PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Do health behaviours change after colonoscopy? A prospective cohort study on diet, alcohol, physical activity and smoking among patients and their partners.
AUTHORS	Hubbard, Gill; Brown, Alistair; Campbell, Anna; Campbell, Neil; Diament, Robert; Fielding, Shona; Forbat, Liz; Masson, Lindsey; O'carroll, Ronan; Stein, Kevin; Morrison, David

VERSION 1 - REVIEW

REVIEWER	Gozde Ozakinci Lecturer in health psychology University of St Andrews
REVIEW RETURNED	28-Aug-2013

THE STUDY	I am not sure what the primary outcome is..
RESULTS & CONCLUSIONS	I am unclear about the outcome variables of interest. It seems like the primary outcome variable that is used for power calculations is physical activity but this is not clearly presented in the text and is rather inferred.
REPORTING & ETHICS	I am unclear about the outcome variables of interest. It seems like the primary outcome variable that is used for power calculations is physical activity but this is not clearly presented in the text and is rather inferred.
GENERAL COMMENTS	This is a novel and unique study that aims to look at spontaneous changes following colonoscopy in patients and their partners. It is based on the teachable moment hypothesis and is relevant to the context of colonoscopy. I read the manuscript with interest. I believe that the manuscript and its contribution would be enhanced if the following points are clarified and expanded upon: 1. I am a little confused regarding the primary outcome of this study. Is it physical activity as it can be inferred from the power calculations? In relation to that could the authors elaborate on why they believe that all health behaviours would be equally affected as a result of colonoscopy? I guess I am wondering if the authors would expect a change in all of those behaviours, some of whom might seem a bit irrelevant to the participants such as alcohol consumption or physical activity in relation to colorectal cancer risk. I think a discussion around why colonoscopy should act as a teachable moment for all health major health behaviours would be very beneficial. 2. Self-efficacy and locus of control have been measured. Would it be possible to include the authors' hypotheses regarding these constructs? It seems like from the discussion that authors were

	interested in fatalistic beliefs. Could they provide background to that? Minor points: 1. Last paragraph in the introduction seems to omit that self-reported diet has also been measured (last sentence). 2. P. 13: I think there's a typo in the last sentence before 'please insert table 1' as it says 55% of ARN and 42% ARN. 3. P. 14: First paragraph mentions 'temporal' trends in relation to partners' lack of behaviour change. I'm not sure if 'temporal' is the right word there. Proximal?

REVIEWER	Williams, Kate University College London
REVIEW RETURNED	19-Sep-2013

GENERAL COMMENTS	**2. Is the abstract accurate, balanced and complete?** The abstract is generally fine but the statement in the conclusion about colonoscopy being a teachable moment is somewhat overstated. **3. Is the study design appropriate to answer the research question?** Not entirely. The authors state that their aim is to describe health behaviours before and after a colonoscopy, however, participants were given their 'baseline' questionnaire at their colonoscopy appointment to complete at home. The baseline questionnaire was therefore completed after the colonoscopy when participants may already have been influenced and started making some changes. How long after their colonoscopy did participants return their questionnaires? Was it before or after they received their results? Was there a deadline to return it? The authors should be clear that the baseline questionnaire was not completed prior to the colonoscopy appointments and acknowledge the limitations of this. Also, although the aim was to describe health behaviours before and after a colonoscopy, much of the results focus on baseline comparisons between the two colonoscopy outcome groups. It is not clear if this was the key question and if the study was powered for this? **4. Are the methods described sufficiently to allow the study to be repeated?** Not entirely. More detail is required to clarify how long after their

	colonoscopy participants returned their questionnaires, whether it was before or after their results and whether there was a deadline to return it (see my response to point 3 above). **6. Are the outcomes clearly defined?** It is not clear whether the authors think that the small behaviour changes observed were different from what would be expected in a population who had not received a colonoscopy? In the absence of a control group it is not possible to attribute behaviour change (or lack of behaviour change) to the colonoscopy. **8. Are the references up-to-date and appropriate?** Introduction, paragraph 1 – The authors claim that the observational research on health behaviour change following a cancer diagnosis is limited to retrospective analyses; however, the paper they refer to (Williams et al., 2013) is a prospective study. There have also been other prospective studies of health behaviour change following a cancer diagnosis e.g. Newsom et al (2012). Introduction, paragraph 2 – The links to the Scottish government recommendations (references 28-30) do not work and were accessed in 2009 so would benefit from being updated. In particular, I am unfamiliar with the recommendation for bread and was unable to verify this using the reference or by searching for the recommendation myself. **9. Do the results address the research question or objective?** The aim was to describe changes in health behaviours from before to after a colonoscopy, but as the baseline questionnaire was completed after the colonoscopy this is problematic (see my response to point 3). Table 2 shows significant differences for both patients and partners on the 'Powerful others' domain of the Multidimensional Health Locus of Control Scale, but there is no mention of this in the results or discussion. The authors should elaborate on this finding or remove these results altogether. **11. Are the discussion and conclusions justified by the results?** In the abstract the authors conclude that a colonoscopy is a teachable moment for some health behaviours and this is reiterated in the discussion. This is a strong statement that is not reflected by the results. Although positive changes were observed for alcohol consumption, the results also show an 8% increase in the proportion

