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Medical Student Involvement in and Attitudes towards Audit and Research: The MEDical Student Experience of Audit and ResearCH (MED-SEARCH) Survey

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Abstract

Background: Medical research and audit are fundamental to evidence-based medicine. It is unclear how medical students perceive these activities. This study aimed to explore medical student involvement in and attitudes towards research/audit.

Methods: An anonymous, cross-sectional, 70-item questionnaire was administered to medical students from all years at the University of Leicester. A mixture of open, closed and Likert Scale questions were used. Multivariate analysis was performed to evaluate the relationship between participant characteristics and research/audit skill confidence.

Results: In total, 114 questionnaires were completed. Forty-eight respondents (42%) had been involved in research/audit during medical school. Frequently cited benefits included 'professional development', 'skill acquisition' and 'CV building'. Over half considered that they needed to participate in research/audit to achieve their career aspirations. Frequently cited barriers included 'time constraints', 'lack of advertisement' and 'lack of awareness of opportunities'. A higher proportion of respondents considered that participation in audit should be mandatory compared to participation in research (47% vs. 34%). In multivariate analysis, previous participation in research/audit, having a prior degree, participation in research/audit during medical school and participation in an intercalated BSc were significantly associated with increased confidence in several research/audit skill domains.

Discussion: Many medical students participate in research or audit and perceive value in doing so. Over half of respondents to this survey considered participation in medical research/audit to be necessary to achieve their career aspirations. Medical educators should consider integrating optional research/audit projects into curricula to maximise benefit for students.

Key Words
Medical Student; Research; Audit; Attitudes; Confidence

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Introduction

Medical research and audit are key drivers of advancement and quality improvement in healthcare. The General Medical Council (GMC) emphasise the importance of research and audit in their 'Outcomes for graduates' guidance[1] and previous work has identified benefits of participation in research and audit as an undergraduate[2]. However, there is considerable variation between different medical schools regarding the level of exposure that medical students receive in research and audit skills training as an undergraduate[3] and many medical students do not have a clear understanding of what constitutes research[4].

Although publishing is seen as important for career progression by the majority of British medical students, only a small proportion seem to publish[5]. One way to guarantee student involvement in research and audit is to include mandatory projects as part of the curriculum. However, it is unclear if mandatory research projects would be welcomed by all medical students[6-8]. This study aimed to explore medical student involvement in and attitudes towards research and audit in a UK medical school. Key aims of this study were to evaluate student perceptions of the benefits of participation, explore attitudes towards mandatory research and audit projects and investigate factors associated with confidence in research and audit skills.

Methods

An anonymous, cross-sectional, 70-item self-report questionnaire was administered to current medical students from all years of the University of Leicester following ethical approval (3920-rin1-medicaleducation) from the University of Leicester Ethics Sub-Committee for Medicine and Biological Sciences.

Questionnaire design

The questionnaire was constructed following consultation of the literature to identify gaps in current understanding of medical student attitudes towards audit and research. A mixture of open, closed and Likert Scale questions were used. The questionnaire underwent piloting to test acceptability. Completion of the questionnaire took around 15-20 minutes on average. Questions were grouped into six main themes: 'Background information', 'Experience of research/audit prior to medical school', 'Experience of research/audit during medical school', 'Attitudes towards research/ audit', 'Perceptions of and attitudes towards research/audit opportunities during medical school' and 'Perceptions of and attitudes towards research/ audit skills'.

Data collection

All registered medical students were sent an email invitation to complete the on-line (Google Form) or paper survey. Email invitations were supplemented by verbal explanation of the survey following selected lectures. Prospective participants were provided with a participant information sheet summarising the project. Student participation in the study was entirely voluntary. No rewards were offered as incentives or gratitude for participation.

