Reply to Redsell et al

Dear Dr Birrell

Re: Redsell S, Bains KK, Le Broq S, Bucks RS, Byrne-Davis L, Gray L, Hotham S, Hennessy M, Kyle TK, McPherson A, Quigley F, Vicari M, Zinn SR. Concerns regarding “Association between intelligence quotient and obesity in England” and unjustifiable harm to people in bigger bodies. Lifestyle Medicine 2021.

We thank Redsell and colleagues for preparing a comment on our important work surrounding the cross-sectional association between intelligence quotient (IQ) and obesity, while adjusting for sex, age, ethnicity, marital status, qualification, employment, income, chronic physical conditions, loneliness, social support, stressful life events, smoking status, alcohol dependence, drug use, and common mental disorders.

1 | METHODOLOGICAL COMMENTS

Our analysis was conducted and reported in accordance with STROBE guidance. The analyses showed that after adjustment for the aforementioned confounders, compared to IQ scores of 120–129, IQ scores of 110–119 (odds ratio [OR] = 1.16), 100–109 (OR = 1.35), 90–99 (OR = 1.26), 80–89 (OR = 1.68), and 70–79 (OR = 1.72) were associated with increased odds for obesity. Furthermore, a 10-point decrease in IQ was associated with a 1.10-fold increase in the odds for obesity. We went on to discuss the findings (i.e., the potential mechanisms that could explain the IQ–obesity relationship) in the context of the limitations of the study and concluded that there was a negative association between IQ and obesity in the UK population.

2 | RISK FACTORS

Correlates of health outcomes and behaviors can either be modifiable (e.g., physical activity level) or nonmodifiable (e.g., IQ). Modifiable correlates inform targets for change in interventions (such as increasing levels of physical activity) and nonmodifiable correlates inform populations who should be targeted for intervention (such as those with a low IQ in obesity prevention). These people with characteristics which may not be modifiable can also benefit from lifestyle interventions as they may be more likely to engage in lifestyle factors, which can lead to adverse health outcomes. In our study, which found that low IQ is associated with obesity, we discuss the potential contribution of lifestyle factors in this association. Identifying both types of correlates in terms of health behavior is essential for successful and targeted intervention. In this context, the present paper perfectly fits into the scope of “Lifestyle Medicine.”

3 | PERCEIVED RISK OF HARM

It is not, nor ever has been our intention to fuel inappropriate perceptions of anyone in society. Indeed, we partake in a lot of co-created research with vulnerable groups and their voice is very important to us. We would like it acknowledged though that we do not have control over how research is used. The authors of this letter seem to infer that open access to scientific articles is not appropriate as it may be misinterpreted by parties with a vested interest. We would strongly refute this and choose to publish in open access journals to increase access to ongoing scientific debates.

We never conclude that people with obesity are more likely to have low IQ in our paper. This is a misinterpretation. We do not even show data on the mean IQ levels of people with and without obesity. Second, this is equal to negating all studies that are based on obesity and a potentially stigmatizing condition such as mental health problems or potentially stigmatizing issues such as sexual orientation. In studies that have found that people with schizophrenia are more likely to have obesity for example, would it be possible for someone to criticize or ask for retraction of a paper saying that this topic is dangerous and harmful since people with obesity may be discriminated because they are more likely to have schizophrenia? Data from these kinds of studies would usually be used to further stimulate research on what lifestyle or pharmacological factors are leading to more obesity in people with schizophrenia, so as to improve health status in people with schizophrenia. This is in line with our study aims.

If some media message emerges as a result of a misinterpretation, this would not be a problem of the paper but the interpretation of the journalist.

The authors of the letter have not clarified which journal article the newspaper article on obesity and IQ (citation 5) was based on and how the journalist misinterpreted the content. This is also true for the newspaper article on policy decisions to bar students to top schools because the student’s parent is too fat (citation 6). In fact, our paper has nothing to do with parental obesity and it is not clear how this is relevant in the context of IQ.
Furthermore, to justify their claims, the authors of the letter should have shown that previous studies on IQ and obesity directly led to discrimination (and not via a misinterpretation as that is not the fault of the paper but rather the journalist who misinterpreted the data), and that these studies on IQ and obesity had undeniable negative impact on the society. The study topic of IQ and obesity is by no means novel and has existed since more than 40 years ago. Thus, if this study topic were to be harmful, we believe that its impact should be evident by now.