	of those with low levels of physical activity. The methods section states that levels of physical activity were categorised as low, moderate and high, implying that this 8% increase reflects a reduction in physical activity levels. As the authors do not report the results for those with moderate or high levels of physical activity it is impossible to tell where these reductions occur. There is currently little mention of this in the discussion so it needs to be addressed further with discussion of why this may have occurred. Given that there were negative changes in physical activity and no changes in smoking behaviour following a colonoscopy, it somewhat overstates the case to say that a colonoscopy may be a teachable moment. **12. Are the study limitations discussed adequately?** As the baseline questionnaires were completed after the patients' colonoscopies, the authors should acknowledge that their health behaviours may already have been influenced. Also, the absence of a control group **16. Does this paper require further specialist statistical review?** I am not a statistical expert so this would be up to the editors to decide. **Additional minor comments** 1. In my version of the pdf there are some errors with the table numbers. Some of these aren't inserted in the text and all the tables are labelled Table 1. 2. There is a typo in the last sentence of the 2nd paragraph of the results section – I think it should read 42% of NRN not ARN. 3. It would be helpful to add a footnote to Table 2 to explain what MHLC stands for.

VERSION 1 – AUTHOR RESPONSE

Point	Reviewer 1: Gozde Ozakinci	Our response
1	I wondered if this was a cohort study, or rather a before-and-after study (though see the second reviewer's comments) or a comparison of two cross-sectional studies. There's no control for the cohort.	We apologise for the confusion. This is a prospective cohort

		study. We have made changes to the article so that it is clear why the study is described as prospective and which groups are being compared. The study design written on page 3 and 8 is as follows: *'We conducted a prospective cohort study of health behaviour change in patients and their partners before and 10 months after colonoscopy. Comparison groups are patients receiving a normal result notification (NRN) versus patients receiving an abnormal result notification (ARN) such as, colorectal cancer, polyps or diverticulitis. Health behaviour change of patients and partners (controls) are also compared.'* We have also included the % of patients that received an ARN and NRN on pages 4 and 13: *'72% (n=387) of patients received an ARN and 28% (n=149) a NRN.'*
2	I am not sure what the primary outcome is..	In our study protocol it states the following: *'The primary outcome measure will be extent of change in individual health behaviours before colonoscopy and 10 months later. Consequently, we have selected measures that rank individuals along a distribution of amount of physical exercise, dietary and alcohol intake, and tobacco use.'* Thus, we have added a sub-heading 'primary outcome' on

		page 10: ***'Primary outcome*** *The primary outcome measure was the extent of change in individual health behaviours before colonoscopy and 10 months later. Consequently, we selected measures that ranked individuals along a distribution of amount of physical activity, dietary and alcohol intake, and tobacco use.'*
3	I am unclear about the outcome variables of interest. It seems like the primary outcome variable that is used for power calculations is physical activity but this is not clearly presented in the text and is rather inferred.	See point 2 above. We hope that the changes we have made make it clear what the outcomes variables of interest are. Also, we have created a separate section to describe the power calculation, which is on page 12: ***'Statistical power*** *Our sample size was based on answering the research question 'Do health behaviours change after a major health threat?' We used the variable physical activity to calculate statistical power because it has the strongest association with colorectal cancer survival and detecting colorectal cancer is one of the main reasons for colonoscopy referral. This paper reports a comparison of changes in health behaviours of patients with NRN and ARN following colonoscopy. However, the study had initially aimed to detect an increase in physical activity of 25 or greater MET hours in patients diagnosed with cancer at colonoscopy compared to non-cancer patients, and samples of 46 cancer and 46 non-*