Data analysis

Statistical analysis was carried out using SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). Figures were constructed in Microsoft Excel 2007 (Microsoft, USA). Categorical data were expressed as number (percentage). Non-parametric data were expressed as median [inter-quartile range]. Responses to open questions were analysed using a thematic approach and categorised into common themes by SPT and reviewed by RIN. The relationship between participant characteristics and self-reported confidence in research and audit skills was evaluated using Spearman's correlation and Kendall's Tau-b statistic for continuous and dichotomous explanatory variables respectively. To facilitate logistic regression analyses, Likert scale data were dichotomised into two groups: ≥3 and <3. Multiple logistic regression was used to evaluate the relationship between research/audit skill confidence and age adjusted for course year. Forward stepwise logistic regression analyses were conducted to evaluate the relationship between participant characteristics and self-reported confidence in research and audit skills in a multivariate model. A p-value<0.05 was considered statistically significant.

Results:

In total, 114 surveys were completed. Participant characteristics are detailed in Table 1. Forty-six respondents (40%) reported that they had participated in or were currently participating in one or more research or audit projects during their time at medical school. Of those claiming involvement, 25 respondents (54%) stated that they had participated on an extra-curricular basis, while 14 (30%) had done so during a student selected module, 13 (28%) during an intercalated BSc and four (9%) as part of their clinical placement.

Attitudes towards Research and Audit

One hundred and eleven respondents (97%) considered that medical students can benefit from participating in research and 107 (94%) considered that medical students can benefit from participating in audit. In open questions, frequently cited benefits included 'Professional development' (n=72, 63%), 'Skill acquisition' (n=41, 36%), 'CV building' (n=26, 23%) and 'Quality improvement' (n=22, 19%); summarised in Figure 1. Respondents identified specific skills that medical students can gain or improve by participating in research and/or audit including: 'Presentation/academic writing skills' (n=40, 35%), 'Data analysis skills' (n=33, 29%), 'Critical appraisal/literature review skills' (n=27, 24%), 'General research/audit skills' (n=25, 22%), 'Scientific thinking/reasoning skills' (n=20, 18%) and 'Organisational skills (n=20, 18%); summarised in Figure 2.

Sixty-one respondents (54%) reported that they needed to participate in research and 66 (58%) reported that they needed to participate in audit to achieve their career aspirations. The median amount of time that respondents reported that they would invest in a research or audit project, if it meant they would become an author on a publication in a peer reviewed journal with a Pubmed ID, was 114 hours [140].

Participant characteristics	Respondents (n=114)
Age (years)	22.7 (3.1)
Gender (male)	39 (34%)
Additional degree	39 (34%)
Participation prior to medical school	33 (29%)
Audit	9 (8%)
Basic Science	11 (10%)
Clinical	10 (9%)
Other	3 (3%)
Presentation prior to medical school	8 (7%)
Poster	4 (4%)
Oral	5 (4%)
Publication prior to medical school	8 (7%)
Participation during medical school	46 (40%)
Audit	24 (21%)
Basic Science	7 (6%)
Clinical	15 (13%)
Other	11 (10%)
Presentation during medical school	22 (19%)
Poster	12 (11%)
Oral	11 (10%)
Publication during medical school	3 (3%)

