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# Childhood factors related to diverging body mass index trajectories from childhood into mid-adulthood: A mixed methods study

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*Conflict of Interest*

The authors have no conflicts to declare.

**Abstract**

Body mass index (BMI) trajectories that improve over the lifecourse result in better cardiometabolic profiles, but only a small proportion of children of an unhealthy weight show improving BMI trajectories. This study aimed to examine the childhood factors related to diverging BMI trajectories from childhood into adulthood using data from the Childhood Determinants of Adult Health study. A convergent parallel mixed methods design was used. Quantitative data (n=2 206) came from the first (2004-06) and second (2009-11) adult follow-ups of 8 498 Australian children (7-15 years) assessed in 1985. Using BMI z-scores, group-based trajectory modelling identified five trajectory groups: Persistently Low, Persistently Average, High Decreasing, Average Increasing and High Increasing. Qualitative data (n=50) were collected from a sub-group (2016; 38-46 years). Semi-structured interviews with 6-12 participants from each BMI trajectory group focused on individual, social and environmental influences on weight, diet and physical activity across the lifecourse. Log multinomial regression modelling estimated relative risks of trajectory group membership across childhood demographic, behavioural, health, parental and school factors. Qualitative data were thematically analysed using a constant comparative approach.

Childhood factors influenced BMI trajectories. Paternal education, main language spoken, alcohol and self-rated health were significant quantitative childhood predictors of BMI trajectory. A distinct 'legacy effect' of parental lifestyle influences during childhood was apparent among interview participants in the Stable and High Decreasing groups, a strong and mostly positive concept discussed by both men and women in these groups and persisting despite phases of unhealthy behaviours. In contrast, the 'legacy effect' was much weaker in the two Increasing BMI groups. This study is the first to simultaneously identify important quantitative and qualitative childhood factors related to divergent BMI trajectories, and to observe a legacy effect of parents' lifestyle behaviours on divergent BMI trajectories. This

work provides direction for further exploration of the factors driving divergent BMI trajectories.

*Key words*: lifecourse, anthropometry, weight, social ecological theory, interviews, family

## Introduction

Up to 90% of children with overweight or obesity will have an unhealthy weight as adults, with children with overweight or obesity having 7-9 times the odds of becoming obese as adults.[AUTHORS 2007] However, a small proportion of children with overweight or obesity have body mass index (BMI) values that improve towards a normal classification (<25kg/m$^2$) by adulthood.[1] This group of individuals has similar cardiometabolic profiles to those who are healthy weight in childhood and adulthood.[2] Given that deviating away from an unhealthy BMI trajectory is uncommon, there may be important lessons to learn from those whose BMI tracks more favourably. Burgeoning rates of childhood overweight and obesity internationally,[2] combined with high rates of conversion to adult obesity, means that identifying childhood factors associated with more favourable BMI trajectories may represent a critical opportunity for informing early intervention strategies.

Social-ecological models offer a useful framework for understanding the influences on weight and weight-related behaviours.[3, 4] These models posit that multiple levels of influence interact to influence behaviours (such as diet and physical activity) and related health outcomes (such as weight). Levels of influence are typically conceptualised at the individual, social and environmental levels. Individual level factors include (but are not limited to) demographic (e.g. gender, age, socioeconomic position), cognitive (e.g. self-efficacy, enjoyment, knowledge, motivation), and health-related (e.g. self-assessed health, injury/illness/disabilty) factors. Social level factors include social support from family, friends, peers and colleagues, cultural norms and expectations, and social connectedness. Environmental factors include accessibility (e.g. to places to be active, to fast food outlets), affordability (e.g. gym/club membership, cost of food), neighbourhood aesthetics and quality (e.g. of facilities, of fresh fruit and vegetables). It is unknown if deviations away from a

projected unhealthy BMI trajectory is a consequence of individual, social, or environmental factors, or a combination of these. A clearer understanding of these factors could help inform targeted interventions.

Drawing on the unique longitudinal dataset of the Childhood Determinants of Health study, [5, AUTHORS 2009, 2017, 2019] the objective of this mixed methods study was to examine the childhood factors that may explain diverging BMI trajectories. Our specific aims were to: 1) quantitatively identify demographic, behavioural and health-related childhood factors associated with divergent BMI trajectories from childhood to adulthood; 2) qualitatively investigate how childhood experiences (e.g. social, cultural, family, school, environmental) shape BMI trajectories from childhood to adulthood.