		cancer patients would have been required. The effect size was derived from Satia, and sample size calculations assumed conventional values of α=0.05 and β=0.20 (giving a power, or 1- β, of 80%). Thus, our study numbers exceeded those required by the initial sample size calculation.'
4	This is a novel and unique study that aims to look at spontaneous changes following colonoscopy in patients and their partners. It is based on the teachable moment hypothesis and is relevant to the context of colonoscopy.	We also believe that the study is novel.
5	I am a little confused regarding the primary outcome of this study. Is it physical activity as it can be inferred from the power calculations? In relation to that could the authors elaborate on why they believe that all health behaviours would be equally affected as a result of colonoscopy? I guess I am wondering if the authors would expect a change in all of those behaviours, some of whom might seem a bit irrelevant to the participants such as alcohol consumption or physical activity in relation to colorectal cancer risk. I think a discussion around why colonoscopy should act as a teachable moment for all health major health behaviours would be very beneficial.	See sections 2 and 3 above. We have added the words 'better' and'beneficial' in the introduction on pages 8-9 in order to emphasise that we expected beneficial changes in all health behaviours in patients following colonoscopy, and especially those receiving an ARN. The AICR/WCRF (ref 27 in latest draft) concludes that there is convincing evidence that physical activity decreases the risk of colorectal cancers while alcohol increases the risk. We therefore hypothesised that these behaviours might change in patients who considered the risks of colorectal cancer following colonoscopy.
6	Self-efficacy and locus of control have been measured. Would it be possible to include the authors' hypotheses regarding these constructs? It seems like from the	On page 8 we have added the following:

	discussion that authors were interested in fatalistic beliefs. Could they provide background to that?	*'We hypothesised that study participants with high scores of self-efficacy and with 'internal' locus of control would change health behaviours for the better following colonoscopy.'* We have explained this as follows: '*There is no cut-off score to define persons as being high or low self-efficacious. Nevertheless, Ralph Schwarzer, an expert in self-efficacy measurement, recommends conducting a median split, which is to dichotomize the sample.* *'Health-Internals' believe that the locus of control for health is internal and that one stays or becomes healthy or sick as a result of his or her behaviour whereas 'health-externals' believe that factors which determine their health are such things as 'powerful others' and 'chance' over which they have little control.'*
7	Minor points: 1. Last paragraph in the introduction seems to omit that self-reported diet has also been measured (last sentence). 2. P. 13: I think there's a typo in the last sentence before 'please insert table 1' as it says 55% of ARN and 42% ARN. 3. P. 14: First paragraph mentions 'temporal' trends in relation to partners' lack of behaviour change. I'm not sure if 'temporal' is the right word there. Proximal?	We have added diet and thank the reviewer for pointing this out. We have corrected this. We deleted the word temporal; the sentence on page 15 now reads as follows:

		'There were no significant changes in health behaviours among patients' partners, suggesting that behavioural changes in colonoscopy patients were not necessarily part of wider trends that might influence health behaviours'
	Reviewer 2: Kate Williams	**Our response**
8	1. [checklist for editorial office only]	
9	Is the abstract accurate, balanced and complete? The abstract is generally fine but the statement in the conclusion about colonoscopy being a teachable moment is somewhat overstated.	We have inserted the word 'marginal' throughout the article in order to avoid overstating that colonoscopy is a teachable moment and agree that this more accurately reflects the results of the study. In the abstract we have also offered a more balanced conclusion: *'Colonoscopy is associated with marginal beneficial and negative changes in some health behaviours. Further work is needed to explore how services can optimize increases in beneficial health behaviours and mitigate increases in harmful ones.'* We have also been more cautious in our discussion and have added the following sentence on page 16:

		'Research about change in health behaviours after diagnosis of chronic health conditions indicate at best, only modest changes. Thus, it is uncertain if, and the extent to which major health events represent teachable moments.'
10	Is the study design appropriate to answer the research question? Not entirely. The authors state that their aim is to describe health behaviours before and after a colonoscopy, however, participants were given their 'baseline' questionnaire at their colonoscopy appointment to complete at home. The baseline questionnaire was therefore completed after the colonoscopy when participants may already have been influenced and started making some changes. How long after their colonoscopy did participants return their questionnaires? Was it before or after they received their results? Was there a deadline to return it? The authors should be clear that the baseline questionnaire was not completed prior to the colonoscopy appointments and acknowledge the limitations of this. Also, although the aim was to describe health behaviours before and after a colonoscopy, much of the results focus on baseline comparisons between the two colonoscopy outcome groups. It is not clear if this was the key question and if the study was powered for this?	We agree that this is a limitation and have inserted the following sentence on page 17: *'while participants were requested to self-report health behaviours before the colonoscopy and as soon as possible thereafter, the baseline questionnaire was completed after the colonoscopy when participants may already have been influenced and starting to make some changes and there was no cut-off date for returning the baseline questionnaire. Thus, the observed changes for the better or worse in health behaviours may be an under-estimation of the extent of change.'* The median time for return of the baseline questionnaires was 12 days for both patients and their partners. We have now included this in the Results.

