Author’s response to reviews

Title: Healthy shopper? Blood pressure testing in a shopping centre Pop-Up in England

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Response to Reviewers (in red)

Reviewer #1 comments:

1. How the unhealthy retail outlet score was calculated to measure for the unhealthiness of the shopping centre? Is there any other researchers have used it before? Please listed the details of the method of score in supplementary materials.

In the methods section, paragraph 2, we already explained how we determined our own unhealthy retail outlet score. We have added more detail to this section (by adding the following text as paragraph 3) including a reference to how it was used before.

Added text:

“We determined our own unhealthy retail outlet score for each shopping centre based on a modified version of that used in the RSPH study [1]. On the day of testing, the lead author (LAE) and two Pop-Up assistants surveyed all the retail outlets within the shopping centre by counting the number open to shoppers on the day of testing. They then established the retail outlets within
each shopping centre which could be classed as one of four types: either a fast-food takeaway, a bookmaker, a tanning salon or a payday loan business, following the guidelines and descriptions used in the RSPH study. If there was any ambiguity about the nature of the retail outlet, as was the case for some counted as fast-food takeaways, then the notes (including photographs) collected on the day were reviewed by all authors and a consensus decision made. The number of these outlets as a proportion (percentage) of all retail outlets open on the day of testing within the shopping centre was then calculated to be our simple surrogate measure for the unhealthiness of the shopping centre. There are, however, some important differences between our own unhealthy retail outlet score and the one used in the RSPH study. In the latter, different scores, or weights, were ascribed to different types of retail outlets based on being negatively health prompting. The RSPH study also ascribed scores to retail outlets it defined as being positively health promoting.”

We recognise our use of this variant of the unhealthy retail outlet score is unique to this study and we now acknowledge this as a limitation too (discussion section, paragraph 6, line 18). Whilst our unhealthy retail outlet score is based on a previous report, it is very much a surrogate measure and has not been validated in other studies.

2. Pop up provided checks for elevated intraocular eye pressure and blood pressure, why not report the two results in one paper?

Thank you for this observation. The investigation of intraocular pressure (IOP) measurements is subject of another report. We state this in the manuscript (background section, paragraph 6, line 22).

3. Suggest to delete "Healthy shopper" in the title, since only blood pressure of the participants were presented in the article, which is not enough to conclude the participants (shoppers) is healthy.

Our study uses a measure of ‘healthy’ and ‘unhealthy’ for each shopping centre, using the novel methods described in the Royal Society of Public Health Report [1]. As a result, we believe this part of the title is a reasonable one, and it gives a potential ‘hook’ that might draw a wider audience to our article. We hope the reviewer accepts this.

4. Line 15-16, is there a typo error? "……≥140/90 mmHg." Should be "……≤140/90 mmHg"?

This is not a typo. We have tried to clarify. Line X now states: “Some participants were already aware of their elevated BP or were on BP-lowering treatment; these participants were still measured and classified as cases if their BP was measured on the day as ≥140/90 mmHg.”

Reviewer #2 comments:
Dear Editor, Thank you for asking me to review this paper. The approach and analysis are novel and challenge the current reactive healthcare system (which under-diagnoses the true prevalence of hypertension) with an investigation of a pro-active approach to detecting possible hypertension. Moreover, the analysis cleverly links case detection rates with various measures of community unhealthiness.

We thank reviewer 2 for these thoughtful comments and are delighted that it is felt our study is ‘novel’ and ‘cleverly links case detection rates with community ‘unhealthiness’’. We have responded to the specific points below.

1) Introduction: there is very little discussion of the NHS Health Check. This should be described in more detail (age range, frequency, how provided, uptake rates, health inequalities, etc). Because this, in effect, is a national prevention programme. But response rates are low. And current research shows that those at highest CVD risk are least likely to attend. Hence the importance of this study, proactively seeking out 'patients' in the community.

Thank you for this constructive comment. We have added the following paragraph to the introduction section (paragraph 4, line 24).

Added text:

Since 2009, adults aged 40–74 years in England have been entitled to an NHS Health Check, a scheme designed to find people with early signs of cardiovascular disease (CVD), kidney disease, type 2 diabetes or dementia [2]. Adults within the age range with no known pre-existing conditions are invited to attend a health check every 5 years. These checks are community based; they are delivered via general medical practices, community pharmacies or another community-based provider [3]. An individual’s CVD risk is predicted by taking into account their sociodemographic characteristics, cholesterol, blood pressure, history of smoking and family history [4]. Those found to be at a higher risk of CVD are placed on a ‘high risk’ register and offered annual reviews. Although a primary aim of the NHS Health Check was to reduce health inequalities, uptake of these checks are relatively low, with those at highest risk of CVD more likely not to attend [5]. A recent systematic review of the delivery and impact of the NHS Health Check concluded that published attendance, uptake, and prescribing rates are all lower than originally anticipated, and data on impact are limited, with very few studies reporting the effect of attendance on health-related behaviours [6]. Moreover, this study also found the uptake of the NHS Health Check to be relatively lower in those living in the most deprived areas. Other studies have also questioned the practicalities [7] and clinical effectiveness of this national prevention programme [8]. Hence, proactively seeking out people at risk of CVD in the community remains an unmet public health need.

