PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Location and Support are Critical to Attracting Foundation Doctors: A Discrete Choice Experiment
AUTHORS	Scanlan, Gillian Cleland, Jennifer Johnston, Peter Walker, Kim Krucien, Nicolas Skatun, Diane

VERSION 1 – REVIEW

REVIEWER	Mr Umo Esen South Tyneside NHS Foundation Trust Harton Lane South Shields NE34 OPL ENGLAND UK
REVIEW RETURNED	17-Oct-2017

GENERAL COMMENTS	Congratulations on an excellent and timely paper that will contribute to the thorny issue of workforce planning as well as / recruitment and retention of medical personnel . Issues to address. 1. Page 7. Lines 16-25 refers to " Foundation Doctors drawn from two contrasting Scottish regions". Could you elaborate on this? What were the contrasts and how would these impact the findings of the focus groups/interviews? 2.The fact that 50% of F2s did not apply for specialty/core training needs further elaboration. This is an incidental but important finding of this paper, that has been reported since the inception of Foundation Programme. It is right to call for further research in to this, but that should also perhaps include a critical look at the Foundation Programme itself as the seeds of non application might have been sown there.

REVIEWER	Dr Sharon Spooner University of Manchester
REVIEW RETURNED	23-Oct-2017

GENERAL COMMENTS	I agreed to review this paper because it sits within in my area of research, however my work is mostly qualitative, therefore I have largely limited my review to non-statistical comments.

	I have indicated negative responses to each of the questions listed below: If statistics are used are they appropriate and described fully? I am unable to rigorously review the appropriateness of the use of statistics or their description as this is not my area of expertise. Are the discussion and conclusions justified by the results? My lack of expertise in statistical methods similarly limits my ability to comment adequately on how these data are discussed and the conclusions justified. Is the supplementary reporting complete (e.g. trial registration; funding details; CONSORT, STROBE or PRISMA checklist)? Documentation available to me included no research checklists. This paper would benefit from revisions as follows: 1. Abstract. Description of the aim of the study does include a statement of the 'ultimate aim' as is described in the final paragraph of the introduction in the main document. 2. Strengths and limitations. The fourth point is unclear; the attempted clarification of the initial point has not achieved its purpose. 3. Methods I have theoretical concern about inclusion of income in the DCE despite acknowledgement that income is not a major factor driving choice of training programme. If the authors feel it imperative to utilise computation of WTP as a marker for preferences in the DCE, the paper should be more explicit in discussion of the limitations of income in this way – and, in later discussion of how strategies may be developed to re-balance entry to under-filled training programmes, ought to clearly state whether this limits the usefulness of income levels as a potential incentive to attract doctors to those training programmes which remain unfilled. 4. I feel the authors ought to acknowledge the potential for bias which can be generated by the use of positive/negative language when referring to variables in the DCE. 5. Further, the paper fails to recognise that whilst many factors related to location may be known prior to working/living in that location, it may not be possible for doctors to accurately ascertain other variables in advance: e.g. the supportiveness of the workplace culture, detailed knowledge of working conditions (including staffing levels which may fluctuate rapidly) and the opportunities for career development which can be achieved as opposed to historic or potentially available opportunities. Even familiarity with a specialty can feel misleadingly higher with brief exposure than is thought relevant after longer exposure. These limitations have not been mentioned. 6. Finally, although the paper claims to be the first such study of Foundation doctors, there appears to be a great deal of overlap between this work and a broader sample of trainee doctors with data from 2013 and published in 2016 (CLELAND, J., JOHNSTON, P., WATSON, V., KRUCIEN, N. & SKÅTUN, D. 2016. What do UK doctors in training value in a post? A discrete choice experiment. Medical education, 50, 189-202.) As such, this paper needs to be clear about it adds that has not already been reported.

REVIEWER	Dr Puja Verma

	Imperial GP Specialty Training Scheme UK
REVIEW RETURNED	28-Oct-2017

GENERAL COMMENTS	Interesting piece of work. Large Scale. Relevant. Interesting choice of methodology (DCE) Conclusion is unclear. Found the results section a little difficult to follow and -? consider sub headings I agree that further qualitative research is very much needed to gain further insight. This data will be useful for Medical schools/ The Foundation programme. Interesting to see CPD rated highly by trainees- again useful for programmes / the advertising of the programmes. Perhaps in the discussion make more of how your findings can be used in real terms. Would be very interesting to see the breakdown - re answers and which specialty the students chose.