## Methods

This study is informed by a realist approach and uses a convergent parallel mixed methods design in a non-independent sample[6] (**Figure 1**).[7] The qualitative phase was informed by a social-ecological framework[3, 4] and used semi structure interviews. Integration occurred at the sampling, analysis and interpretation levels of the study.[8, 9]

### Quantitative Component

*Quantitative Sample/Participants*

The quantitative component used data collected from participants in the Childhood Determinants of Adult Health (CDAH) study. The CDAH study has followed a nationally representative sample of 8 498 children (7-15 years) from the 1985 Australian Schools Health and Fitness Survey (1985 ASHFS) with the aim of identifying childhood influences on adult cardiovascular health[5, AUTHORS 2009] (**Figure 2**). At the time of writing, two adult follow-ups have been completed (2004-6 and 2009-11, known as CDAH-1 and CDAH-2), with a third adult follow-up underway (2014-18, CDAH-3). The mixed methods study described here is known as the CDAH-Pathways (CDAH-P) study.

Participants in the 1985 ASHFS came from 109 public (government), Catholic and independent (private) schools. They were approached to participate in the CDAH study, with online directories, historical and current electoral rolls, school and participant networks used to access contact details. Adults (n=2410) completed questionnaires and attended a 3-hour study clinic in CDAH-1 (aged 26-36 years), and 1,589 completed questionnaires only. In CDAH-2, 3 049 adults (aged 31-41 years) completed questionnaires online or via telephone. Further details regarding response proportions and loss to follow-up from the first two adult

follow-up studies have been reported elsewhere,[AUTHORS 2017, 2019] and only measures of relevance to this study's aims are reported on here.

*Quantitative Procedures*

Height and weight were measured by trained technicians using standardised procedures at 109 schools in the ASHFS (1985) and at 34 study clinics in CDAH-1 (2004-6). In CDAH-2 (2004-6), height and weight were self-reported. At each timepoint, participants also completed extensive questionnaires capturing demographic, behavioural, social and environmental information.

*Quantitative Measures*

Information on height and weight was collected either through clinical measurement (1985 ASHFS, 2004-6 CDAH-1), self-report (2009-11, CDAH-2), or a combination of both (2004-6). Correction factors, applied to self-report measures of weight, were developed using a linear regression model of data collected from participants who had both clinical and self-reported measures available.[AUTHORS 2007] For the outcome variable, BMI ($kg/m^2$) z-scores were used in trajectory-based group modelling[10] to identify clusters of individuals following similar BMI pathways over time, using SAS Software (Version 10.0). In group-based trajectory modelling, groups should not be interpreted as literal entities [11, 12], as the aim is to identify clusters of individuals on similar developmental trajectories, but who are not necessarily homogenous [11, 12]. This method models the probability of a participant's membership in each of the defined groups (Figure 3), which were: Persistently Low, Persistently Average, Increasing from Average (Average Increasing), Increasing from Very High (High Increasing) and Decreasing from Very High (High Decreasing). This method

requires data from individual participants at each timepoint, therefore represents a complete-case analysis.

Childhood exposure variables were collected through surveys in the 1985 ASHFS and included demographic factors (age, gender, area-level socioeconomic position (SEP) from postcode, language spoken at home, urban/rural status from postcode), behavioural factors (physical activity, breakfast consumption, smoking experimentation, alcohol consumption, parental physical activity, parental smoking), and health-related factors (self-rated health). Childhood variables reported retrospectively in adulthood (in CDAH-1) were parental education and parental occupation at a child age of 12 years as indicators of individual-level SEP, and age at menarche. For descriptive purposes we report participants' age, highest level of education, occupation and perceived health (from self-report).

*Quantitative Analyses*

Log multinomial regression models were used to estimate the relative risk and 95% confidence interval for each of the non-excluded BMI trajectory groups (Persistently Average was the excluded trajectory group). Only variables with P-values $\leq 0.25$ in unadjusted analyses were added in full adjusted models. The importance of each added variable was verified according to the Wald statistic. Variables were removed except those with Wald p-value $< 0.15$ in at least one trajectory group and a new model was fit. The likelihood ratio test (LRT) was used to compare this new model to the old, larger model. A LRT p-value $> 0.05$ suggested that the reduced model fit the data as well as the complex model and was therefore used as it was more parsimonious. This process of deleting, re-fitting and verifying continued for variables with Wald p-value $< 0.10$ and $< 0.05$ in at least one trajectory group until we obtained a model including all the important variables. Any variable not selected from the

full model was added back into the model one at a time for re-verifying to avoid missing essential variables.