2) Methods. I think this needs a more scientific description. It should begin with a description of the study: cross sectional survey data, etc. As it stands, it begins with a
description of 'Bluedog Productions' which reads a bit like a commercial advertising blurb.

We thank the reviewer for this observation. We have begun the methods section (paragraph 1, line 3) with a description of the type of study we carried out.

Added text:

This was a prospectively done cross-sectional study designed to capture BP measurements in people in the community using a Pop-Up in shopping centres throughout England. Our “Feeling the Pressure” Pop-Up was designed for use in covered areas by Bluedog Productions (www.bluedogproductions.co.uk, Hants, UK) and Wordbird (www.wordybirdy.co.uk, London, UK) (Figure 1). The Pop-Up comprised two private testing areas and an open reception space designed to engage the public. The Pop-Up was assembled for two consecutive working days in different shopping centres across England during August 2016.

3) Methods. I have some reservations about the methods used to obtain a BP reading (pg6). There is no mention of cuff size (introducing possible bias based on obesity - a standard cuff size will produce a BP reading which is higher than the true reading). There is no reference to NICE Clinical Guideline 127 which recommends: "Section 1.2.2 if blood pressure measured in the clinic is 140/90 mmHg or higher: Take a second measurement during the consultation. If the second measurement is substantially different from the first, take a third measurement. Record the lower of the last two measurements as the clinic blood pressure. [2011]" A study in which 2 or 3 readings had been taken, according to CG127, would have been stronger.

We thank the reviewer for this thoughtful and constructive comment; we agree it is unclear that NICE Clinical Guideline 127 was followed. However, our study was carefully scrutinised by the City, University of London research and ethics committee and monitored by an advisory group. We have added to the methods a section regarding the guidelines we followed and have specifically mentioned cuff size and repeat measurements. We would like to reassure the reviewer that we recognised the cuff bladder should encircle 80% of the participants arm circumference, and that there would be an error in blood pressure measurement if an inappropriate cuff size was used, specifically, overestimation would occur if the cuff size was too small [9]. We had access to two different cuff sizes (adult; 16 × 30 cm and large adult; 16 × 36 cm) and these were used appropriately. Unfortunately, we did not record which size cuff was used for each participant.

The following paragraph (line 19) has been amended in the methods section:

All four optometrists (LAE; DJT; PC; RS) had training in good practice and competency for measuring BP under guidance of a lecturer in nursing at the university. BP was measured after five minutes resting, with the participant sitting with their left arm supported at heart level. Care
was taken to use an appropriate size cuff bladder. Everyone tested was given his or her BP measurement recorded on an information leaflet about BP designed for this study. The outcome measure for this study was people with a BP of ≥140/90 mmHg on repeat testing. (For the repeat BP testing, we followed the NICE Clinical Guideline CG127. So, for example, if the second BP measurement was substantially different from the first, then a third measurement was taken with the lower of the last two measurements recorded.) For this report, we define these people as cases. For these cases, we also sent a referral note to their GP.

4) Discussion: this is an important study drawing attention to the social determinants of high blood pressure. However, the limitations are poorly discussed. There is no discussion about cuff size and lack of second/third BP recording. This is important because the differences between 'healthy' and 'unhealthy' locations selected for this study may have arisen from differences in obesity; also from differences in white coat hypertension rates (which plausibly could be higher in more deprived areas where the shoppers were less familiar with engaging with health professionals). The authors acknowledge the lack of ethnicity data which is also likely to have skewed results; but in stating this limitation they should elaborate about why ethnicity is important and that the Black population have higher baseline BP values (Carapeti et al) - hence the importance of omitting this variable.

Thank you for this comment. We are pleased that the reviewer feels this is an ‘important study’. We have addressed the issue regarding cuff size and repeat BP measurements in the above response. We have expanded our discussion on the important limitations in this study. Therefore, we now have two paragraphs (starting from line 19) detailing the limitations. We could not find a relevant reference for a first author called Carapeti, yet we believe the reviewer might have been suggesting Cappuccio et al., 1997 [10].