REVIEWER	Martin Howell School of Public Health, University of Sydney
REVIEW RETURNED	02-Nov-2017

GENERAL COMMENTS	I have been asked to review the design and analysis of the DCE and have not reviewed the paper as a whole. I am unable to form a view as to the soundness of the methodology and analysis as the authors have provided insufficient detail of the following: a. The methodology used to design the DCE. b. Details of the regression model(s). The text indicates a conditional logit, however the tables indicate an MNL. The utility function does not show an error term. c. The method used to calculate the confidence intervals for the WTP has not been indicated. c. The software used for the analysis has not been stated. d. There is insufficient detail to check the step wise approach to the final model. I recognise that much of this detail would not be of interest or relevance to most of the readers of the article. However, the authors could include detail in supplementary files. Other aspects I have noted include - the lack of a participant characteristics table and the mode of adminstration. I refer the authors to the following report which provides a checklist that may assist in ensuring reporting is at a level to enable a informed review to be undertaken. Hauber, A. B., J. M. González, C. G. M. Groothuis-Oudshoorn, T. Prior, D. A. Marshall, C. Cunningham, M. J. Ijzerman and J. F. P. Bridges (2016). "Statistical Methods for the Analysis of Discrete Choice Experiments: A

VERSION 1 – AUTHOR RESPONSE

Dear Editor and Reviewers,

Thank you for taking your time to review this paper and for all the positive suggestions on how to improve it. We have responded to each reviewer individually and where deemed appropriate and necessary changes were made to the paper. Below is a list of each point made by each reviewer and the responses made by the authors.

Best Wishes,
Ms G Scanlan

Editorial requirements:

Please revise the title of your manuscript to include the research question, study design and setting. This is the preferred format of the journal.

Response:
What Factors Are Critical to Attracting NHS Foundation Doctors into Speciality or Core Training: A Discrete Choice Experiment

Reviewer(s)' Comments to Author:

Reviewer: 1
Reviewer Name: Mr Umo Esen
Institution and Country: South Tyneside NHS Foundation Trust, ENGLAND, UK
Please state any competing interests or state 'None declared': None declared

Issues to address.
1. Page 7. Lines 16-25 refers to " Foundation Doctors drawn from two contrasting Scottish regions". Could you elaborate on this? What were the contrasts and how would these impact the findings of the focus groups/interviews?

Response: Thank you for this we have now added the sentence below to include information about the two regions selected in the data set, see Page 7, lines 11-13: These regions were chosen as they are diverse in terms of size and geographical locality, and because local data indicated that they attract a different groups of FP doctors in terms of home origin and medical school attended.

2.The fact that 50% of F2s did not apply for specialty/core training needs further elaboration. This is an incidental but important finding of this paper, that has been reported since the inception of Foundation Programme. It is right to call for further research in to this, but that should also perhaps include a critical look at the Foundation Programme itself as the seeds of non application might have been sown there.

Response: Great point, we have now included the following sentence in the discussion on Page 17, lines 9-15. And we aligned this with a comment from reviewer 2 about the limitations of the study (see

comment 5): The location of a job is often known prior to accepting a training post. However, it may not be reasonable to assume that doctors will be able to determine other variables in advance. For example, they may not be able to assess the level of support in their new workplace, or have a detailed knowledge of the staffing levels or career development opportunities. However, given emerging evidence indicates that experiences during the Foundation Programme are influential in early career decision making, it is perhaps timely to consider a critical evaluation of this programme.

Reviewer: 2
Reviewer Name: Dr Sharon Spooner
Institution and Country: University of Manchester
Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below
I agreed to review this paper because it sits within in my area of research, however my work is mostly qualitative, therefore I have largely limited my review to non-statistical comments.
I have indicated negative responses to each of the questions listed below:

If statistics are used are they appropriate and described fully?
I am unable to rigorously review the appropriateness of the use of statistics or their description as this is not my area of expertise.

Are the discussion and conclusions justified by the results?
My lack of expertise in statistical methods similarly limits my ability to comment adequately on how these data are discussed and the conclusions justified.

Is the supplementary reporting complete (e.g. trial registration; funding details; CONSORT, STROBE or PRISMA checklist)?
Documentation available to me included no research checklists.

This paper would benefit from revisions as follows:
1. Abstract.
Description of the aim of the study does include a statement of the 'ultimate aim' as is described in the final paragraph of the introduction in the main document.

Response: The aims now align with each other. Please see the last sentence in the introduction: 'Our ultimate aim in doing so was to investigate the relative value of F2 doctor's preferences for different training post characteristics during the time in which they either applied for core training, specialty training or take a break'

2. Strengths and limitations.
The fourth point is unclear; the attempted clarification of the initial point has not achieved its purpose.

