STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

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|  | Item No | Recommendation |
|  **Title and abstract** | 1 | 1. **Indicate the study’s design with a commonly used term in the title or the abstract**

*Yes, in page 1 and page 3.****Title****: Combined effects of weight change trajectories and lifestyle factors on adiposity status at four years of age, a birth cohort study****Abstract****: In our ongoing birth cohort study, we used nine follow-up time points (birth, 3, 6, 9, 12, 18, 24 months, and 3, 4 years) to calculate the change between two adjacent weight for age z-scores (WAZ-change), and then to define weight trajectories using group-based trajectory modeling.* |
| 1. **Provide in the abstract an informative and balanced summary of what was done and what was found**

*Yes, in page 3.* |
| Introduction |
| Background/rationale | 2 | **Explain the scientific background and rationale for the investigation being reported***Yes, in page 4-5.* |
| Objectives | 3 | **State specific objectives, including any prespecified hypotheses***Yes, in page 5.* |
| Methods |
| Study design | 4 | **Present key elements of study design early in the paper***Yes, in page 5.* |
| Setting | 5 | **Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection***Yes, in page 5. This is an observational birth cohort, no exposures.* |
| Participants | 6 | 1. **Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up**

*Yes, in figure 1 “Flow chart of the study participants”.* |
| 1. **For matched studies, give matching criteria and number of exposed and unexposed**

*Not applicable. This is an observational birth cohort.* |
| Variables | 7 | **Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable***Yes, in methods part, page 6-8.**Outcomes: weight, BMI, waist circumference, waist-to-height ratio (WHtR), biceps circumference, subcutaneous fat.**Exposure: non applicable**Predictors: WAZ-change trajectories, early lifestyle factors (eating behaviors, physical activity, media exposure time and total sleep duration)**Confunders: baseline family income, gestational age of the child at delivery, maternal pre-pregnancy BMI, paternal BMI, newborn weight at the first three days, sex and energy intake at six months.*  |
| Data sources/ measurement | 8\* | **For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group***Yes, in page 7-8.**Eating behaviors**Physical activity time**Media exposure**Total sleep duration* |
| Bias | 9 | **Describe any efforts to address potential sources of bias***Yes.*1. *The follow-up age of the children were limited within the critical following-age-window. That is in the first follow-up stage (n=262), we carried out a person-to-person interview at 9 time points, namely late pregnancy, birth within 3 days, 42 days postpartum (± 3 days) and 3, 6, 9, 12, 18, 24 months after birth (± 7 days); and in the second follow-up stage (n=237), person-to-person interviews at 3, 4 and 6 years of age (±1 month) were conducted. Children with exceeding our critical following-age-window were excluded in the further analysis. (page 5)*
2. *All measurements were done according to standardized protocols by trained research staff. For reliability, all measurements were taken in duplicates. A third measurement was taken if the first two measurements differed by >1.0 cm for length/height, by > 1.0 kg for weight, by >1.0 cm for waist circumference and biceps circumference, by >1.0 mm for triceps and subscapular skinfold thicknesses. If a third measurement was taken, the two closest measurements were averaged. If the third measurement fell equally between the first two measurements, all three were averaged. (page 6)*
3. *To avoid loss of statistical power due to missing data, we performed a multiple imputation using chained equations (MICE) with 100 imputed data sets to estimate the missing values. To test whether substantial differences existed due to imputation, we compared the results before and after the data imputation. (page 9-10)*
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| Study size | 10 | **Explain how the study size was arrived at***This sleep birth cohort is a pilot study of the Shanghai birth cohort study (Zhang J, et al. Int J Epidemiol. 2019;48(1):21-21g.), we did not calculate the sample size. However, our post hoc calculations indicated that with a type I error rate of 0.05, we had 0.78, 0.66, 0.89 and 0.84 power to detect differences in weight, BMI, biceps circumference and subcutaneous fat between steady and early rapid WAZ-change trajectories, all of which had a significant finding, but the power was only 0.40 and 0.62 for waist circumference and WHtR, both of which did not.*  |
| Quantitative variables | 11 | **Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why***Yes, in page 8-9.*1. *To analyze the WAZ-change trajectories, the WAZ-changes were calculated and group-based trajectory modeling (GBTM) was used. We quantified WAZ-change during each age interval as the substraction between adjacent measurement points with positive differences representing WAZ gain and negative differences representing WAZ loss, and defined WAZ-change ≥ +0.67 over two time points as rapid change. The following eight age intervals, i.e. 0-3, 3-6, 6-9, 9-12, 12-18, 18-24, 24-36 and 36-48 months were defined to characterize the WAZ-change trajectories.*
2. *The lifestyle factors (i.e. food responsiveness , enjoyment of food, satiety responsiveness and food fussiness, total sleep duration, and media time) investigated at 2 and 4 years were averaged as the childhood exposure partly to reduce the number of data points and the odds of chance reporting (e.g. recall bias)*
3. *If the individual early lifestyle factor (i.e. food responsiveness , enjoyment of food, satiety responsiveness and food fussiness, total sleep duration, outdoor playtime, and media time) had a significant effect on adiposity measures, they were then categorized as dichotomous variables by median levels except for media time whose cut-off was defined as one hour.*
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| Statistical methods | 12 | 1. **Describe all statistical methods, including those used to control for confounding**