We are also unaware if white-coat hypertension rates vary by socio-economic status. We came across one study (albeit in a non-systematic search) that suggests it does not vary by SES [11]. Yet we have discussed the plausibility of this phenomenon adding to the variability in our results. We have added the following paragraphs to the discussion section, line 18:

Added text:

Around one half of all cases reported in this study were already aware of having elevated BP, or self-reported some history of issues with elevated BP. The effect we detected between the unhealthy and healthy shopping region could therefore be explained by differences in undiagnosed hypertension/suspected hypertension or be explained by differences in possible poor control of known hypertension/suspected hypertension; as likely, the effect could be explained by a combination of the two factors. Overall numbers were not substantial enough for us to make a distinction between these two factors. Yet this distinction is important. One centres on medication adherence and long-term management issues, whilst the other centres on detection. Both have substantial public health importance and their relationship with SES should be studied further, as suggested by other reports [12].
There are some critical limitations to our observations. For example, there are ethnic differences in the prevalence of hypertension but we did not record or report our participants’ ethnicity. Prevalence of hypertension is raised in South Asians, Afro-Caribbeans, and West Africans in England and ethnicity is an important consideration in assessing BP measures in community-based studies [13]. We therefore cannot comment on a bias that might be introduced by some areas having higher prevalence of different ethnic groups compared to others. Similarly, a bias in our results may have been introduced by differences in levels of obesity between ‘healthy’ and ‘unhealthy’ locations or differences in ‘white coat’ hypertension whereby the clinical setting precipitates artificially elevated BP due to increased patient anxiety.

Furthermore, a diagnosis of elevated BP cannot be made from measurements at a single point in time. One author (LAE) performed most, but not all of the testing so our results might be limited by the use of different assessors. Nevertheless, other discrepancies in measurement from, for example, failure to position participants and their arms consistently would have been minimised by the identical testing environment afforded by the purpose-built Pop-Up. An unavoidable limitation of the results from our case finding exercise arises from only being able to assess individuals interested in having their BP measured. Moreover, we originally aimed to test only people who were >40 years but the Pop-Up generated a lot of interest and we examined younger people too; consequently, around one quarter of our participants were younger than 40 years. Our study design meant our results are limited to observational associations. Moreover, our study did not have a longitudinal element where we could, for example, follow-up the suspected cases. In addition, whilst our unhealthy retail outlet score is based on a previous report [1] it is very much a surrogate measure and has not been validated in other studies.

5) Finally, the analysis and discussion do not make clear the contribution of the known hypertensive patients to the final results. Almost half the sample already had either diagnosed or possible hypertension. Was the study merely picking up on poor BP control in those patients already known to be hypertensive, in poorer areas. This distinction is important. Either the effect detected by this study reflects possible undiagnosed hypertension; or possible poor control of known hypertension/suspected hypertension. One is a community detection issue. One is a medication adherence and Long Term Condition management issue. Both have substantial public health importance. But the authors should either offer both explanations of their findings. Or re-analyse the results and determine which group (the two groups are identified in Table 1) are driving the differences between wealthier/poorer areas.

We thank the reviewer for this thoughtful comment. As the reviewer notes we have identified the two groups of people (those with and those without some sort of previous diagnosis of elevated BP or hypertension) in table 1. For those without a previous diagnosis we detected 24 (12.1%) and nine (5.9%) cases in the unhealthy and healthy locations respectively. The difference in the proportion of cases indicates a larger relative risk (2.04) than what we report with the two groups combined in the original manuscript but the value is not statistically significant (p=0.06). This suggest that a person tested in an unhealthy shopping region is two times more likely (RR = 2.04) to be tested positive as a ‘new’ case than a person tested in a healthy shopping region. Yet, the 95% confidence interval is much wider than what we report from the combined data in the
manuscript, ranging from below one (0.98; hence not statistically significant at P=0.05 level) to 4.25. This implies that we did not have the power in our study (sufficient number of overall cases) to untangle where the difference might lie, although it hints (larger RR) that it is in the ‘new’ cases, or in those people who had not previously been diagnosed. Ultimately, as the reviewer suggests, we do not know if the effect detected by this study reflects possible undiagnosed hypertension or reflects possible poor control of known hypertension/suspected hypertension.

We have added the following paragraph (discussion section, line 18).

Around one half of all cases reported in this study were already aware of having elevated BP, or self-reported some history of issues with elevated BP. The effect we detected between the unhealthy and healthy shopping region could therefore be explained by differences in undiagnosed hypertension/suspected hypertension or be explained by differences in possible poor control of known hypertension/suspected hypertension; as likely, the effect could be explained by a combination of the two factors. Overall numbers were not substantial enough for us to make a distinction between these two factors. Yet this distinction is important. One centres on medication adherence and long-term management issues, whilst the other centres on detection. Both have substantial public health importance and their relationship with SES should be studied further, as suggested by other reports [12].

6) Overall, there are substantial limitations to this paper. But it is refreshingly novel and draws important attention to the current lack of proactive screening, the under diagnosis of hypertension and the social determinants of high BP.

We thank the reviewer for this comment and are pleased they think the study is ‘refreshingly novel’. We hope our consideration and response to their comments, along with adding more detail to the limitations, has improved the manuscript to a publishable standard.

REFERENCES