Response: We have reworded this fourth point, so it is clearer, to read as:

Our Focus was on generic 'push-pull' factors rather than speciality choice (i.e. surgery or general practice). Thus, we could not investigate if there was an association between certain preferences and whether, or not, a respondent applied for speciality training, or for particular training programmes.

3. Methods
I have theoretical concern about inclusion of income in the DCE despite acknowledgement that

income is not a major factor driving choice of training programme. If the authors feel it imperative to utilise computation of WTP as a marker for preferences in the DCE, the paper should be more explicit in discussion of the limitations of income in this way – and, in later discussion of how strategies may be developed to re-balance entry to under-filled training programmes, ought to clearly state whether this limits the usefulness of income levels as a potential incentive to attract doctors to those training programmes which remain unfilled.

Response: The reviewer is sceptical about validity of WTP results because "income" attribute might not have been well understood/accepted by the participants – It is a fair point. However, we used the cost attribute to compute WTP to compare the relative importance of the attributes and not the absolute size of the WTP values. We have explained why we did this in the Methods (highlighted).

4. I feel the authors ought to acknowledge the potential for bias which can be generated by the use of positive/negative language when referring to variables in the DCE.

Response: If the reviewer is referring to the values provided to each attribute i.e. undesirable location, this is just a name given to the variable in the model itself. All variables have several levels, some have two and others have three. For geographical location we have desirable and undesirable to simply describe the attribute levels, this also helps with ease of interpretation. Also, the variable levels were developed from the literature and extensive qualitative work with the target population, so the language reflects their input. We have made this clearer in the methods section.

5. Further, the paper fails to recognise that whilst many factors related to location may be known prior to working/living in that location, it may not be possible for doctors to accurately ascertain other variables in advance: e.g. the supportiveness of the workplace culture, detailed knowledge of working conditions (including staffing levels which may fluctuate rapidly) and the opportunities for career development which can be achieved as opposed to historic or potentially available opportunities. Even familiarity with a specialty can feel misleadingly higher with brief exposure than is thought relevant after longer exposure. These limitations have not been mentioned.

Response: Thank you we have now added in a paragraph explaining some of these limitations. Please see page 17, lines 9-15. We also aligned with reviewer ones point two:

The location of a job will be known prior to accepting a training post. However, it may not be reasonable to assume that doctors will be able to determine other variables in advance. For example, they may not be able to assess the level of support in their new workplace, or have a detailed knowledge of the staffing levels or career development opportunities. However, given emerging evidence indicates that experiences during the Foundation Programme are influential in early career decision making, it is perhaps timely to consider a critical evaluation of this programme.

6. Finally, although the paper claims to be the first such study of Foundation doctors, there appears to be a great deal of overlap between this work and a broader sample of trainee doctors with data from 2013 and published in 2016 (CLELAND, J., JOHNSTON, P., WATSON, V., KRUCIEN, N. & SKÅTUN, D. 2016. What do UK doctors in training value in a post? A discrete choice experiment. Medical education, 50, 189-202.) As such, this paper needs to be clear about it adds that has not already been reported.

Response: We have highlighted content in the introduction and the methods which highlight the differences in these studies and that this is a new investigation into this group of doctors in training i.e. F2 doctors. Additionally, in the introduction page 5 line 16, we make clear 'Thus, to address this gap in the literature, we developed a new DCE'. Furthermore, we have put the words 'focussing solely' in

line one of the discussion, to indicate this is the first study that looked as this specific group in time. Cleland et al (2016) paper looked at trainees at all levels of training.

Reviewer: 3
Reviewer Name: Dr Puja Verma
Institution and Country: Imperial GP Specialty Training Scheme, UK
Please state any competing interests or state 'None declared': None Declared

Please leave your comments for the authors below
Interesting piece of work.
Large Scale.
Relevant.
Interesting choice of methodology (DCE)

Conclusion is unclear.

Response: Please see the last sentence of the discussion found on page 19, for better clarity:
In other words, meeting the needs of F2 doctors may help to strengthen the level of commitment doctors in training have towards the NHS54, help with retention of this group of doctors and hence meet immediate and future service delivery needs.

Found the results section a little difficult to follow and -? consider sub headings

Response: Thank you, in the results section there is sub headings already in place. Please see highlighted sub headings in the results section. This sub headings included are the standard in DCE Papers.