Table 1: Participant characteristics

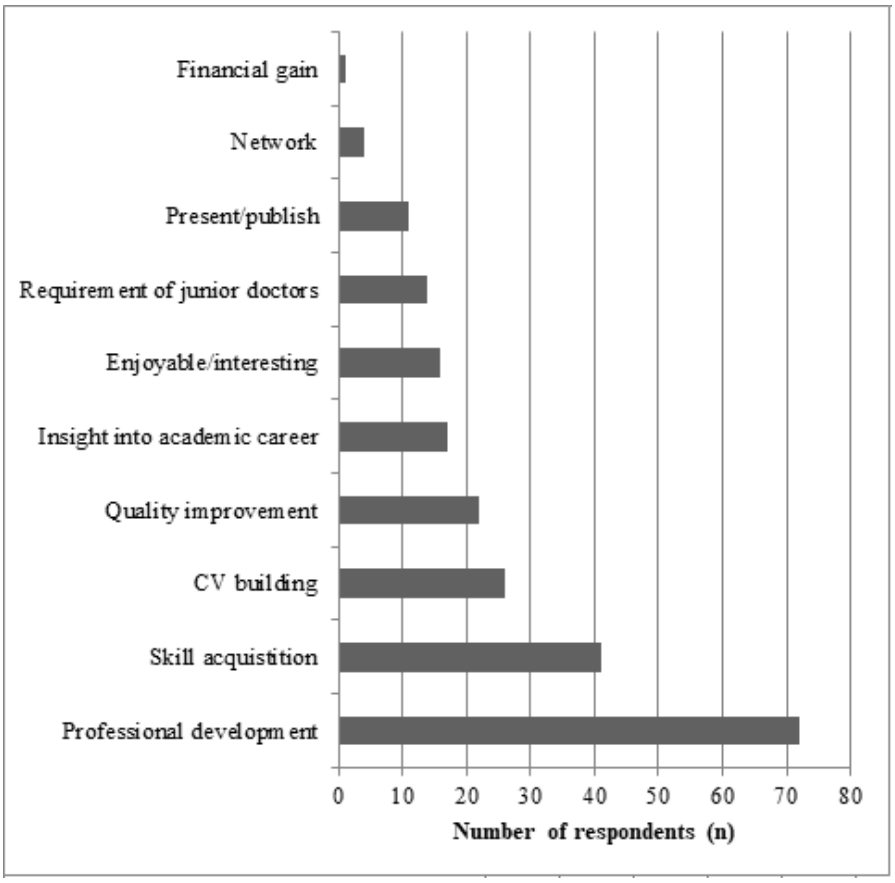

Figure 1: Themes identified in responses to open question regarding ways in which medical students can benefit from participating in research/audit

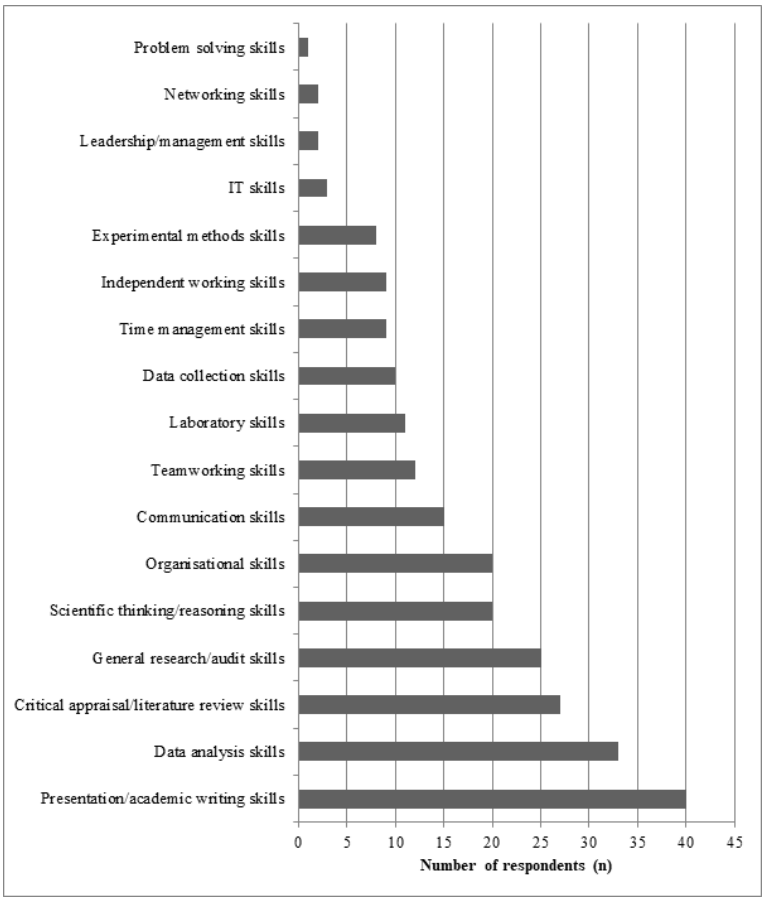

Figure 2: Themes identified in responses to open question regarding skills that medical students can gain/improve by participating in research/audit