Qualitative Component

*Qualitative Sample*

The sample for the qualitative component of CDAH-P involved a sub-group of CDAH participants who had provided height and weight data at each of the first three timepoints (1985 ASHFS, CDAH-1 in 2004-06, CDAH-2 in 2009-11), and who had also provided these data at a fourth timepoint as part of the CDAH-3 follow-up (2014-16), described elsewhere[AUTHORS 2019] (see Figures 1 and 2). As data collection for CDAH-3 was underway at the time CDAH-P was implemented, the full cohort was not represented, but we considered that there was sufficient heterogeneity in the study outcomes of interest (BMI groupings) for the purposive sampling requirements of this qualitative component.

As detailed above for the quantitative component, group-based trajectory modelling[10] was used to identify clusters of individuals following similar BMI trajectories (Persistently Low, Persistently Average, Average Increasing, High Increasing, High Decreasing), but in this case using data from four time points. A random sample of participants from each of these five BMI trajectory groups were invited to participate in semi-structured telephone interviews.

*Qualitative Procedures*

Participants were initially contacted by post and followed up via telephone. Letters were mailed until the initial target of 50 participants had been recruited, representing approximately 10 participants from each BMI trajectory group. Semi-structured telephone

interviews (average duration 50.5 minutes, range 24.5-94.1 minutes) were conducted from August to November 2016. Consent was audio-recorded preceding the interview questions.

*Qualitative Measures*

Demographic information for each interview participant was obtained from the most recent follow-up survey data available, supplemented by information gathered in interviews. Using a social-ecological framework[3, 4] and taking a sequential life-stage approach, a semi-structured interview schedule was developed to explore influences on weight-related behaviours (e.g. diet and physical activity) at the personal (e.g. values, beliefs), social (e.g. family, friends) and environmental (e.g. school, neighbourhood) levels across the life-course. Pilot testing of the schedule with one man and one woman of the same age group but not involved in the CDAH study resulted in only minor changes. For consistent data collection, one experienced author (SB), blinded to trajectory group, conducted all interviews. Interviews were audio-recorded and transcribed verbatim.

*Qualitative Analysis*

Interviews were thematically analysed using a constant comparative approach (a grounded theory method) facilitated by use of NVivo 11 (QSR International, Doncaster, Victoria, Australia).[13] A codebook developed during data collection guided a five-member team coding approach.[3, 4, 14] Coding consistency was checked twice using a common interview, resulting in some codebook refinements. Regular meetings during the six-month team coding phase (November 2016 - April 2017) facilitated coding and discussion of emerging themes. On completion of preliminary analysis all coding was reviewed by one team member (MS) for thoroughness and relevance. Thematic analysis was conducted across the trajectory groupings. For the purpose of the thematic analysis, the Persistently Low and Persistently

Average groups were collapsed into one group (referred to as "Stable"), which was compared with the remaining three trajectory groups (referred to as Average Increasing, High Increasing, High Decreasing). Team meetings continued until consensus was reached that data had been comprehensively analysed, and no new themes were emerging. Themes were compared across gender and education level where relevant. An audit trail included the interview schedule, transcripts, codebook, notes on research team meetings, memos and reflective notes. Transcribed interviews were not returned to participants for checking.

*Data Integration*

A variety of methods exist for integrating data in mixed methods studies.[8, 9] These include concepts of merging, connecting, embedding, transforming, comparing and blending. Both arms of this study used quantitative data from the CDAH study to categorise participants according to their BMI trajectory from childhood to adulthood. Discriminatory comparative analyses were conducted for the quantitative arm and a comparison of thematic data occurred between BMI trajectory groupings in the qualitative arm. The quantitative analyses examined the influence of childhood factors on BMI trajectories while qualitative analysis investigated the influence of different life stages and life events. The findings and conclusions from the quantitative and qualitative arms were combined during the discussion and conclusion in order to enhance our understanding of the impact of childhood factors on the BMI trajectories.[8]

Ethics

The 1985 ASHFS study was approved by the Director General of Education in each state, and both parental and child consents were obtained. The three adult follow-ups were approved by the Human Research Ethics Committee (Tasmania) Network (formerly the Southern

Tasmanian Health and Medical Human Research Ethics Committee). Written informed consent was obtained from all participants before participation in the quantitative CDAH study, and verbal consent was obtained before participation in the qualitative CDAH-P study.