*Yes, in page 8-10.* 1. *The differences in characteristics between lost and retained children at 4 years were assessed by t-test and χ2 test for continuous variables and categorical variables, respectively.*
2. *To analyze the WAZ-change trajectories, the WAZ-changes were calculated and group-based trajectory modeling (GBTM) was used. We further defined the critical age interval for the most marked changes in the trajectories took place using t-test or ANOVA analysis.*
3. *We examined the predictors of the different WAZ-change trajectories determined using t-test and determined their predictive effect on the adiposity outcomes at four years of age using linear regression.*
4. *We tested the independent and combined effects of different lifestyles with WAZ-change trajectories on each adiposity outcome using multivariate linear regression model.*
5. *Post hoc pairwise comparisons were performed with Bonferroni multiple-comparisons tests.*
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| 1. **Describe any methods used to examine subgroups and interactions**

*Yes, in page 9.*1. *We combined the WAZ-change trajectories and each of the dichotomous lifestyle factors to examine a range of their joint effects on the adiposity outcomes. Children with lower risk factors of overweight/obesity were used as the reference group in the analyses, e.g. steady growth pattern and lower FR score, or steady growth pattern and higher SR score. Post hoc pairwise comparisons were performed with Bonferroni multiple-comparisons tests.*
2. *The WAZ-change trajectory, each significant lifestyle factor, and their interaction terms as the independent variables were analyzed to clarify whether a synergistic or antagonistic effect on outcomes existed.*
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| 1. **Explain how missing data were addressed**

*Yes, in page 9-10. To avoid loss of statistical power due to missing data, we performed a multiple imputation using chained equations (MICE) with 100 imputed data sets to estimate the missing values.* |
| 1. **If applicable, explain how loss to follow-up was addressed**

*Yes, in page 8.* *On average, each child had 4.9 (95% CI: 4.7, 5.2) WAZ-change observations over the first four years, and only children who had completed a minimum of three WAZ-change observations were included.* |
| 1. **Describe any sensitivity analyses**

*Yes, in page 10. To test whether substantial differences existed due to imputation, we compared the results before and after the data imputation.* |
| Results |
| Participants | 13\* | 1. **Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed**

*Yes, all reported in the Figure 1.* |
| 1. **Give reasons for non-participation at each stage**

*Yes, all reported in the Figure 1.* |
| 1. **Consider use of a flow diagram**

*Yes. Figure 1.* |
| Descriptive data | 14\* | 1. **Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders**

