Author's response to reviews

Title: Factors associated with type of footwear worn inside the house: a cross-sectional study

Authors:

Alex Barwick (alex.barwick@scu.edu.au)
Jaap van Netten (jaap.vannetten@qut.edu.au)
Sheree Hurn (sheree.hurn@qut.edu.au)
Lloyd Reed (l.reed@qut.edu.au)
Peter Lazzarini (peter.lazzarini@qut.edu.au)

Version: 1 Date: 25 Jul 2019

Author's response to reviews:

Response to Reviewers

Thank you to the editors for considering this manuscript and to the reviewers for their valuable insights on the paper. Please see our response below:

Reviewer #1:

Thank you for this very interesting paper which explores an important aspect of footwear habits namely indoor usage.

The paper is well written and has clear justification within the background section. The method is well described and the results presented well. Further the results are all discussed well with reference to previous works highlighting the importance of footwear education and behavioural change in relation to the type of footwear worn indoors. A clear result is the disconnection between footwear advice and footwear choices.

Response: We very much thank the reviewer for their kind summary observations.

There are a few minor amendments which I feel would provide clarity.

COMMENT 1 First, as the study aimed to investigate indoor footwear choices in the year prior to hospitalisation, the title is a bit misleading. I would consider removing 'inpatient' as this study is not about what they are wearing as an inpatient but what they have worn over a year indoors. Hence indoor or worn in the home should be in the title (as per line 125-6 footwear worn in the...
home is the focus). The fact that they responded whilst they were an inpatient is just how you recruited.

Response: We thank the reviewer for this suggestion and we agree. We have changed the title in accordance with your observations, the title is now:

Factors associated with type of footwear worn inside the house: a cross-sectional study

COMMENT 2 Can you clarify the statements in relation to the younger participants and lower socio-economic group - in the abstract you state that they are 'less likely to wear socks or go barefoot' then line 201 'less likely to wear no footwear' implying that they would wear some footwear- this is conflicting and unclear.

Response: We thank the reviewer for identifying we had inadvertently incorrectly expressed this in the original abstract and this has now been corrected, see below:

Those of older age (0.97, p<0.001)… were less likely to wear no footwear (socks or barefoot).

COMMENT 3 Did you ask how much time the participants spend in the home compared with outdoor? If you do have this it would provide further context.

Response: We agree that this would have been good contextualising information, however, unfortunately such data was not collected in this study.

COMMENT 4: 232-235 need to clarify that this outdoor footwear type was worn indoors.

Response: This section has been rephrased for clarity:

Only one in nine people wore a protective indoor footwear type. Wearing such protective footwear was not independently associated with medical or foot conditions that normally require protective footwear, such as peripheral neuropathy or history of amputation. This demonstrates the disconnection between footwear recommendations and actual footwear use in these populations...Our finding that one in nine people wear protective footwear inside the house indicates that this disconnection may be much more distinct in footwear worn inside the house than that worn outside the house with close to one in two people wearing protective footwear outside the house reported in our previous paper (26).

COMMENT 5: For a message to clinicians it is worthy of expanding on the need for patient education and behaviour change strategies in respect of indoor footwear. It may be that clinicians never see what people wear indoors and never ask the question about what is worn- in this respect may need a behaviour change by clinicians. This is an important message.
Response: Thank you for these very important points. We have used the opportunity kindly provided by the review to expand on these important points in the discussion:

This is consistent with prior research in people at high risk of ulceration who have been found to be more likely to adhere to their prescribed bespoke shoes outside the house than inside the house (10). This highlights the importance of specifically inquiring about footwear habits inside the house and implementing both indoor and outdoor footwear-related preventative measures in clinical encounters with at-risk patients. This is particularly pertinent when considering some of these populations have been shown to do more weight-bearing activity indoors than they do outdoors (10).