4 | STIGMA

We agree of course that weight stigma has deleterious effects on health. We also agree with the authors of the letter that science is an excellent vector to fight against any type of discrimination. However, based on these claims, it seems that the authors are saying that no studies on obesity and a potentially stigmatizing condition can take place as this can lead to weight stigma. We do not believe that this is likely to happen and omitting these kinds of studies would mean that there will be no data on how to improve health status of people with potentially stigmatizing conditions, which in itself can be discriminatory. If the authors of the letter believe that these studies should be abolished from research, our recommendation would be to contact larger scientific bodies or organizations to disseminate their message and ask for their opinions. In terms of IQ and obesity, as we show below, there is a huge body of literature on this topic, although limited as samples are not nationally representative and key potential confounding variables have not been considered, and thus, contacting all journals and authors of these previous publications may lead to a more balanced view, and requesting a retraction only of our study will probably not lead to any change in practice that the authors of this letter seem to want.

5 | METHODS

We were not sure what this means but the reference provided by Redsell and colleagues does not conclude that BMI is a poor indicator of health but that the diagnostic accuracy of BMI to diagnose obesity is limited. This is a different message. Furthermore, based on the World Health Organization definition, BMI is the parameter used for the diagnosis of obesity. Finally, BMI does have limitations at an individual level. However, it was developed for epidemiological purposes, whereby associations across populations are established. Therefore, the limitations of using BMI do not confound the type of research presented in our paper.

It is incorrect to say the limitations of self-report BMI were not acknowledged. We have openly acknowledged the limitations of self-reported BMI and provided an appropriate reference to substantiate this. The limitations paragraph indicates:

"Second, BMI was based on self-reported weight and height, and it is thus possible that the prevalence of obesity was underestimated in this sample as people tend to underreport their weight."

A cross-sectional study never assesses causation, as it cannot. We do not understand how "exploring the association between IQ and obesity, not causation" can be a major flaw in the study. Rather, a cross-sectional study that overemphasizes causation is a problem. In our study, this is not the case, as we mention the following in the limitation section:

"Third, this was a cross-sectional study and thus no conclusions about causality or temporality of the association between IQ and obesity can be drawn."

Cross-sectional studies are exploratory in nature commonly used as platforms for future prospective and interventional studies to provide further evidence on causality and direction of associations. They can also instigate future research on the underlying mechanism of a certain association.

It is incorrect to say "there is no consideration of the overwhelming evidence supporting the social and structural causes of higher BMI." Loneliness and social support were included in the analyses, and both loneliness and social support can hardly be considered as individual level variables given that they subjectively and objectively depict the interaction of an individual with his/her environment, respectively.

6 | INTELLECTUAL DISABILITIES

People with intellectual disabilities are out of the scope of the present study. Intellectual disability is traditionally defined as ≥2 standard deviations below mean IQ or IQ ≤ 70. In our study, participants had IQ scores between 70 and 127. Thus, the study that the authors of the letter cite is not comparable. We are not sure what the authors mean by a direct association but associations after adjustment for various confounders have been found between IQ and obesity as mentioned in the Introduction. Also, adjustment for wealth is included in our study.

Please note that investigations of IQ and obesity are by no means a novel idea and have been extensively studied by various groups for many years since the 1970s and have been present in the academic literature. For example, in 2010, one systematic review collated the literature on the association between IQ and obesity, particularly childhood IQ in relation to adulthood obesity, and included 26 studies. The review concluded that "overall there was an inverse full IQ/obesity association, except in pre-school children. However, after adjusting for educational attainment, full IQ/obesity association was not significantly different. A lower full IQ in childhood was associated with obesity in later adulthood perhaps with educational level mediating the persistence of obesity in later life." We carefully identify this literature among others in the introduction of our paper (see references 6–10).

Redsell et al. state "To propose that a direct, linear relationship between IQ and BMI exists without any further analysis and understanding of the underlying factors which may link the two is thus incomplete and misleading." An association may exist even if there are no confounders. This is why the phrase "univariate association" exists. The control variables included in our study are clearly explained. Thus, the readers
are aware of the fact that the association between IQ and obesity in our study is the association when adjusted for these factors and that it is possible that residual confounding may exist due to factors not included in our study. In fact, our study advances the field by including multiple potential confounders, which have not been considered in previous studies on IQ and obesity.

7 | BENEFITS AND HARMs

The benefits of studying this issue are to identify people at high risk of obesity. Based on the argument of Redsell and colleagues, the potential harm that they refer to is caused by a misinterpretation. Any paper can be misinterpreted if read by a nonscholar and it is not normal scientific practice to note that the study may be harmful as someone can misinterpret the data.

