, convenience sampling was also a limitation. Given the topic of the survey, it is also possible that students interested in PA may have been more likely to take part, potentially creating a more biased sample and $\overline{\mathbf{b}}$ response. This sample was in fact more active than the general population in Scotland. Regardless, even with most participants being active, knowledge and confidence were still an issue in this group which suggests these results may have been even more stark in a less active sample.

Clinical implications and future research

The findings of this study suggest several areas for future research and practice. To ensure PA guidelines are able to be translated into medical practice and are not overly complex, practising medical professionals should be involved in the decision-making stages of guidelines development. With regard to implications to the undergraduate medical curriculum, there needs to be an increased focused not only merely providing training on PA but also to ensure students are confident to deliver PA advice. This may include improving the quality and quantity of training but also having PA knowledge and clinical competency formally assessed. Future surveys with undergraduate students could explore this by adding in questions on the number of hours of training they receive, the content of their courses and whether they feel including assessments in PA may improve their ability to deliver PA advice. This research could also include more open-ended questions on why they feel they were not adequately trained to help support these ideas. In addition, conducting audits of undergraduate medical courses to understand what is being delivered alongside students perceptions is needed to further validate this work.

CONCLUSION

One decade following Dunlop and Murray's survey, this study suggests that more medical students are aware of the existence of PA guidelines and more have received education on PA in their curriculum. However, this study also found that fewer students were able to correctly identify the current PA guidelines or felt adequately trained to deliver PA advice to patients than in the 2013 study. This highlights the ongoing need to improve PA in the undergraduate medical curriculum and potentially incorporate PA as an examinable aspect of courses. Future studies should continue to evaluate students' confidence and ability to deliver PA advice to patients, as PA training continues to be implemented across UK universities.

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Contributors Both authors (GCR and IS) collaboratively designed, conducted and reported this study. IS undertook data collection and most of the report write up, under the guidance of GCR providing regular feedback to enhance its quality. GCR acts as guarantor for the study and accepts full responsibility for the work and/ or the conduct of the study, had access to the data, and controlled the decision to publish. Both authors contributed to updating the manuscript for journal publication.

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