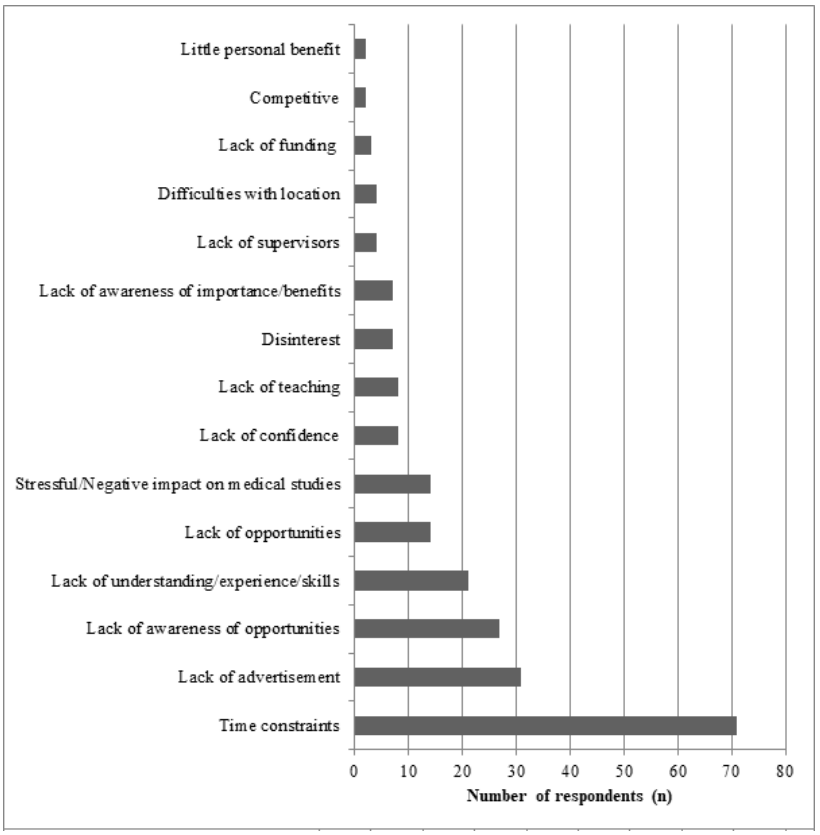

Figure 3: Themes identified in responses to open question regarding barriers to participation in research/audit

Research and Audit Opportunities

In open questions, frequently cited barriers to accessing research and/or audit opportunities included 'time constraints' (n=71, 62%), a 'lack of advertisement' (n=31, 27%) and a 'lack of awareness of opportunities (n=27, 24%); summarised in Figure 3. Suggestions to increase student involvement in research and audit included 'Better advertising and signposting of opportunities' (n=40, 35%), 'More time/allocated time to carry out research and/or audit' (n=30, 26%), 'More teaching' (n=29, 25%) and 'More opportunities' (n=25, 22%); summarised in Figure 4.

