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PARENTAL WILLINGNESS TO PARTICIPATE IN A NUTRITION-HEALTH SURVEY DISTORTS RATES OF CHILDREN'S NOURISHMENT STATUS

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Abstract

Obtaining written consent prior to any study enrolment is an ethical issue and especially important when a study focuses on vulnerable population groups, such as children. However, parental willingness to participate in a study focused on children can significantly distort findings and lead to false conclusions. This is especially important for inflating childhood obesity rates, when interventions rely on such results could fail greatly.

We compared state of nourishment (based on IOTF criteria) and cardiometabolic risk of 226 children for which parental active consent (45.1%) or passive consent (54.9%) was provided. In the active consent group, state of nourishment for boys was underestimated, while for girls, underweight and normal weight were overestimated, and overweight and obesity were underestimated. Parents with obese children (p=0.019) and parents of a male child (p=0.017) were more likely to provide passive consent. In the passive consent group, children had higher cardiometabolic risk (p=0.017). Unemployment (p<0.001) and high-school diploma, especially for mothers were indicators of passive consent. Interestingly, all parents with the lowest and the highest education level provided passive consent. Our findings clearly show distorted prevalence rates of overweight/obesity in children as a result of parental willingness to participate in the study, which are mediated with parental education and employment status. More effort is needed to obtain representative data on such an important public health problem like childhood obesity.

Keywords: *Childhood obesity; state of nourishment; parental education; parental employment Status; survey participation*

Introduction

Obtaining a representative sample is the component in epidemiological and clinical studies when we aim to achieve generalizability of study results. Yet, they are often misconstrued and conflated, masking the central issues of internal and external validity. While focusing on the ethical aspects of a study and the need to obtain written permission, researchers often neglect these two key

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aspects which will determine pass or fail of a study.

Response rates to study participation, even in epidemiological studies with no invasive procedures (e.g. blood sampling) [*Keeter S et al., 2000*], have fallen drastically over the last four decades. For adequate statistical analysis response rate of 80% (a minimum 75%) is needed [*Mellor JM et al., 2008*]. However, for many studies these response rates are unachievable, and the usual response rates range anywhere between 30% and 60% [*Tiggers BB, 2003*].

Children are considered as especially delicate and sensible population, and the decision of whether or not a child will participate in a study rests on parents/guardians. So far, a number of studies had shown that various parental determinants, like how many times previously parents were approached and how they reacted, provision of a monetary incentive, can result in getting an active or passive consent [*IOM, 2004*]. For parents whose child has a medical issue, participation in a study is seen as an opportunity to gain additional access to medical care and/or more information about their child's condition and treatment [*Hussemann JM et al., 2016*].

The topic of a survey can change participation rates significantly and therefore affect interpretation of study results, which was previously shown in studies assessing adolescent cigarette smoking and alcohol consumption [*Mellor JM et al., 2008*]. Given the magnitude of childhood obesity, which has reached alarming proportions [*Obesity Evidence Hub, 2023*], it is surprising that parents tend to underestimate child's nourishment status. Estimated 175 million children aged 5-19 years globally are affected with obesity according to World Obesity in year 2020 [*World Obesity, 2023*]. Complex socioecological model was developed to incorporate some of the personal and environmental factors influencing paediatric obesity [*Jebeile H et al., 2022*]. Parents, especially for young children have a profound role in preventing and treating obesity [*Balantekin KN et al., 2020*]. In conjunction with that, paradoxically less parents over the years are able to assess their child's nourishment status correctly, misperceiving child's obesity/overweight more often [*Duncan DT et al., 2015; Twarog JP et al., 2016*] and indicating a shift in social norms related to body weight [*Hansen AR, et al., 2014*] despite more health professionals communicate child's weight to parents [*Sugiyama T et al., 2016*].

The aim of this study was to analyse the magnitude of sampling bias resulting from active consent procedure from parents in a nutrition-health survey focused at children's state of nourishment and related health behaviours.

Material and Methods

To examine the rate of sampling bias in regard to the prevalence of underweight, normal weight, overweight, and obesity among children aged 6-7 years, we paired data from parents providing active and passive consent.

The consent was asked during the medical examination prior starting primary school (first grade entry) at the age of 6-7 years during year 2019. Since year 2015, during the medical examination, parents are asked to participate in the nutrition-health survey focused on children's dietary and lifestyle habits. We previously reported findings regarding the survey from earlier years [*Banjari et al., 2020*]. After informed consent procedures, parents need to provide written consent (active consent group). Parents who did not provide written consent were the passive consent group.

Under passive consent, parents are notified that their nonresponse indicates consent to their child's participation. Under active consent, parents must provide written authorization by signing the informed consent form.