I agree that further qualitative research is very much needed to gain further insight. This data will be useful for Medical schools/ The Foundation programme. Interesting to see CPD rated highly by trainees- again useful for programmes / the advertising of the programmes. Perhaps in the discussion make more of how your findings can be used in real terms.

Response: Thank you. We have stressed the importance of ensuring a supportive working culture to attract and retain trainees in the discussion, and highlighted the importance of the Foundation Programme experience in early careers decision making. We have suggested the need to review the FP.

Would be very interesting to see the breakdown - re answers and which specialty the students chose.

Response: Yes, it would have been, but we were unable to do this due to the study design. We have suggested this as a focus for future research. See Page 17, lines 18-19 and Page 18 lines 1-7.

Our focus was generic "push-pull" factors51 rather than specialty choice (e.g., a preference for surgery or general practice), so we did not investigate possible links between these preferences and specialty preferences. This means that we could not compare if compensation values varied between those whose preference was to apply for a popular specialty, versus those who were intending to apply to a less competitive specialty. However, this generic focus allowed us to pull out differences between those who did, and did not, apply for core medical training or specialty training, at the standard time. Future research could look at the association between particular preferences (e.g., for work-life balance) and specialty choice.

Reviewer: 4

Reviewer Name: Martin Howell
Institution and Country: School of Public Health, University of Sydney
Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below
I have been asked to review the design and analysis of the DCE and have not reviewed the paper as a whole. I am unable to form a view as to the soundness of the methodology and analysis as the authors have provided insufficient detail of the following:
a. The methodology used to design the DCE.

Response:
We have included the following to a sentence found on page 8, line 14:
A D-efficient design with null priors was generated with 12 choice sets to investigate the main effects of changes in the training position's characteristics on respondents' choices. We have also added in this reference: Johnson FR, Lancsar E, Marshall, D, et al. Constructing experimental designs for discrete-choice experiments: Report of the ISPOR conjoint analysis experimental design good research practices task force. Value Health 2013; 16:3-13.

b. Details of the regression model(s). The text indicates a conditional logit, however the tables indicate an MNL. The utility function does not show an error term.

Response: We changed to include the MNL model information and added an error term for the utility function. Please see page 9, lines 12-15:

This can be represented via a multinomial conditional logit model (MNL)regression42 with the underlying utility (Vntj) obtained through the characteristics of the training positions presented by the following: $V = b.X + e$, where e is an error term which is independently and identically distributed as type 1 extreme value.

c. The method used to calculate the confidence intervals for the WTP has not been indicated.

Response. See page 10, line 11: We used the delta approach on STATA to calculate the WTP confidence intervals.

c. The software used for the analysis has not been stated.
Response: This is now included. We used STATA. See page 10, line one:
The analysis of the five qualitative characteristics (i.e., geographical locality, familiarity with speciality, culture of working and learning environment, working conditions, and opportunities for professional development) was analysed on STATA and are entered in the model as dummy coded…

d. There is insufficient detail to check the step wise approach to the final model.

Response: This is already included in text. We have highlighted this for clarity. Please see page 11, lines 8-12.

Thus, for ease of reporting and interpretation, we used stepwise regression to identify the most relevant interaction effects and specify a more parsimonious choice model. All personal characteristics with a non-significant result using a significance level of 20% (P-value < 0.2) were removed in the final conditional logistic regression model analysis.

I recognise that much of this detail would not be of interest or relevance to most of the readers of the

article.
However, the authors could include detail in supplementary files.
Other aspects I have noted include - the lack of a participant characteristics table and the mode of adminstration.

Response: Participant characteristics are included in text. We have highlighted this on page 12, lines 2-9. We omitted a demographic table due to the number of tables already included in this paper, however, we are happy to provide if the editor would like this table.
The mode of administration is provided throughout the paper, it was an e-survey, we have highlighted this in the paper for clarity. Please see page 9, lines 2-3. Please see page 18, lines 14-15:

The DCE was incorporated into the National F2 Career Destination Survey 2016 within Scotland. This e-survey collects…

…our survey escaped the usual response to an e-survey request…

VERSION 2 – REVIEW

REVIEWER	Martin Howell School of Public Health, University of Sydney
REVIEW RETURNED	06-Dec-2017

GENERAL COMMENTS	The authors have provided cursory responses to my comments. They have provided some additional detail that confirms aspects of the methodology. Some comments: 1. If I have not seen something in the text in undertaking a methodological review then this would suggest it was not clear. For example I am not familiar with the larger survey and the mode of administration is not easily found. As this is reporting on the DCE then these aspects should be clear. 2. It is still not clear how the step wise model was under taken and what tests have been undertaken to justify the 'final' model compared to others or the base model. To respond that it is in the text has not addressed my initial comment. As I suggested this information could be provided in supplementary material. 3. I would still suggest that a patient characteristic table is an important aspect of reporting.

