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ORIGINAL ARTICLE

The role of answering behaviours on weight misreporting

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KEYWORDS
Weight misreports;
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Summary
Background: Biases in self-reported weight are very common among young adults and adults. Although social norms are the most commonly accepted explanation for these misreports, corresponding evidence is scarce and conflict-ridden. An alternative explanation for biases in weight self-reports comes from answering behaviours; non-random rounding, formally an answering behaviour, has been found to play a significant role in several studies of weight misreporting. However, the presumably rich role of answering behaviours has seldom been explored. This study brings a second answering behaviour into the analysis: inconsistency.
Methods: An inconsistency index was computed as an individual-level score from several questions across waves in the National Health and Nutrition Examination Survey. By regression analysis ($N = 3480$ men and 1856 women) the simultaneous role of inconsistency and of non-random rounding on weight misreporting was explored.
Results: Inconsistency was found to be associated with higher self-reported weights. Inconsistent individuals provided significantly different misreports, with women under-reporting 0.23[kg] (0.01—0.45) less and men over-reporting 0.42[kg] (0.02—0.82) more than their consistent counterparts. *Inconsistency* was found to play a simultaneous and substantially larger role than *non-random rounding*. This result was clearer among men than it was among women.
Discussion: Although social norms are usually thought to be the central explanation of weight-biased misreports, there are other factors, such as answering behaviours, that might play a more influential role.

Introduction

There is an extensive body of literature showing that sensitive questions, such as questions related to sexual behaviours and drug use, are often

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self-reported in surveys with substantial non-random errors, presumably due to a ''social desirability bias'' attached to social norms [1].

Weight has also been misreported in surveys, as has been repeatedly shown over several decades [2]. All 34 studies on female weight misreporting included in Engstrom et al.'s survey [3] showed that females under-report their weight. Men also misreport their weight [4—6], but their misreports are smaller than women's [4,7,8]. In fact, many researchers have recommended not using weight self-reports for studies about the prevalence of obesity, especially amongst adolescents and elderly individuals [9—16], although occasionally self-reports in all age and sex groups are found to be acceptable [2,4,17]. Weight misreports have been found to exist, and they differ along sex and age groups, as well as among cultural and ethnic groups [6,18]. Even if weight misreports were random, which they are not, non-random noise would be introduced in categorical measures of obesity because misreports ''swell'' the tails of the Body Mass Index (BMI) distribution [19].

Social desirability bias attached to social norms is the most commonly accepted explanation for weight-biased misreporting (excluding elderly individuals, where recall bias and anthropometric change allegedly play a role). The role of social norms is consistent with both intuition and evidence about preferences for ideal body images across Europe [20,21] and the USA [22].

However, evidence supporting the role of social norms is scarce and conflict-ridden. Only four studies so far have attempted to quantitatively address the impact of social norms on weight misreporting [8,20,23,24]. The most recent study [24] found that within each weight category (underweight, normal, overweight and obese), social norms played no role, or even the opposite role: ''Perceiving oneself as too heavy appears to reduce rather than exacerbate weight, height, and BMI misreporting biases'' [24]. The second of the four studies found that social norms do play a role, but only among non-obese women [23]. This is surprising because by intuition, social norms regarding weight should play a clearer role among obese individuals. In fact, eating disorders have been found to be associated with higher accuracy in weight reports [25,26]. Two studies [8,20] concluded that social norms played a significant role in weight misreports. But they used body weights as measures for social norms, not being clear that social norms were the explanation underlying the association between weight status and weight-misreporting. This is particularly important as the majority of studies have identified weight itself (or BMI) as the most influential factor associated with misreports, with underweight individuals over-reporting and overweight individuals under-reporting [3,5,8,11,19,27—30]. Nineteen out of twenty studies that examined such associations in Engstrom et al.'s study [3] found these associations to be true. Many factors other than social norms might channel this association.

There is considerable evidence, although somewhat ignored, about the significance and size of a ''digit preference'' effect (i.e. the tendency to round outcomes to terminal digits such as 0 or 5). Weight reports show a strong digit preference, with 30—60% of individuals reporting a 0- or 5-ending digit [7,22,27,31]. Even though the effect of digit preference is most likely underestimated because not all 0- or 5-ending-digit responses should be labelled as digit preferences, this effect is commonly found as a significant predictor of misreports among women, and occasionally among men, with the size of the misreport among digit-preference individuals being between a third or three times as much as the rest of the individuals in the survey [3,5,7,14,27—29,32]. This effect has been documented in several areas of the medical field: fecundability studies [33], hypertension, birth weight [9], general practice and blood pressure, among many others. Even among parents, there is evidence of digit preference in the reporting of children's weight [34]. Thus, digit preference is associated not only with random rounding, but also with non-random rounding. And, while weight or BMI are strongly positively correlated with weight-biased misreports (WBMs), there is evidence that digit preference is more common amongst overweight individuals [20,31].

It is probable that all answering behaviours introduce random and non-random errors. Digit preference is an answering behaviour, like the tendency to answer yes, the tendency to pick the first item on a list, the tendency to answer ''I don't know'' or ''no response'', and the tendency to provide inconsistent answers across time or questions within a survey. Answering behaviours are, in their original conceptualisation, independent of social norms and any question-specific issue, although there are no studies on whether answering behaviours work independently of social norms. Focusing some attention on answering behaviours as a main topic behind weight misreports is certainly reasonable because (1) digit preference alone is widespread and has a significant and sizable effect, (2) social norms have thus far failed to be the main explanation for weight misreports. Moreover, the size of misreports are on average rather small (between 1[kg] and 2[kg]) [2,3,9,14,20,29,35], which further opens the door