Previous foot care by a specialist medical physician in the previous year was also associated with protective footwear. Yet, foot care by any other health professional (podiatrist, general practitioner, surgeon, nurse, orthotist, other) was not associated with wearing protective footwear. This was against our expectations, as we would expect footwear change interventions to be implemented successfully by most of these health professionals. This lack of association along with the high proportion of those with risk factors not wearing protective footwear inside the home, demonstrates a lack of implementation of effective footwear change interventions, particularly for footwear worn inside the house. Recently, motivational interviewing has been demonstrated to increase the adherence to therapeutic footwear in those at high risk of ulceration in the short-term (27). Though more research on effective strategies to reduce footwear related risk are required, it is recommended that consideration to the practicalities, purpose and social norms are considered (28). Further to this, wearing protective footwear was independently associated with an education level above year 10. This relationship may be mediated by the link between lower educational attainment and poorer health literacy (29) so this should be considered in the delivery of indoor footwear.

and in the conclusions:

The findings of this study demonstrate the need to focus attention on indoor footwear use as particularly problematic in these at-risk populations Sociodemographic factors such as education level and age are also associated with footwear and should be considered in any intervention that aims to change footwear habits….

COMMENTS 6-8 Abstract- Position of subheading results needs to be moved

Line168 - % missing after 3.4

Line 326 - remove (albeit important)

Response: Amended.

Again thank you for this paper as it adds to the body of knowledge.
We thank the reviewer again for their comments and observations, the responses to which we feel have considerably improved the manuscript.

Reviewer #2:

COMMENT 1 Thank you for the submission of your manuscript for review.

Whilst there is a need for more research in the area of footwear and foot health, unfortunately, your manuscript does not provide any new or novel information that would add to the research body of knowledge in this area.

Response: We thank the reviewer for their thoughts, however, we respectfully disagree with the reviewer that the manuscript does not provide any new or novel information that adds to the body of knowledge. Although footwear in specific pathological populations has been studied before, to the best of our knowledge this paper is the first to provide insights into what indoor footwear a large cohort of people in the general population typically wore in the previous 12 months and what factors they were linked to. However, we do agree with many of the below comments and address them below.

COMMENT 2 There are some quirky socio-economic and footwear relationships drawn that appear somewhat scatter-gun and are of limited meaningfulness. ie. Moccasins related to depression. If these claims are relevant to footwear choice, how are they relevant and how do they relate to clinical implications and recommendations for health practitioners?

Response: We again thank the reviewer for their comment and it is true that we found some associations of seemingly limited meaning mostly based on footwear types less worn (e.g. not having depression was associated with wearing socks). However, we do note that we did highlight this for the reader to interpret some associations with caution (and the one the reviewer refers to) in our original submission.

However, since <5% of the sample wore moccasins these associations should be interpreted with caution.

However, the study is at risk of type 1 error with the volume of analyses performed, and this may account for some of the associations we identified that have seemingly no potential causal pathway or other explanation for the association; for example, not wearing socks only was associated with having depression, which does not seem to have a plausible explanation.

On the flip side, we also highlight that we did discuss many associations with much clinical meaning in footwear that was worn much more often. For example, the potential clinical implications of the association of wearing slippers (209 people or 28% of the sample) with sociodemographic factors (age, SES and education level) are discussed and placed in the context of previous literature.
A form of slippers (either backless slippers or standard slippers) were the most common non-protective footwear type worn in our study, but this was still a lower proportion, at 28%, than that of previous studies. Munro and Steele (9) found up to 38% of people over 65 living in the community wore slippers indoors, and Davis et al. (8) found 48% of women aged between 60 and 80 years also preferred wearing slippers indoors. This is potentially explained by our sample being more diverse in age (18-99), as slippers too were associated with age with odds increasing by 7% with each year of age and perhaps a warmer climate of Queensland Australia compared with New South Wales and Victoria where these previous studies were performed. Slippers have been found to be unsupportive, quick to lose their structural integrity and can have a lack of grip and fixation (9). They are therefore not recommended for populations at risk of falls or foot ulcers, although more research is needed into the types of footwear that contributes to or prevents falls (30).

