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Letter to the Editor

The claim that effectiveness has been demonstrated in the Parenting, Eating and Activity for Child Health (PEACH) childhood obesity intervention is unsubstantiated by the data

Childhood obesity prevalence is high, and effective strategies to prevent and treat this disease are greatly needed. Hence, we read with interest the article by Moores *et al.*[1] entitled 'Pre–post evaluation of a weight management service for families with overweight and obese children, translated from the efficacious lifestyle intervention Parenting, Eating and Activity for Child Health (PEACH)'. The authors conclude that their intervention was effective due to the statistically significant decrease in BMI z-score by −0·11 SD units and waist z-score by −0·05 SD units at the 6-month assessment time point in an adapted, non-randomised control designed, version of the PEACH childhood obesity intervention[2]. However, the study conclusions can be entirely explained by a statistical phenomenon called regression to the mean (RTM).

The consequences of RTM in obesity research have been outlined by George *et al.*[3] and specifically in childhood obesity research by Skinner *et al.*[4]. If not accounted for, RTM can lead to frequent erroneous conclusions on treatment effects in uncontrolled and even some controlled trials[5]. RTM typically occurs when a measurement on individuals at baseline BMI-z-score[1] is segregated into groups, such as a high BMI z-score group. Because the high BMI z-score group is the furthest away from the mean, a second measurement of BMI z-score in this group assessed at a future time point will have decreased, not necessarily due to intervention effect but rather because the BMI z-scores furthest away from the mean will 'regress to the mean' upon the second measurement[6]. Without a control group to compare the degree of change in the two variables, it is impossible to delineate if the decrease is due to treatment effect or RTM. An example of this phenomenon in childhood obesity is the Early Childhood Longitudinal Study, Kindergarten (ECLS-K) cohort, which annually gathered anthropometric data on children aged 5–6 years, without any intervention[4]. Because of the effects of RTM, there was a decrease in BMI z-score in children by 0·183 SD units. Also of note, the reductions observed in BMI z-score are the most pronounced among the obese weight class, as healthy-weight children experienced a 0·0058 SD unit increase in BMI z-score over the year. This is a clear example of children at the highest range of values (obesity) regressing to the mean upon second measurement.

The PEACH study was adapted from a randomised control trial whose primary aim was to reduce adiposity in children between 5 and 9 years old through a lifestyle intervention while testing the role of added parenting skills training[2]. While the intervention was followed by significant reductions in BMI and waist z-scores, there did not exist a control intervention-free group for comparison. The original study therefore cannot demonstrate efficacy of the PEACH curriculum. The reductions in BMI z-score in the present study were more modest (0·11 reduction) than those reported by Magarey *et al.*[2]. However, both effect sizes (or, more aptly, 'association sizes') are similar in magnitude to (actually, not even as large as) the observed changes in BMI z-score among children in this same age range from the ECLS-K cohort described above who received no intervention[4].

In both PEACH articles mentioned, the changes in child BMI z-score can be explained by RTM, and therefore, the results cannot substantiate conclusions of intervention effectiveness or efficacy. Because the conclusions of this study could influence future decision-making as to the best practices for childhood obesity treatment, it is essential that these results be interpreted correctly and causal inference not be exaggerated. Increased recognition of RTM and other methodological errors in statistics is needed in the field of obesity, if researchers are to make progress toward effective strategies for treatment and prevention of this disease at all ages. We therefore suggest and request that the authors revise their published conclusions.

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[1] Note, that this is true for any other variable and is a fundamental statistical phenomenon and not unique to BMI.

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