## Results

### *Quantitative findings*

Child and adult characteristics of the quantitative sample are presented in **Table 1**, for the whole sample and stratified by BMI trajectory group.

Unadjusted associations between individual childhood factors and BMI trajectory group are presented in **Table 2**. Age and area-level SES were associated with trajectory group membership, but no consistent patterns were observed. Being female was significantly associated with an increased risk of being in the Persistently Low group, as was age at menarche, which was also associated with a decreased risk of belonging to the Average Increasing, High Increasing and High Decreasing groups. Lower paternal education, lower parental education and poorer self-rated health were associated with a decreased likelihood of being in the Persistently Low group and an increased likelihood of being in the High Increasing and High Decreasing groups; lower paternal, maternal and parental occupation status demonstrated a similar pattern. Speaking a language other than English at home was associated with an increased likelihood of belonging to the High Decreasing group. Physical activity was associated with an increased risk of being in the Persistently Low group with inconsistent patterns observed for other trajectory groups. Not consuming breakfast and moderate alcohol consumption were associated with a lower risk of belonging to the Persistently Low group, and not consuming breakfast was associated with a higher risk of belonging to the High Increasing group.

In multivariable analyses, lower paternal education was significantly associated with a decreased risk of being in the Persistently Low BMI trajectory and increased risk of being in the High Increasing BMI trajectory (**Table 3**). Speaking a language other than English was significantly associated with decreased risk of being in the Persistently Low and Average Increasing BMI trajectories, and increased risk of being in the High Decreasing trajectory group. Moderate alcohol consumption in childhood was only significantly associated with decreased risk of being in the Persistently Low BMI trajectory. Poorer self-rated health in childhood was associated with being in the Persistently Low BMI trajectory and increased risk of being in the High Increasing and High Decreasing BMI trajectory groups.

*Qualitative findings*

Characteristics of the qualitative sample are presented in **Table 4**, for the whole sample and stratified by BMI trajectory group. Just over half the sample were women, with more women represented in the Average Increasing and High Increasing trajectory groups and fewer in the High Decreasing trajectory group. More than half the sample had a tertiary qualification, which was more common in the Persistently Low and High Decreasing groups. Most of the sample were currently employed. Average BMI in the whole sample increased over time, but variations in each of the trajectory groups were consistent with their quantitative classification. No systematic differences were found for gender or education level.

*Childhood experiences and the 'legacy effect'*

Participants on divergent BMI trajectories recalled the impact of parental values surrounding lifestyle behaviours and how these shaped their adult health related beliefs and behaviours. Compared with the Increasing BMI trajectory groups, those in the Stable and Decreasing

groups more commonly (almost half of the participants in these two groups) attributed their current healthy lifestyle behaviours to the positive influence of their parents and/or their general childhood upbringing, suggesting a 'legacy effect'. A theme discussed by both men and women irrespective of education level: *"Mum did a great job setting me up" (man; High Decreasing*). Another said that the impact of their parents' healthy lifestyle was "*Very positive, because I'm pretty much the same" (woman; Stable).* How early life experiences shape adult health-related identity was also discussed: *"We were raised to eat pretty well, we didn't have a lot of junk food available, we were always encouraged to be outside to play sport, we were always really active as kids. I think I've really maintained that through the majority of my life." (woman; Stable).* The 'legacy effect' also appeared to persist throughout adulthood despite periodic lapses into less favourable behaviours, such as poorer eating habits (e.g. more take away), less physical activity (e.g. organised sport) and greater alcohol consumption: *"There's a few lapses having kids and babies, and busy…But I think I've always wanted to make sure that I come back to a healthy lifestyle and being active." (woman; Stable)*

Several men and women in the Stable and Decreasing groups only discussed an inverse relationship between their childhood experiences and their adult behaviours. Many of these participants (regardless of education levels) indicated that negative lifestyle-related experiences in childhood had influenced their own positive health behaviours as adults, and they had essentially rejected their childhood experiences in adulthood:
*"I know what my childhood was like and I didn't have those influences [positive role modelling] at all. Regardless of whether I'm big or small, still being active I think is the key, and showing your children that you're giving it a go...I still get out there and go for a run." (woman; High Decreasing)*

*"Well, I think I've done the complete change, and as soon as I had kids I realised they [parents] were just doing the best they could, and you can't blame, it's made me who I am, and that's it, move on." (woman; Persistently Low)*

The most common reason given by both men and women for rejecting their parents' unhealthy behaviours was parenthood (only one participant who had rejected their parents' lifestyle habits did not have children). Other reasons were also discussed, such as a family history of ill-health, their own health scare and partner influence. Two women said that difficult childhoods (e.g. a mother with an eating disorder; a dysfunctional/abusive household) had led them to adopt different health behaviours than their parents.