The factor that associated most often with indoor footwear type and category worn most in the previous year was age. In addition to the previously mentioned associations between increasing age and non-protective footwear, slippers and moccasins, older people were less likely to go barefoot and this relationship was maintained when adding socks in with barefoot in our ‘no footwear’ group. This also has implications for falls prevention as going barefoot is associated with falls in older people (32). The variety of relationships between footwear types and age may reflect generational preferences, or perhaps as people age and develop chronic health conditions they may value the warmth and comfort that wearing footwear such as slippers and moccasins in the home can provide compared to being barefoot. The finding that older people are more likely to wear non-protective footwear like slippers and moccasins demonstrates the need for behaviour change strategies around footwear in this population. However, the finding that older people are less likely to go without footwear is a positive starting point that may enable behaviour change interventions to more easily facilitate a move towards more protective indoor footwear.

Thus, we believe that we have tried to take a measured approach in how these associations were discussed in terms of clinical meaningfulness and acknowledge the potential for type 1 error and small group sizes.

COMMENT 3 The manuscript lacks focus and robustness and would benefit from a re-write with a clearer direction as I am unsure of what the clinical recommendations or policy implications are from the results. The manuscript appears to have too much content that is not sufficiently linked.

Response: We again thank the reviewer for their thoughts and with the many revisions made to address the three reviewers’ comments we hope that the revised manuscript clarifies the direction and clinical recommendations for the reviewer and makes for a more cohesive paper. For example,
Such population-based information identifying potential moderating factors in such strategies may assist clinicians, researchers and public health policymakers to target strategies that reduce footwear-related health risks and their associated burden.

Changes to Discussion: The discussion has a renewed focus on the clinical implications including implications of the findings for education strategies around footwear. For example,

Only one in nine people wore a protective indoor footwear type. Wearing such protective footwear was not independently associated with medical or foot conditions that normally require protective footwear, such as peripheral neuropathy or history of amputation. This demonstrates the disconnection between footwear recommendations and actual footwear use in these populations. This is often acknowledged clinically and has been demonstrated previously in people with a history of stroke, Parkinson’s disease (7) and diabetic foot ulceration (13). Our finding that one in nine people wear protective footwear inside the house indicates that this disconnection may be much more distinct in footwear worn inside the house than that worn outside the house with close to one in two people wearing protective footwear outside the house reported in our previous paper (26).

This highlights the importance of specifically inquiring about footwear habits inside the house and implementing both indoor and outdoor footwear-related preventative measures in clinical encounters with at-risk patients. This is particularly pertinent when considering some of these populations have been shown to do more weight-bearing activity indoors than they do outdoors (10).

This was against our expectations, as we would expect footwear change interventions to be implemented successfully by most of these health professionals. This lack of association along with the high proportion of those with risk factors not wearing protective footwear inside the home, demonstrates a lack of implementation of effective footwear change interventions, particularly for footwear worn inside the house. Recently, motivational interviewing has been demonstrated to increase the adherence to therapeutic footwear in those at high risk of ulceration in the short-term (27). Though more research on effective strategies to reduce footwear related risk are required, it is recommended that consideration to the practicalities, purpose and social norms are considered (28). Further to this, wearing protective footwear was independently associated with an education level above year 10. This relationship may be mediated by the link between lower educational attainment and poorer health literacy (29) so this should be considered in the delivery of indoor footwear.

The final association found with a protective footwear type was oxford shoes being associated with being born overseas. This highlights potential cultural factors influencing footwear preferences.

Changes to Conclusion:

The findings of this study demonstrate the need to focus attention on indoor footwear use as particularly problematic in these at-risk populations. Sociodemographic factors such as education
level and age are also associated with footwear and should be considered in any intervention that aims to change footwear habits…

The observations of this study should help inform clinicians, researchers and policymakers to develop interventions aimed at improving indoor footwear habits that may help prevent significant health care burdens such as falls and foot ulcers in future.

COMMENTS 4-5 Was the footwear most often worn the previous year the same ones worn at the time of fall? Were participants asked why they chose this footwear?