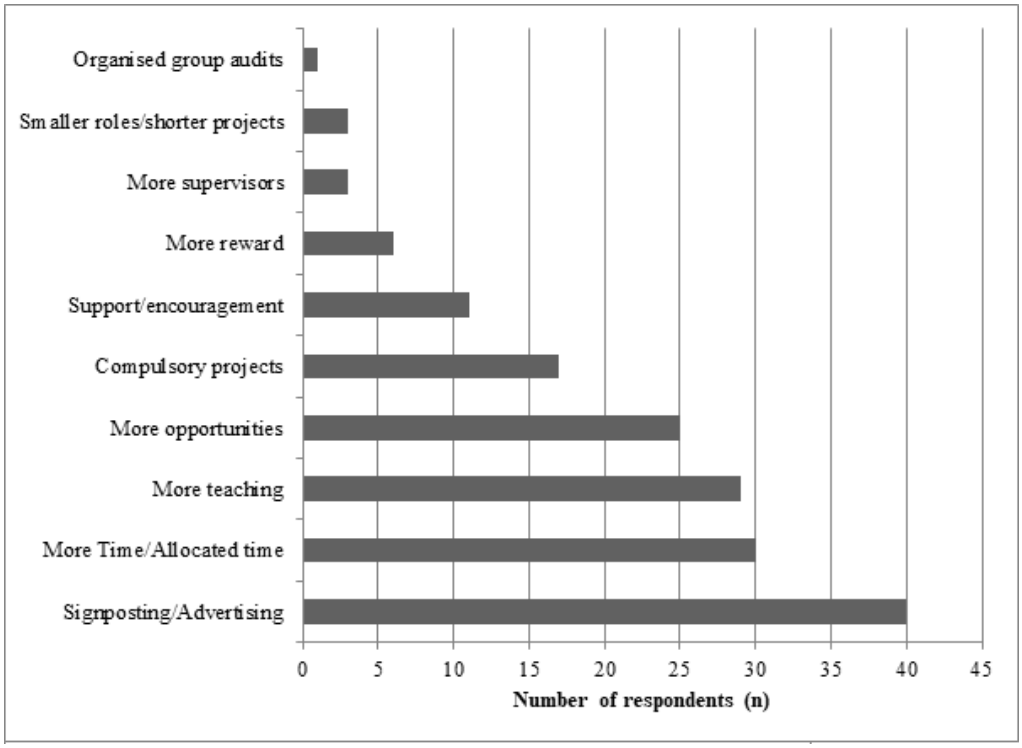

Figure 4: Themes identified in responses to open question regarding suggestions to increase participation in research/audit

One hundred and nine respondents (96%) favoured provision of an optional, dedicated research project-based module for students interested in research but not wanting to commit to a full intercalated BSc year. Only 39 respondents (34%) considered that a research project should be mandatory, whereas 54 respondents (47%) considered that an audit project should be a mandatory part of the curriculum. Of those in favour of mandatory research and audit projects, the median length of time that respondents stated should be allocated to carry out such projects were six weeks and three weeks, respectively. In univariate analysis, there were no significant differences in participant characteristics between those in favour versus those not in favour of mandatory research or audit projects.

Research and Audit Skills

Of the 11 research and audit skill domains surveyed, students reported the highest level of confidence regarding their ability to 'retrieve information from medical research databases'. Students were least confident regarding their ability to 'set up and carry out an audit', 'carry out statistical analysis in medical research', 'carry out a systematic review/meta-analysis' and 'take a research idea and turn it into a project (i.e. proposal writing, grant writing, seeking ethical approval)'. Figure 5 summarises respondent confidence in the 11 research/audit skill domains. Sixty respondents (65%) specified that formal teaching of the process of research and audit should occur earlier (pre-clinical years), while 23 (25%) specified that this should occur later (clinical years) during medical training.