Men and women in the Average Increasing and High Increasing groups less commonly attributed their current lifestyle to parental influences and childhood experiences: *"I don't think they [parents] have had any influence on me…as I grew up, I kind of developed my own sorts of attitudes towards different things." (man; Average Increasing).* Where parental influence on current lifestyle habits was referred to within these two BMI groups the language used tended to be less convincing irrespective of education level. For example, using phrases such as *"a little bit"* or *"not especially" (man; High Increasing).* While the influence of positive health-related childhood experiences on adult health-related behaviour was a weaker theme in the Increasing groups, where a legacy effect was evident it too appeared to persist despite 'lapses' during late adolescence and/or early adulthood: *"…It's almost come full circle…When I was a kid…there was no takeaways…dinners out were a special thing. Then you get to that young adulthood, you leave for university and then two-minute noodles and takeaway is all you live on. And, so you get to a point where you go, best*

*I start looking after myself and then the home cooked meals and the carrots come back into it"(man; High Increasing).*

There were no participants in any BMI trajectory group who had been brought up with what they perceived to be a healthy lifestyle who talked about deliberately rejecting this way of life in adulthood.

**Discussion**

This study explored how childhood factors influence BMI trajectories across the lifecourse from childhood to mid-adulthood. It found that specific childhood factors (paternal education, language spoken at home, self-rated health and to a lesser extent, alcohol consumption) and broader family experiences, such as parental eating and physical activity attitudes, values and beliefs, appear to be influential with long-lasting impacts. This 'legacy effect' suggests that some socioeconomic, cultural, behavioural and health-related factors and broader childhood family experiences and values related to healthy eating and physical activity delineate and shape BMI trajectories. Positive and negative experiences of healthy eating and physical activity in childhood were carried forward into adulthood in complex and inter-related ways that were more strongly revealed through our qualitative data.

This study was informed by socio-ecological theory which focuses on discrete levels of influence for individual behaviours. However, the findings indicate that social practice theory may provide a more useful conceptual framework through which to understand the results of this mixed methods study. Social practices, as outlined by Shove and colleagues,[15] are dependent on a range of social and material factors and can be understood as 'human activities that are reproduced and transformed through their re-enactment and performance'.[16] Three key elements inform the development of social practices: meanings (ideas, aspirations), materials (objects, infrastructure) and competencies (skills, know-how).[15, 17] Social practices are dependent on the way in which materials, meanings and competencies combine. Social context, cultural traditions and economic conditions will all influence social practice development and evolution. Practices are interlinked, dynamic and have their own trajectories[17, 18] with practices emerging, persisting and disappearing as the links between their elements appear and disappear.[15] Understandings and skills, such as those gained in

childhood, will inform current and future practices but practices will evolve or be modified over time in response to changing elements.

The relationship between BMI trajectories and specific childhood factors, such as paternal education and speaking a language other English, and the lasting impact (legacy) of childhood experiences of healthy eating and physical activity, reflects the way in which social practices operate over time to shape specific outcomes. Families, and parents in particular, appear to have played a critical role in the shaping of health behaviours of the participants in this study. Studies investigating child and adolescent predictors of adult weight have found that parental fatness, socioeconomic status, birth weight, timing/rate of maturation and to some extent physical activity, dietary factors and psychological factors in childhood are related to obesity in adulthood.[19] While not all of these factors were explored in this study, we found that lower paternal education in childhood was associated with a much higher risk of being in the High Increasing BMI trajectory group, a group that could be considered the least favourable, and a lower risk of being in the Persistently Low trajectory group. This supports earlier work demonstrating a link between low childhood socioeconomic status and increased fatness in adulthood.[19] Race and sex are also important predictors of severe obesity,[20] with language spoken at home in childhood, but not gender, showing an association with BMI trajectory in this study.