Response: We thank the reviewer for these comments, however this comment confused us a little we are sorry and we apologise if we had inadvertently confused the reviewer. Our paper was designed to explore associations between various factors and the footwear people wore inside the house most of the time. The paper was not designed for or had an outcome related to falls so we did not collect any information on participants falls. Thus, information about whether the footwear was the same as that worn at the time of a fall and the reasoning behind choosing the footwear was not collected and not in the scope of the study. We hope that has clarified this for the review and apologise if we had confused this at all.

COMMENT 6 Compliance with footwear recommendations for patients who have foot ulcers or who have had falls is a big issues for health practitioners so should not have come as a surprise to the authors.

Response: Indeed this was not a surprise to us we agree, however, we believe this is useful data from a larger more general population that supports previous clinical and research observations from smaller more specific populations. This has been rephrased for clarification:

This is often acknowledged clinically and has been demonstrated previously in people with a history of stroke, Parkinson’s disease (7) and diabetic foot ulceration (13).

COMMENT 7 A review of footwear literature and related issues would be beneficial for a re-write of this manuscript.

Response: We feel the changes that have been made, better reflect the literature around footwear and related issues. This includes changes to the section in background that outlines the influencing factors on footwear decision-making:

However, regularly wearing footwear in line with that advice is complicated by contextual and personal factors (2). Aesthetic preferences (6), financial priorities (3, 7), comfort (6, 7), presence of foot problems (3, 8) are all influencing factors in footwear decision-making (3, 6-8). Some of these may be differently prioritised in footwear worn inside the home, compared to those worn outside the home, for example, people are willing to spend less on their indoor footwear (7).
And changes to Discussion section that detail the previous research on (non)protective footwear prevalences and footwear behaviour change interventions (see change in response to reviewer 2, comment 3).

COMMENT 8 Readability was also difficult due to the use of many double-negatives throughout the manuscript.

Response: We again thank the reviewer for the comment which we must admit was a bit of challenge in our original manuscript due to multiple negative associations. We have taken the opportunity afforded by the reviewer to revise our language on our use of double-negatives in the manuscript again and we have made the following change:

Statistical analysis of risk factor stroke history framed as negative e.g. no stroke has been re-analysed as positive e.g. stroke history, reducing the use of double-negatives when discussing this.

We again thank the reviewer for their comment, however, highlight that unfortunately, double-negatives are not easy to avoid considering the footwear categories of – no footwear and non-protective footwear and the occurrence of some negative associations. In most cases we could not see a feasible way around this and hope the reviewer understands.

Reviewer #3:

This was a well-written article, and a pleasure to review. I commend the authors' work, as the exploration of footwear behaviour is an important factor to consider for many clinical populations.

Response: In a similar vein to reviewer 1, we again very much appreciate reviewer 3’s kind summary observations.

There are several areas where I felt the article could be enhanced for clarity and readability:

Introduction:

COMMENT 1 * Line 66: "…risk of developing falls or foot ulcers…” Suggest that the authors re-phrase this sentence to indicate "….risk of experiencing falls or developing foot ulcers…”

Response: We thank the reviewer and have rephrased as suggested:

Some specific populations also have special footwear needs because of health conditions that increase their risk of experiencing falls or developing foot ulcers, such as those with diabetes
COMMENT 2 * Lines 70-72: The authors raise a very valid point that differences in the choice of indoor and outdoor footwear can be influenced by several factors - e.g. "aesthetics less important; comfort more important." However, what is not clear is the comparison - for example, comfort is more important for which type of footwear indoor or outdoor? I recommend that the authors review this sentence for clarity.

Response: This sentence has also been rephrased for clarity and accuracy and we again thank the reviewer:

However, regularly wearing footwear in line with that advice is complicated by contextual and personal factors (2). Aesthetic preferences (6), financial priorities (3, 7), comfort (6, 7), presence of foot problems (3, 8) are all influencing factors in footwear decision-making (3, 6-8). Some of these may be differently prioritised in footwear worn inside the home, compared to those worn outside the home, for example, people are willing to spend less on their indoor footwear (7).

COMMENT 3 * Line 76: Please remove the hyphen from "at-risk"

Response: This has now been removed.