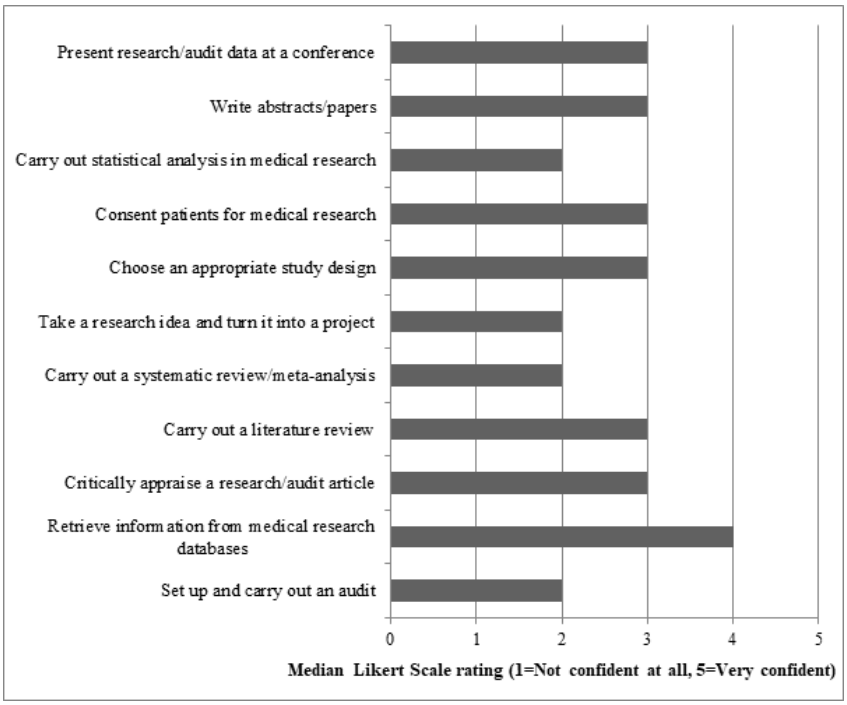

Figure 5: Self-reported confidence in the 11 research/audit skill domains surveyed

Univariate analysis

In univariate analysis, age was significantly associated with confidence in several research and audit skill domains and remained a significant predictor after adjustment for course year using multiple logistic regression, summarised in Table 2. Participation in research/audit during medical school was associated with confidence in only one of the 11 research and audit skill domains: 'ability to set up and carry out an audit' (Kendalls Tau-b 0.361, p<0.001). Participation in an intercalated BSc was associated with confidence in respondents' ability to 'set up and carry out an audit' (Kendalls Tau-b 0.204, p=0.017), 'critically appraise a research/audit article' (Kendalls Tau-b 0.17, p=0.048) and 'consent patients for medical research' (Kendalls Tau-b 0.177, p=0.037). Male gender was associated with confidence in respondents' ability to 'take a research idea and turn it into a project' (Kendalls Tau-b 0.293, p=0.001), 'carry out statistical analysis in medical research' (Kendalls Tau-b 0.197, p=0.022) and 'present research/audit data at a conference' (Kendalls Tau-b 0.203, p=0.016). Previous participation in research and having a degree prior to medical school were both significantly associated with several research and audit skill domains, summarised in Table 3.

Skill domain	Age		Age adjusted for course year			
	Spearman's rho	P-value	P-value	Odds Ratio	Lower 95% CI	Upper 95% CI
Set up and carry out an audit	0.373	<0.001***	0.011*	1.240	1.050	1.464
Retrieve information from medical research databases	0.217	0.020*	0.755	0.971	0.809	1.166
Critically appraise a research/ audit article	0.272	0.003**	0.011*	1.285	1.058	1.560
Carry out a literature review	0.504	<0.001***	<0.001***	1.541	1.233	1.926
Carry out a systematic review/ metanalysis	0.294	0.002**	0.058	1.148	0.995	1.325
Take a research idea and turn it into a project	0.226	0.016*	0.153	1.103	0.964	1.262
Choose an appropriate study design	0.052	0.583	0.250	1.083	0.945	1.242
Consent patients for medical research	0.326	<0.001***	0.020*	1.224	1.033	1.451
Carry out statistical analysis in medical research	0.014	0.880	0.349	0.931	0.802	1.081
Write abstracts/papers	0.281	0.002**	0.070	1.136	0.990	1.304
Present research/ audit data at a conference	0.397	<0.001***	0.009**	1.270	1.061	1.519

Table 2: Spearman's rank correlation analysis and multiple logistic regression (age adjusted for course year) of the relationship between age and research/audit skill confidence

Skill domain	Prior degree		Prior research	
	Kendall's tau-b	P-value	Kendall's tau-b	P-value
Set up and carry out an audit	0.083	0.341	0.041	0.644
Retrieve information from medical research databases	0.254	0.003**	0.137	0.115
Critically appraise a research/ audit article	0.243	0.004**	0.138	0.107
Carry out a literature review	0.443	<0.001***	0.266	0.001**
Carry out a systematic review/ metanalysis	0.235	0.007**	0.286	0.001**
Take a research idea and turn it into a pr oject	0.218	0.012*	0.278	0.001**
Choose an appropriate study design	0.107	0.217	0.205	0.017*
Consent patients for medical research	0.236	0.005**	0.060	0.481
Carry out statistical analysis in medical re search	0.053	0.538	0.125	0.148
Write abstracts/papers	0.335	<0.001***	0.343	<0.001***
Present research/ audit data at a conference	0.335	<0.001***	0.317	<0.001***