8 | NATIONAL ADULT READING TEST

The NART for this study was only conducted for scientific purposes and thus widespread use of IQ testing and its impact on the community is not within the scope of this paper. Furthermore, we do not advocate widespread IQ testing anywhere in the paper. Interestingly, the paper of McGurn and colleagues that Redsell et al. refer to supports the use of the NART because 0.6 is considered good enough: “These findings validate the NART as an estimator of premorbid ability in mild to moderate dementia.”

In addition, another study has shown that a revised version of the NART can be used in people without dementia: “NART-R estimated IQ scores correlated reliably with earlier obtained IQ scores: FS1Q \( r = 0.70 \); VIQ \( r = 0.68 \); PIQ \( r = 0.61 \) (all \( p's < 0.05 \)).” (Abstract)

“These results represent the first confirmation of the retrospective accuracy of the NART-R in estimating WAIS-R scores across time, a previously untested but critical assumption for clinical application of this approach.” (Abstract)

Finally, there are papers derived from the dataset used in our study that use the NART to assess IQ, suggesting that this is an accepted proxy in academia.

9 | PPI

This sixth point further emphasizes the misinterpretation of our paper by Redsell et al. Our paper showed that a 10-point decrease in IQ was associated with a 1.10 times higher odds for obesity. Therefore, if PPI was to be conducted then we would select people with lower IQ and not overweight and obesity. We agree that there is great value in PPI. However, Redsell and colleague must try to take a more holistic approach to identifying research priorities of which PPI forms one contributory avenue.

Redsell and colleagues state: “This research does not address any of the more recently published priority issues for people with higher BMIs (for example https://mrc.ukri.org/research/initiatives/obesity-research/); in fact, this cited document contains the following statement: “In terms of our remit, obesity’s consequences for health are the dominant cause for concern. For example, obesity results in a substantial increase in risk of type 2 diabetes. This means that a balance between approaches – reducing or preventing obesity and breaking the link between obesity and related diseases – is required. An intermediate approach, targeting common points in the link (such as insulin resistance) is also possible.” When considering this statement and “preventing obesity” then our paper is addressing this priority in that we are identifying a subset of the population who is at risk of obesity and thus we may wish to target with prevention efforts. Moreover, we know that this population is at greater risk of some obesity-related diseases.

10 | ETHICAL APPROVAL

Secondary data analysis does not require further ethical approval. Furthermore, as mentioned above, Redsell and colleagues have not been able to prove any evidence that this study topic is harmful. Thus, their claim that this study would require further ethical approval due to serious concerns cannot be justified.

11 | SOCIETAL AND CLINICAL IMPLICATIONS

Screening for obesity in people with low IQ is not discriminatory. This is part of preventive medicine. By overemphasizing potential stigma, we believe that the authors of this letter may potentially be fomenting discrimination against people with potentially stigmatizing conditions by leaving them out of health care. This is indeed unethical.

12 | CHALLENGES OF WEIGHT MANAGEMENT

The paper that Redsell and colleagues cite, saying “It is well established that healthcare professionals find it challenging to raise weight management with people [15]” is on child weight management, despite the fact that our study only includes adults. Furthermore, this paper does not say that child management is not possible nor that it should not be done. In contrast, the review identified several facilitators such as healthcare professionals’ knowledge or parents seeking help.

13 | WIDESPREAD TESTING

IQ and other related measures are documented in some pediatric and psychiatric practices. We never advocate widespread testing of IQ, so the authors’ comment about this is incorrect. Please refer to the text below which can be found in our manuscript:

“Although the present findings provide valuable information on the link between low IQ and obesity, it is important to understand that IQ is a nonmodifiable risk factor that is rarely assessed in the general
population. Therefore, the development of obesity prevention programs focusing on intelligence is difficult to implement. Nevertheless, IQ may be regularly assessed in specific situations such as the follow-up of children with developmental difficulties or the follow-up of adults with psychiatric disorders.”

We only suggest strategies under circumstances where data on IQ are available for another purpose.

14 | CRITERIA FOR PUBLICATION

We did not find any evidence-based concerns in the letter by Redsell and colleagues and thus certainly a retraction of this paper is not warranted. In particular, despite their claims “Yet this paper suffers a number of methodological flaws and breaches two ethical principles, namely, beneficence and justice that significantly detract from the soundness of the science.” Redsell and colleagues do not provide in the letter any evidence supporting such claims. These are very strong accusations that need to be supported by objective data.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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