Amongst those on stable or decreasing BMI trajectories, positive childhood experiences were often embraced in adulthood, while negative experiences were often rejected as participants aged and established their own families, practices and traditions. Plausibly, a strong sense of 'health identity'[AUTHORS 2019] has been instilled in these participants by their parents, which has carried forward with them into adulthood and contributed to their ability

to maintain a more favourable BMI pathway. For those on less favourable BMI pathways, parents' lifestyle seemed less influential on their current behaviours. Participants in these increasing BMI trajectory groups may have weaker 'health identities' and as such are more vulnerable to other influencing factors, such as the obesogenic environment, leading to unhealthy lifestyle behaviours. Undoubtedly cultural factors, which have been captured in this study by the language spoken at home, will strongly influence social practices related to eating and physical activity during childhood. Despite the quantitative arm of this study being unable to establish whether specific ethnic groups were at higher or lower risk of being on less favourable BMI trajectories (due to the large diversity in the number of languages spoken at home), ethnicity appears important because not speaking English at home was associated with BMI trajectory. This finding supports previously observed ethnic disparities in adult obesity[21] and the limited research that has examined how culture and/or ethnicity relates to BMI from childhood into adulthood.[22] The qualitative arm of this study did not specifically explore how culture impacted social practices, but it has highlighted that cultural and social practices of childhood will continue to influence adult behaviours.

The findings related to self-rated health in childhood and BMI trajectories are unsurprising. Less favourable ratings of childhood health were associated with being on a stable but below average BMI trajectory. This could potentially be because of pre-existing illnesses (not measured in the childhood survey), leading to children rating their health negatively, and these existing illnesses also being related to lower BMI. Poorer self-rated health was also associated with an increased risk of being in the High Increasing and High Decreasing BMI trajectory groups, which may reflect the shared childhood origins of a high BMI and the likely negative health impacts of this. While alcohol consumption was significantly associated with a decreased risk of being in the Persistently Low BMI group, there was no

apparent dose-response and no associations with any other trajectory, suggesting caution in the interpretation of this finding.

A potential limitation of this study is the possible misclassification of BMI trajectory groups. This could be related to errors in the measurement of BMI (although where self-reported measures were used, an adjustment factor was included), BMI at the time of measurement not representing usual BMI (e.g. post-pregnancy or periods of illness where weight loss or gain had occurred), or poor 'fit' into the defined trajectory groups (although only participants with a >70% probability of being included in their respective trajectory group were invited to participate). Generalisability may be an issue for the quantitative findings, whereby data from only around one quarter of the original childhood sample were available. Women, those with higher levels of education, those married/living as married, and those employed in higher status occupations tend to be over-represented in this sample, as reported elsewhere,[AUTHORS 2017, 2019] although there is still substantial heterogeneity in the characteristics of participants.

There may have been important factors not examined in the childhood quantitative component or revealing questions missed in the adulthood qualitative component. However, the childhood questionnaire was comprehensive and covered a wide range of demographic, behavioural and health-related topics, and the adult interview schedule was guided by a social-ecological framework comprehensively exploring individual, social and environmental influences across the lifecourse. Participants in the qualitative study were also invited to provide additional comments of relevance. We did not examine the effect of adjusting for adult factors, although future work could explore whether the influence of childhood factors on BMI trajectories is direct or indirect (e.g. through tracking of these factors into adulthood).

Strengths of this study include the mixed methods design and integration of findings that allows deeper insights into the influences on lifecourse obesity risk and weight-related behaviours over time. Few studies internationally have collected such extensive childhood information and mostly objective assessments of BMI prospectively over a 30-35-year time period. Other strengths include the use of a single blinded interviewer for consistency in qualitative data collection, the team approach to coding allowing thorough consistency checks and ongoing discussion of emergent themes.

In conclusion, this study found an explicit acknowledgement of the impact of parents' lifestyle behaviours in childhood amongst those with more favourable BMI trajectories, and identified some specific childhood factors that appear critical in influencing obesity risk over time. This work deepens understandings of the lasting impact of childhood factors and broader experiences on adult health and provides direction for further quantitative and qualitative exploration of divergent BMI trajectories. This study has also highlighted the critical importance of family and parents in shaping early life weight-related experiences, attitudes and behaviours that appear to have long-lasting impacts into adulthood. These findings should be considered in programs and policies designed to prevent obesity across the lifecourse.