Table 2: Univariate analysis of the relationship between participation in research prior to medical school, having a degree prior to medical school and research/audit skill confidence

Multivariate analysis

Forward stepwise logistic regression identified several independent predictors of research and audit skill confidence using available participant characteristics. Data presented as: odds ratio, 95% confidence interval, p-value. Having a degree prior to medical school was associated with participant confidence in their ability to: 'set up and carry out an audit' (OR 3.02, 1.17-7.81, p=0.023), 'critically appraise a research/audit article' (OR 4.05, 1.55-10.61, p=0.004), 'carry out a literature review' (OR 9.65, 3.39-27.45, p<0.001) and 'consent patients for medical research' (OR 4.6, 1.7-12.45, p=0.003). Participation in research/audit prior to medical school was associated with participant confidence in their ability to: 'carry out a systematic review/ metanalysis' (OR 3.82, 1.59-9.17, p=0.003), 'take a research idea and turn it into a project' (OR 2.52, 1.03-6.15, p=0.043), 'choose an appropriate study design' (OR 2.6, 1.08-6.28, p=0.033), 'write abstracts/papers' (OR 5.23, 2.05-13.36, p=0.001) and 'present research/audit data at a conference' (OR 6.38, 2.2-18.54, p=0.001). Participation in research/audit during medical school was associated with participant confidence in their ability to: 'set up and carry out an audit' (OR 7.17, 2.85-18.07, p<0.001) and 'consent patients for medical research' (OR 0.36, 0.14-0.93, p=0.034). Participation in an intercalated BSc was associated with participant confidence in their ability to: 'critically appraise a research/audit article' (OR 4.02, 1.04-15.45, p=0.043), 'consent patients for medical research' (OR 13.02, 2.41-70.39, p=0.003), 'write abstracts/papers' (OR 3.72, 1.16-11.9, p=0.027) and 'present research/audit data at a conference' (OR 4.97, 1.3-19.05, p=0.019). Male gender was associated with participant confidence in their ability to 'take a research idea and turn it into a project' (OR 4.13, 1.76-9.72, p=0.001).

Discussion:

This study suggests that medical students perceive value in obtaining experience of research and audit during their training and over half of respondents to this survey considered this experience to be necessary to be able to achieve their career aspirations. Many students go on to participate in research or audit projects during their time at medical school and a large proportion of these students appear to do so in their own time. While many respondents expressed interest in participating in research and audit, the majority did not favour inclusion of a mandatory research or audit project during medical school.

Given the demanding nature of medical school curricula, the extra-curricular participation in research and audit by medical students highlights the motivation and drive that many of them possess. Despite their interest in research and audit, however, respondents to this survey identified barriers to participation. In open questions, the most frequently cited barrier to participation in research and/or audit was 'time constraints'. Medical school curricula are notoriously demanding, which can make decisions concerning time allocation challenging. Integration of research and audit into medical curricula could enable medical students to meet the criteria set out in the GMC's 'Outcomes for Graduates' guidelines in which research and audit skills are highlighted as a requirement[1]. However, many respondents to this questionnaire did not favour mandatory projects. These data suggest that many students support an optional research project-based module for students wishing to participate in research but not wanting to undertake a full intercalated BSc year.

Providing optional research and audit opportunities may be an effective way to engage students in projects while at medical school. A literature review carried out by Chang et al.[2] suggested that optional and mandatory research projects do not differ in terms of student productivity and students appear to derive more satisfaction from optional/elective projects. The authors postulate that this may be because students participating in voluntary projects are self-selected and are therefore more likely to have positive perceptions regarding research. Moller et al.[9] investigated medical student perceptions of their learning environment during a mandatory research project. The authors found that individual supervision, continuous feedback and a positive atmosphere characterised by varied learning interactions and a sense of trust were characteristics of a 'good' learning environment. The authors also found that students who participated in basic science and epidemiological projects rated their learning environment and supervision more highly than those participating in clinical research projects. The authors suggest that this may be because basic science projects are typically carried out within teams who work in close collaboration. Another study from the same group[10] found that students who undertook pre-clinical research projects expressed greater interest in participating in part-time research in the future while students who undertook clinical research projects were least interested in participating in further research projects. Parsonnet et al.[11] highlight the pros and cons of mandatory research projects and conclude that medical educators should consider if such projects are an essential component of their institutions' 'educational mission'. If the answer to this question is 'yes', the authors argue that educators should carefully consider the resources required as providing mandatory components may be resource intensive.