COMMENT 4 * Line 81: Please review to avoid using the phrase "don't wear them" - and use more formal terminology (e.g. ….those who have been prescribed footwear to prevent foot ulceration often fail to wear their recommended shoes within the home.)

Response: This has now been rephrased to:

This is similar for people with diabetes and a history of foot ulceration (13), and importantly, those who have been prescribed footwear to prevent foot ulceration often fail to wear these inside the home (10).

COMMENT 5 * Lines 83-92: The paper aims to investigate the indoor footwear types worn most often in the year prior to hospitalisation. Whilst this is an important and timely topic to address, it would be useful to provide the reader with greater information about why this period of data collection (i.e. the year prior to hospitalisation) is useful for clinicians etc. This point needs stronger justification of its relevance.

Response: The reasoning for choice of time period has been added to the methods section:

The previous 12 months was chosen as a time period as this is most relevant to the participant’s current health and sociodemographic situation whilst also being within the participant’s recall.
Methods:

COMMENT 6 * Line 103: The authors describe several characteristics of the study sample - all of which are highly relevant. Whilst the majority of the characteristics listed concern sociodemographic factors, one medical factor (diabetes) is also listed. This seems somewhat out of place, and it is unclear why the authors would select this one medical condition, given it was not the specific focus/target population of the paper?

Response: We agree this is oddly placed and have removed it from this line.

COMMENT 7 * Line 107-108: "Trained data collectors" - were these people research assistants, clinicians, students, any of the authors listed?

Response: The data collectors were all registered podiatrists. We thank the reviewer for allowing us to clarify and revised this important point:

Self-reported explanatory variables were collected for each participant by trained data collectors who were registered podiatrists and recorded on a validated data collection form.

COMMENT 8 * Line 108: Please provide further, albeit brief, details about the "validated data collection form"

Response: We thank the reviewer for this comment and we have now provided further details about this form in the revised manuscript:

This previously validated form, the Queensland High Risk Foot Form, was designed to capture foot risk factors and complications in diverse populations (16). The variables included: sociodemographic factors (age, sex, indigenous status, country of birth, socioeconomic status (using the participant’s postcode of usual residence and the Australian Index of Relative Social Disadvantage to determine (17)),

COMMENT 9 Line 115: Were the trained data collectors qualified to provide a diagnosis of foot conditions? Was it their responsibility to provide a "new" diagnosis, or simply to confirm an existing diagnosis (previously made by a health care professional)? If the latter is correct, then I suggest the authors consider revising the terminology used in this sentence. On this, what happened to the participants once they were given a new diagnosis? Were they referred for subsequent assessment/management to a relevant health care professional?

Response: We thank the reviewer for this comment which was similar to an earlier comment we addressed. The above data collectors were registered podiatrists and thus were qualified to provide a diagnosis of foot conditions. However, no actions were taken following a new diagnosis, as per ethics approvals (The Prince Charles Hospital Human Research Ethics
Committee (HREC) (Ethics No. HREC/13/QPCH/5) and the Queensland University of Technology HREC (Ethics No. 1300000367)).

COMMENT 10 * Line 119: Please can the authors provide a reference to the accepted criteria they used to diagnose the presence of peripheral neuropathy.

Response: This was unintentionally omitted from the original manuscript but has now been added back into the revised manuscript and we apologise to the reviewer for this original omission.

COMMENT 11 * Line 128: Participants were shown a footwear picture chart, to help determine which footwear was worn most in the house. Specifically, participants were asked "what is the one type of shoe you have worn most". Given that there were options for 'barefoot' and 'socks only', was this question not modified to account for shod and unshod conditions?

Response: We thank the reviewer for this very good observation. The question was not modified but the visual information on the picture chart was thought to express this adequately. Given the proportion of participants who answered barefoot, we do not feel that this influenced people against these choices.

COMMENT 12 * Lines 132-135: From a readability perspective, this is a difficult sentence to digest (with the term 'footwear' repeated 7 times). I suggest the authors review this sentence.