REVIEWER	Umo Esen South Tyneside NHS Foundation Trust, Harton Lane South Shields Tyne and Wear NE34 0PL
REVIEW RETURNED	18-Dec-2017

GENERAL COMMENTS	The amended title should have a question mark as in: What Factors Are Critical to Attracting NHS Foundation Doctors into Speciality or Core Training?: A Discrete Choice Experiment

VERSION 2 – AUTHOR RESPONSE

Dear Editor and Reviewers,
Thank you for taking your time to review this paper and for all the positive suggestions on how to improve the second revision of this paper. We have responded to each reviewer individually and where deemed appropriate and necessary changes were made to the paper. Below is a list of each point made by each reviewer and the responses made by the authors.
Best Wishes,
Ms G Scanlan

Reviewer(s)' Comments to Author:

Reviewer: 4
Reviewer Name: Martin Howell

Institution and Country: School of Public Health, University of Sydney

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below
The authors have provided cursory responses to my comments. They have provided some additional detail that confirms aspects of the methodology.
Some comments:

1. If I have not seen something in the text in undertaking a methodological review then this would suggest it was not clear. For example I am not familiar with the larger survey and the mode of administration is not easily found. As this is reporting on the DCE then these aspects should be clear.
Response: In the Methods section under the heading 'Sample and Data Collection' we explain what the larger survey is referring to and the mode of administration (e-survey). For further clarity we have added that the e-survey was sent via email by the Scottish Foundation programme director. Please see below:
The DCE was incorporated into the National F2 Career Destination Survey 20164 within Scotland. This e-survey collects data on the career destinations of F2 doctors as near as practicable to completion of their foundation training and so was considered an apt vehicle for our DCE. The Destination Survey was sent via email by the Scottish Foundation Programme director to all Scottish F2 doctors due to complete FP2 in August 2016) (n=798) in June 2016, and closed in August 2016. Two reminder emails were sent during this time.
Additionally, in our paper we explain that the mode of administration was via e-survey (Please see line 10 of page 2 of the abstract. Please see lines 1-2 of page 9. Please see lines 15-16 on page 18) however, perhaps now we have added the above sentence about how the e-survey was sent out this will provide better clarity.

2. It is still not clear how the step wise model was under taken and what tests have been undertaken to justify the 'final' model compared to others or the base model. To respond that it is in the text has not addressed my initial comment. As I suggested this information could be provided in supplementary material.
Response: We have now explained the stepwise selection procedure and adapted this section in the paper (page 11, lines 9-15). Please see below:
Thus, for ease of reporting and interpretation, we used a backward stepwise regression. This approach allowed us to start a model with all relevant variables of interest. In the next stage the least significant variable was removed from the model using a significance level of 20% (P-value < 0.2).

This approach then applied the same rule to smaller models until all remaining variables were statistically significant. Thus, this method allowed us to identify the most relevant interaction effects and allowed for a more parsimonious choice model. And in the final conditional logistic regression model analysis all personal characteristics with a non-significant level of 20% were removed.

3. I would still suggest that a patient characteristic table is an important aspect of reporting.
Response: Thank you for your comment on this. As noted earlier in our previous response, participant demographics are presented within the text. Please refer to the instruction guidelines for authors under the sub section 'tables' it provides this information: 'Tables should be self-explanatory and the data they contain must not be duplicated in the text or figures'. We omitted the participant demographic tables due to duplicating the same information found in the text and due to the number of tables/figures already included in the paper. However, we are more than happy to provide this to the editor if they would like this to be included.

Reviewer: 1
Reviewer Name: Umo Esen

Institution and Country: South Tyneside NHS Foundation Trust, Tyne and Wear, UK

Please state any competing interests or state 'None declared': None Declared

Please leave your comments for the authors below
The amended title should have a question mark as in:
What Factors Are Critical to Attracting NHS Foundation Doctors into Speciality or Core Training?: A Discrete Choice Experiment
Response: Thank you for this. We have now added the question mark into the title. See below:
What Factors Are Critical to Attracting NHS Foundation Doctors into Speciality or Core Training? A Discrete Choice Experiment

VERSION 3 – REVIEW

REVIEWER	Martin Howell University of Sydney School of Public Health Australia
REVIEW RETURNED	18-Jan-2018

GENERAL COMMENTS	Thank you for your responses. I look forward to the completed publication.