		Please refer to Point 1 and 3 above, where we hope that we have clarified this.
11	Are the methods described sufficiently to allow the study to be repeated? Not entirely. More detail is required to clarify how long after their colonoscopy participants returned their questionnaires, whether it was before or after their results and whether there was a deadline to return it (see my response to point 3 above).	We have added the following sentence on page 11: *'Participants were requested to report health behaviours before colonoscopy. There was no cut-off date for returning the baseline questionnaire.'*
12	Are the outcomes clearly defined? It is not clear whether the authors think that the small behaviour changes observed were different from what would be expected in a population who had not received a colonoscopy? In the absence of a control group it is not possible to attribute behaviour change (or lack of behaviour change) to the colonoscopy.	We believe that partners acted as controls because they had not undergone colonoscopy? We have tried to make this clearer in our description of study design – see point 1 above.
13	Are the references up-to-date and appropriate? Introduction, paragraph 1 – The authors claim that the observational research on health behaviour change following a cancer diagnosis is limited to retrospective analyses; however, the paper they refer to (Williams et al., 2013) is a prospective study. There have also been other prospective studies of health behaviour change following a cancer diagnosis e.g. Newsom et al (2012). Introduction, paragraph 2 – The links to the Scottish government recommendations (references 28-30) do not work and were accessed in 2009 so would benefit from being updated. In particular, I am unfamiliar with	We have removed the word 'retrospective' and thank the reviewer for pointing out this error. We thank the reviewer for pointing out the Newson article and we have referred to it in the discussion on page 16. The study drew on two key

	the recommendation for bread and was unable to verify this using the reference or by searching for the recommendation myself.	Scottish Government reports and we have up-dated access to these reports with the most recent web address. The following document includes recommendation for bread: Scottish Government, Healthy Eating, Active Living: An action plan to improve diet, increase physical activity and tackle obesity (2008-2011), 2008, Scottish Government, Edinburgh.
14	Do the results address the research question or objective? The aim was to describe changes in health behaviours from before to after a colonoscopy, but as the baseline questionnaire was completed after the colonoscopy this is problematic (see my response to point 3). Table 2 shows significant differences for both patients and partners on the 'Powerful others' domain of the Multidimensional Health Locus of Control Scale, but there is no mention of this in the results or discussion. The authors should elaborate on this finding or remove these results altogether.	See points 10 and 11 above. I the discussion on page 15-16 we have added the following sentence: *'At baseline, we found that ARN patients and their partners scored significantly higher than the NRN patients and partners on the MHLC Powerful Others scale, indicating that ARN patients and partners believed more strongly that health professionals were responsible for their health and health outcomes. Thus, ARN patients in particular, may be receptive to health promotion advice from health professionals.'*

15	Are the discussion and conclusions justified by the results? In the abstract the authors conclude that a colonoscopy is a teachable moment for some health behaviours and this is reiterated in the discussion. This is a strong statement that is not reflected by the results. Although positive changes were observed for alcohol consumption, the results also show an 8% increase in the proportion of those with low levels of physical activity. The methods section states that levels of physical activity were categorised as low, moderate and high, implying that this 8% increase reflects a reduction in physical activity levels. As the authors do not report the results for those with moderate or high levels of physical activity it is impossible to tell where these reductions occur. There is currently little mention of this in the discussion so it needs to be addressed further with discussion of why this may have occurred. Given that there were negative changes in physical activity and no changes in smoking behaviour following a colonoscopy, it somewhat overstates the case to say that a colonoscopy may be a teachable moment.	See point 9 above. We have now included information on all 3 categories of physical activity so that changes in high and moderate physical activity can be seen. We have commented on the changes in other levels of physical activity in the Discussion, as suggested and suggested why other symptomatic effects may also act on patients' physical activity levels.
16	Are the study limitations discussed adequately? As the baseline questionnaires were completed after the patients' colonoscopies, the authors should acknowledge that their health behaviours may already have been influenced. Also, the absence of a control group	See point 10 and 12.
17	Does this paper require further specialist statistical review? I am not a statistical expert so this would be up to the editors to decide.	Our statistician for the study is Shona Fielding who is a co-author.
18	Additional minor comments	

	1. In my version of the pdf there are some errors with the table numbers. Some of these aren't inserted in the text and all the tables are labelled Table 1. 2. There is a typo in the last sentence of the 2nd paragraph of the results section – I think it should read 42% of NRN not ARN. 3. It would be helpful to add a footnote to Table 2 to explain what MHLC stands for.	We thank the reviewer for pointing this out and will check when we up-load this revised article. We have corrected this. We have added this as requested.

VERSION 2 – REVIEW

REVIEWER	Gozde Ozakinci University of St Andrews, Scotland UK
REVIEW RETURNED	26-Oct-2013

GENERAL COMMENTS	I thank the authors for clarifying the primary outcome issue. I guess I am used to seeing a singular primary outcome and in this case, a host of health behaviours are selected. But then, physical exercise is picked for sample size calculations. Isn't it more appropriate to state that Physical activity was the main outcome and the others were secondary? Maybe it's a moot point and I may well be wrong but I think it's worth clarifying.