Response: We agree. This sentence has been revised:

The type of indoor footwear selected by participants was then categorised into three broad footwear categories: ‘protective footwear’, ‘non-protective footwear’ and ‘no footwear’. These categories were based on recommended protective features deducible from the footwear type selected.

COMMENT 13 & 14 * Line 141: Recommend that the authors also include the term 'flip flops' as an alternative interpretation of 'thongs', to cater for an international readership.

Results:

* Line 165: As above. Recommend that the authors also include the term 'flip flops' as an alternative interpretation of 'thongs'.

Response: We have made changes to reflect the reviewer’s suggestion now throughout the document.
COMMENT 15 * Line 184-185: Rather than using the phrase "year 10 education levels" can I suggest that the authors state "educated above Year 10 level" or something similar, to enhance readability.

Response: This phrase has been amended here and multiple times within the manuscript:

… most of the time indoors was independently associated (Odds Ratio (OR); 95% CI) with an education level above year 10…

Discussion:

COMMENT 16 * Lines 244-253: The authors discuss their findings of independent associations with wearing protective footwear - specifically education level and previous foot care. Whilst there is further in-depth discussion around the latter variable (i.e. foot care), there is no comment on the participants' education level. I recommend the authors pay equal attention to both findings within their interpretation of the findings. It may be opportune to consider whether more or less educated people benefit from "education" delivered by health care professionals, and their likelihood to act upon this education?

Response: On reflection we must admit we agree with the reviewer on this valuable point. We have now expanded upon this point in the discussion to give it the weight it deserves:

wearing protective footwear was independently associated with an education level above year 10. This relationship may be mediated by the link between lower educational attainment and poorer health literacy (29) so this should be considered in the delivery of indoor footwear. The translatability of current footwear guidelines to clinical practice and acceptability of such footwear to patients is also a topic for further research.

COMMENT 17* Lines 261-263: For what reasons would people following a stroke, or who had been diagnosed with Parkinson's disease, change their indoor footwear to be more supportive? Please can the authors elaborate on this rationale - which I suspect may centre on (in part) impaired balance and gait control?

Response: We again thank the reviewer for this point and we have elaborated on it in the relevant section of the discussion:

Bowen et al. found that following a stroke or Parkinson’s diagnosis people change their indoor footwear towards being more supportive suggesting this is for reasons of foot problems and mobility changes (7).
COMMENT 1 Please review the Biomed Central guidelines for statistical reporting, taking particular note of reporting of whole numbers as appropriate, reporting both number and percentage and reporting mean (SD). Particularly considering the SAMPL guidelines: https://www.biomedcentral.com/getpublished/editorial-policies#standards+of+reporting

Response: These guidelines have been reviewed and changes made to the manuscript: summarised below:

Prevalences of footwear types has been rounded to whole numbers as it is felt that this does not compromise interpretation.

Sociodemographic information prevalences are reported as whole numbers and percentages

Mean age is reported as mean (SD)

COMMENT 2 Methodology: Given an outcome is relating to disadvantage status is discussed, please provide additional information on how this was determined,

Response: Participant’s postcode of usual residence was used to determine Australian Index of Relative Social Disadvantage status. This has been added to the methods section:

The variables included: sociodemographic factors (age, sex, indigenous status, country of birth, socioeconomic status (using the participant’s postcode of usual residence and the Australian Index of Relative Social Disadvantage to determine (17)), geographical remoteness (using the participant’s postcode of usual residence and the Accessibility/Remoteness Index of Australia status to determine (18))

COMMENT 3 Ln 108: These variables included: rather than These included:

Response: Amended

COMMENT 4 Ln 113: include medical with general medical practitioner, specialist (non-general medical practitioner) as there are other specialists from non-medical fields.

Response: Amended.

COMMENT 5 Please reference supplementary data as Supplementary data file 1 etc rather than Tables.

Response: Amended.
COMMENT 6 Consideration of the repetition of results (particularly values) in the discussion should be made by authors.

Response: We have reduced this repetition in the discussion by removing the odds ratios and prevalences where it was not necessary for context in the sentence.

We very much thank the editor for taking the time to improve our manuscript as we believe our manuscript has been improved for these changes.