Study subjects: A total of 226 children at the age 6-7 years completed the medical exam (114 boys, 112 girls), with 102 parents (45.1%) providing written consent (active consent group) and completing the nutrition-health survey on children's dietary and lifestyle habits.

For the remaining 54.9% of children (124 parents) from the passive consent group, only anthropometric measurements were collected.

Anthropometric measurements: Anthropometric data included height and weight measurement

with children barefoot and wearing minimal clothes. Seca scale with integrated stadiometer was used, with child's head in the Frankfurt plane (±1 cm). A non-elastic tape was used to measure child's waist circumference.

Anthropometric measurements were used to calculate children's Body Mass Index (BMI) which was then used to classify them according to their nourishment status as underweight, normal weight, overweight or obese according to the International Obesity Task Force criteria [*Cole TJ, Lobstein T, 2012*]. Additionally, cardiometabolic risk (CMR) was calculated as a ratio between waist in cm and height in cm, where values <0.5 represents low risk, 0.5 – 0.6 increased risk and >0.6 high risk [*Khoury M et al., 2013*].

Data analysis: Statistical analysis was conducted with Statistica software (TIBCO Software Inc., version 14.0), with level of significance set to 0.05. For data plotting and graphic presentation of data, MS Office Excel package was used (version 2016, Microsoft Corp., USA). Absolute frequencies are used for data plotting while Chi square test was used to test differences between active consent and passive consent group.

Results

Based on parental consent, in the active consent more girls were underweight (10.7% vs 7.1%) and in the category of normal weight (32.1% vs 25.9%) in comparison to passive consent groups where more girls were overweight (8.0% vs 6.3%) and obese (6.3% vs 3.6%) (**Fig 1**). On the other hand, for boys in the active consent groups prevalence rates for all four categories of nourishment status were lower than in the passive consent group **(Fig 1**).

Parents who have obese children were more likely to provide passive consent (p=0.019) in comparison to parents of underweight children. Also, parents of boys were more likely to provide passive consent (p=0.017).

Significantly higher CMR have children of parents who gave passive consent, regardless of gender (p=0.017) (**Fig 2**). Low CRM was found in 6.3% of girls and 9.6% of boys in the passive consent group, and additional 0.9% of boys in the passive consent group had high CMR (**Fig 2**).

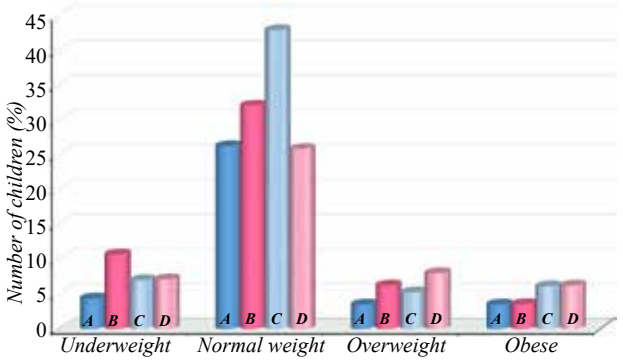

Figure 1. *State of nourishment of 7 years old children according to the International Obesity Task Force criteria according to parental provision of active or passive consent for the nutrition-health survey.*
*Legends: (**A**)- Active Biys (**B**)- Active Girls (**C**)- Passive Biys (**D**)- Passive Girls*

Unemployment (p<0.001) and high-school diploma, especially for mothers were indicators for passive consent provision from parents (**Table 1**). Interestingly, all parents with primary school and those with PhD level of education refused to participate in the survey (**Table 1**).

Discussion

Active consent procedures result in sampling bias in surveys dealing with various children and adolescent behaviours, including overweight/obesity. However, despite being recognized as important, only a handful of studies looked at data discrepancies between active and passive consents.

Response rate in our study was higher than the one reported by *Strugnell C et al.* [*2018*] of just

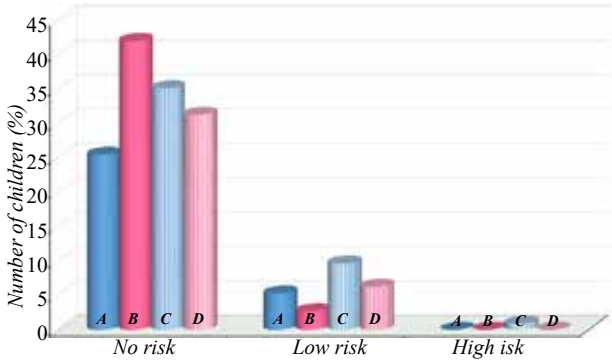

Figure 2. *Cardio-Metabolic Risk of 7 years old children according to parental to parental provision of active or passive consent for the nutrition-health survey.*
*Legends: (**A**)- Active Biys (**B**)- Active Girls (**C**)- Passive Biys (**D**)- Passive Girls*