Some barriers to participation in research and audit may be easier to address than others and addressing these barriers may have a significant impact on the number of students participating in projects. For example, interventions such as providing greater support and encouragement and increasing student awareness of research and audit opportunities via improved advertising and signposting may result in greater student engagement. Similarly, organisation of group audits and research projects, modelled on the successful STARSurg initiative[12] may facilitate student involvement. Collaborations enable students to share the workload of a large-scale research or audit project by playing a small, clearly defined role within a set timeframe. Having a structured approach to research and audit in this manner may enable students, who are inevitably busy with course commitments, to participate in meaningful research and gain valuable skills which they can utilise in future projects.

Interestingly, many respondents felt that participation in research and audit was necessary to achieve their career aspirations. This is in-keeping with findings from a study carried out by Giffin and Hindocha[5] which found that British medical students viewed publishing as important for career progression. The authors note that despite the importance that medical students place on publishing, only a small proportion seem to publish. The discordance between student perceptions of publishing and the number who publish may be partly due to time constraints, which has been highlighted by many respondents in this study.

Confidence in research and audit skills

Respondents to this questionnaire expressed lower levels of confidence in their ability to 'set up and carry out an audit', 'carry out statistical analysis in medical research', 'carry out a systematic review/ meta-analysis' and 'take a research idea and turn it into a project'. In multivariate analysis, several characteristics were identified as independent predictors of confidence in the 11 skill domains. Prior experience of research or audit, having a degree prior to starting medical school, participation in an intercalated BSc and participation in research or audit during medical school were strongly associated with increased confidence in several skill domains. Some of these findings are unsurprising however it is of interest that participation in an intercalated BSc was associated with increased confidence. This suggests that participation in an intercalated BSc may facilitate professional development and enable students to develop additional skills outside of the undergraduate medical curriculum. Furthermore, participation in intercalated degrees may lead to improved performance in undergraduate examinations and may increase likelihood of pursuing academic careers[13]. Interestingly, this study found that male gender was associated with participants confidence in their ability to 'take a research idea and turn it into a project'. This was an unexpected finding and suggests that gender gaps may still exist to some extent in academia. Many respondents considered that medical students should receive more formal teaching of research and audit skills; the majority felt that research and audit skill teaching should take place early in the course, during pre-clinical years. Early exposure to research and audit may enable students to begin developing specific skills at an early stage, this may in turn lead to greater confidence and more opportunities to participate in projects later during undergraduate medical training. Further research is needed to evaluate the value of early research and audit exposure and identify optimal timing of research hand audit skill teaching.

Limitations

The main limitations of this study are the self-report survey design, which carries a risk of response bias, and the voluntary nature of this study which will have reduced the response rate. Furthermore, the survey was relatively long in duration, taking around 20 minutes to complete, which may have contributed to a reduction in overall response rate. Finally, this study was conducted at a single centre and for findings to be generalisable this study would need to be performed at other UK medical schools.

Conclusion:

Many medical students perceive value in obtaining experience of research and audit during medical school. This cross-sectional survey suggests that a proportion of students would prefer involvement in research and audit to be voluntary. Several factors appear to influence medical student confidence in research and audit skills, including prior participation in research/audit projects, having an additional degree and participation in an intercalated BSc. These findings would benefit from confirmation in a larger cohort including other UK medical schools. Medical educators should consider ways to integrate optional research and audit opportunities, in addition to targeted research and audit skills teaching early in the undergraduate medical curriculum to maximise benefits for students.

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