*Yes, in page 10 and Table 1 and Table S1.* |
| 1. **Indicate number of participants with missing data for each variable of interest**

*Yes, in Table S1.* |
| 1. **Summarise follow-up time (eg, average and total amount)**

*Yes, in the Figure 1.* |
| Outcome data | 15\* | **Report numbers of outcome events or summary measures over time***Yes, we reported the absolute WAZ-change between steady and early rapid WAZ-change trajectory groups in each age interval in Table S2 and Figure 2.* |
| Main results | 16 | 1. **Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included**

*Yes, in Table 2-3, and Table S3-S4.* |
| 1. **Report category boundaries when continuous variables were categorized**

*Yes, in page 9. If the individual early lifestyle factor (i.e. food responsiveness , enjoyment of food, satiety responsiveness and food fussiness, total sleep duration, outdoor playtime, and media time) had a significant effect on adiposity measures, they were then categorized as dichotomous variables by median levels except for media time whose cut-off was defined as one hour.* |
| 1. **If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period**

*Not applicable.* |
| Other analyses | 17 | **Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses***Yes, in page 11-12.**We did not find an interaction effect of the WAZ-change trajectory and each subscale of eating behaviors on the outcomes at four years old (data not shown).**Furthermore, our sensitivity analyses found that the results from multiple-imputation and complete-case analyses had limited impact on the results with the exception of the results for the SR score (Table S3-S4 and Fig. S2).* |
| Discussion |
| Key results | 18 | **Summarise key results with reference to study objectives***Yes, in page 12.**There are several important findings. Firstly, we found a high percentage of infant with rapid WAZ-change in our full-term birth cohort. Secondly, we identified two WAZ-change groups over 0-4 years, i.e. steady and early rapid trajectories, with the critical window for this change occurring over 0-6 months, especially over 0-3 months. Thirdly, the WAZ-change trajectories and childhood eating behaviors not only had independent but combined effects on adiposity outcomes at the age of four years.* |
| Limitations | 19 | **Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias***Yes, in page 15.**Our findings should be considered within the context of some limitations.* |
| Interpretation | 20 | **Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence***Yes, in page 15-16.**Our study identified two weight change patterns, highlighted the first six months as a possible critical growth window, and showed the effect of WAZ-change trajectory and eating behaviors, either alone or in combination, on adiposity measures at four years of age. These findings provide a very valuable model to aid researchers, clinicians and public health practitioners in designing early-life interventions targeting specific ages, specific populations and specific lifestyle behaviors to prevent childhood overweight/obesity. Our cohort is ongoing, and future follow-up on these children would be essential to evaluate whether our observations have long-term repercussions in later childhood or adulthood. And future studies with larger samples, longer time frames and more exact evaluation of lifestyle behaviors in other populations are also needed to verify our findings.* |
| Generalisability | 21 | **Discuss the generalisability (external validity) of the study results***Yes, in page 15.* *Our sample was from Shanghai, a relatively socioeconomically advantaged city in China. The majority of parents were university educated and had family incomes at or above the national average. Hence, the findings might not be generalizable to the national population. However, Shanghai is representative of most of the cities that have evolved from developing to developed status within China. Therefore, our findings are likely to reflect what will happen in other developing cities (both in China and around the world) and inform the design of early-life interventions to prevent childhood overweight/obesity in this socioeconomic setting.* |
| Other information |
| Funding | 22 | **Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based***Yes in page 17.**The study was supported by Chinese National Natural Science Foundation (81773443, 81602868, 81728017); Ministry of Science and Technology (2016YFC1305203); National Health Commission of the People’s Republic of China (201002006); Science and Technology Commission Shanghai Municipality (18695840200, 17XD1402800, 2018SHZDZX05, 18JC1420305, 14441904004); Shanghai Municipal Health Commission (2016ZB0104, 2017ZZ02026, 20164Y0095); Shanghai Jiao Tong University (YG2016ZD04).* |

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org