Conclusions These simple recommendations, supported by a real-life research example, can improve sensitivity analyses for unmeasured confounding and reduce the potential for selective reporting, thereby improving the quality of population health research.

Background Understanding the factors that predict/cause individuals’ withdrawal, or dropout, from weight loss can provide useful insight into adaptations that could ensure that such programmes have greater impact. If one event follows another, conclusions are drawn that the first event caused the second. However, these associations may be observed due to chance, confounding, or selection bias. Although a lot of research has been conducted to identify factors related to attrition and adherence in weight management/loss programmes, their findings do not have a concrete (causal) interpretation beyond recognising that some predictors are often favoured over others from an initial pool of candidate predictors.

Methods Dalle Grave et al. (2015) recruited 634 patients seeking obesity treatment at Italian medical centres. They performed logistic regression to assess the association between demographic, personality characteristics, eating disorder features, psychological well-being, and attrition. This study aims to illustrate the key issues through directed acyclic graph (DAG) informed re-analysis of the Dalle Grave et al. (2015)’s data to explore if and by how much conclusions might vary between common prediction approaches and a causal inference approach.

Results According to Dalle Grave et al. (2015), personality traits, which were assessed through the Temperament and Character Inventory (TCI), are less relevant in predicting attrition. In contrast, causal inference analysis suggests that temperament scores (harm avoidance (Probability=0.33; CI=0.29, 0.37), novelty seeking (Probability=0.34; CI=0.30, 0.38), persistence (Probability=0.30; CI=0.26, 0.34), and reward dependence (Probability=0.30; CI=0.26, 0.33)) and character scores (self-transcendence (Probability=0.34; CI=0.30, 0.39), cooperativeness (Probability=0.32; CI=0.27, 0.36), self-directedness (Probability=0.32; CI=0.27, 0.37)) are causally associated with higher probability of drop-out. Additionally, Dalle Grave et al. (2015) considered body uneasiness scores to be irrelevant in predicting drop-out. Whereas, causal inference analysis indicated that higher body uneasiness scores to be causally associated with the highest probability of drop-out (Probability=0.39; CI=0.34, 0.44).

Conclusion New insights into factors that predict/cause drop-out from weight-loss programmes can be gained through causal inference-informed analysis. On the basis of this re-analysis, factors previously identified as irrelevant or excluded with respect to a traditional prediction perspective appear to be important from a causal perspective. Dalle Grave et al. (2015)’s analysis can be considered a case of the ‘table 2’ fallacy, where mutually adjusted coefficients in a prediction model are (inappropriately) inferred to have an equivalent interpretation. Different causal models must be generated, based on a DAG, to derive ‘correct’ (causal) inferences.