TABLE 1

Parental education and employment status in regard to providing active or passive consent

Variables		Mother		Father	
		AC n (%)	PC n(%)	AC (%)	PC n (%)
Education level	Primary school	0 (0.0)	7 (3.1)	0 (0.0)	0 (0.0)
	High-school	58 (25.9)	77 (34.4)	72 (32.3)	86 (38.6)
	University degree	41 (18.3)	34 (15.2)	29 (13.0)	24 (10.8)
	MSc	3 (1.3)	2 (0.9)	1 (0.4)	8 (3.6)
	PhD	0 (0.0)	2 (0.9)	0 (0.0)	3 (1.3)
Employment status	Employed	96 (43.0)	93 (41.7)	100 (44.6)	103 (46.0)
	Unemployed	6 (2.7)	28 (12.6)	2 (0.9)	19 (8.5)

NOTES: *AC - Active consent, PC- Passive consent*

36.3% or Mellor et al. [2008] with just 26.1% of active parental consent. Our study was less complex, and direct contact with parents was used for the informed consent procedure, which could have improved our response rates.

Our results are in line with a previous study conducted in Australia on primary school children aged 9 to 12 years which found that active consent underestimated obesity prevalence, particularly in girls [*Strugnell C et al., 2018*]. After analysing obesity prevalence among active consent and passive content group the authors found significant difference; 9.8% in active consent vs 14.3% in passive consent group ($p<0.0001$) for the overall group of children. Interestingly, obesity prevalence in boys between these two groups did not differ significantly (12.6% vs 14.8%, $p=0.070$) but did in girls (7.4% vs 13.8%, $p<0.0001$) [*Strugnell C et al., 2018*]. In our study, all four categories of nourishment status for boys were underestimated in the active consent group, while for girls, overweight and obesity were underestimated and underweight and normal weight were overestimated in the active consent group (**Fig 1**).

Mellor JM et al. [2008] found that parents of children who are overweight or at risk for being overweight, especially if children are of younger age, are significantly less likely to give active consent for participation in a study assessing childhood obesity and related health behaviours. Our results are in line with their findings and confirm that having a child with weight problem diminishes the possibility that a parent will provide active consent for a study focused on determinants involved in childhood obesity.

In our study, parents with male children were also less likely to provide active consent, which may be explained with different weight stigma and social norms regarding body image between girls and boys [*Crielaard L et al., 2020; Haqq AM et al., 2021*].

Children of lower educated parents are more likely to have higher BMI, and they have a higher risk for obesity later in life [*Mekonnen T et al., 2022*]. Health risks, especially the risk of cardiovascular diseases and diabetes can be observed through CMR, which is usually higher in obese children in comparison to children in normal weight category [*Chung ST et al., 2018*]. Our results prove that children from the active consent group had better health status observed through CMR in comparison to children from the passive consent group (**Fig 2**).

Hussemann JM et al. [*2016*] found that parental gender, education, and employment positively correlate with active consent, while marital status and household income had no significant relationship to active consent. Parents with higher education level, female parent and employment were indicators linked to provision of active consent, while marital status had no influence on the decision [*Hussemann JM et al., 2016*]. We previously reported that parental education level, especially maternal education level significantly affects both BMI and CMR of a child over time, while paternal education level seems to be more important later in life in regard to child's BMI [*Peričić VI et al., 2023*]. Lower education and unemployment (**Table 1**), as in previously mentioned studies, were found as important indicators for passive consent and consequently resulted in distorted rates of overweight/obesity in children.

Unexpected finding is the lack of interest from highly educated parents (**Table 1**). Higher education level usually correlates with better income

and social status providing more favourable environment for children in regard to obesity risk, by providing better access to healthier diets, more physical activity and less screen time [*Inoue K et al., 2023*]. Improved health-related decisions and better parenting practices are expected in parents with a higher education level, who often have higher motivation and practice healthier lifestyle to be role models for their children [*Seum T et al., 2022*]. We, on the other hand, found that parents with the highest education level were uninterested because they self-assessed their knowledge of the topic as higher from the average population and assessed the study as unworthy of their time. Still, given that this interpretation is based on a handful of parents, a large-scale study is needed to analyse the reasons behind the behaviour of highly educated parents when providing active consent.

Conclusion

The results clearly show data distortion regarding child's nutritional status as a result of parental education and employment status. In order to get representative data, both researchers and clinicians need to imply techniques to encourage parents to participate in nutrition-health surveys.

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