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**Figure Legends**

Figure 1: A convergent parallel mixed method design

Figure 2. Flowchart of participation

Figure 3: BMI trajectory groups from ASHFS (1985), CDAH-1 (2004-6) to CDAH-2 (2009-11)

**Table 1: Characteristics of the quantitative sample**

| | Childhood to Adulthood BMI Trajectory Group | | | | | |
|---|---|---|---|---|---|---|
| | **All** | **Persistently Low** | **Persistently Average** | **Average/ Increasing** | **High/ Increasing** | **High/ Decreasing** |
| **Childhood Variables (1985)** | | | | | | |
| Age (years), Mean(SD), n=2 206 | 12.0(2.0) | 12.0(2.0) | 12.1(2.0) | 11.9(2.1) | 11.9(1.8) | 12.1(2.1) |
| Sex, %, n=2 206 | | | | | | |
| Male | 46.1 | 43.1 | 50.5 | 44.2 | 43.6 | 40.0 |
| Female | 53.9 | 56.9 | 49.5 | 55.8 | 56.5 | 60.0 |
| Highest paternal education, %, n=1 544 | | | | | | |
| University (Bachelors and higher) | 22.5 | 26.1 | 20.6 | 21.6 | 8.2 | 11.8 |
| Diploma, Trade/Voc., Other | 31.0 | 31.0 | 32.7 | 28.1 | 20.4 | 29.4 |
| School/No education | 46.5 | 42.9 | 46.6 | 50.4 | 71.4 | 58.8 |
| Highest maternal education, %, n=1 590 | | | | | | |
| University (Bachelors and higher) | 16.3 | 18.2 | 15.5 | 15.5 | 6.3 | 11.5 |
| Diploma, Trade/Voc., Other | 17.7 | 17.8 | 18.0 | 17.6 | 18.8 | 13.5 |
| School / No education | 66.0 | 64.0 | 66.6 | 66.9 | 75.0 | 75.0 |
| Highest parental education, %, n=1 620 | | | | | | |
| University (Bachelors and higher) | 27.3 | 31.0 | 25.6 | 26.2 | 12.0 | 15.1 |
| Diploma, Trade/Voc., Other | 32.6 | 32.5 | 34.1 | 31.0 | 26.0 | 26.4 |
| School / No education | 40.1 | 36.6 | 40.3 | 42.8 | 62.0 | 58.5 |
| Highest paternal occupation, %, n=1 614 | | | | | | |
| Professional/White Collar | 56.4 | 58.2 | 57.2 | 49.0 | 50.0 | 48.2 |
| Blue Collar/Unpaid / Unemployed | 43.6 | 41.8 | 42.8 | 51.1 | 50.0 | 51.8 |
| Highest maternal occupation, %, n=1 619 | | | | | | |
| Professional/White Collar | 54.7 | 57.2 | 53.9 | 55.9 | 44.7 | 37.5 |
| Blue Collar/Unpaid / Unemployed | 45.3 | 42.8 | 46.1 | 44.1 | 55.3 | 62.5 |
| Highest parental occupation, %, n=1 655 | | | | | | |
| Professional/White Collar | 73.4 | 75.4 | 73.1 | 73.5 | 66.0 | 57.9 |
| Blue Collar/Unpaid / Unemployed | 26.6 | 24.6 | 26.9 | 26.5 | 34.0 | 42.1 |

| | Childhood to Adulthood BMI Trajectory Group | | | | | |
|---|---|---|---|---|---|---|
| | **All** | **Persistently Low** | **Persistently Average** | **Average/ Increasing** | **High/ Increasing** | **High/ Decreasing** |
| Area-level SES, %, n=2 122 | | | | | | |
| Quartile 1 | 25.7 | 27.7 | 26.2 | 18.5 | 14.3 | 22.2 |
| Quartile 2 | 27.7 | 29.4 | 25.6 | 29.1 | 23.2 | 29.6 |
| Quartile 3 | 39.1 | 36.0 | 39.8 | 45.5 | 57.1 | 39.5 |
| Quartile 4 | 7.6 | 7.0 | 8.5 | 6.9 | 5.4 | 8.6 |
| English at home, %, n=2 160 | | | | | | |
| Yes | 89.5 | 91.0 | 88.3 | 92.2 | 86.2 | 81.9 |
| No | 10.5 | 9.0 | 11.7 | 7.8 | 13.8 | 18.1 |
| Urban-Rural, %, n=2 138 | | | | | | |
| Urban | 77.9 | 79.4 | 77.1 | 75.9 | 76.8 | 75.6 |
| Rural | 22.1 | 20.7 | 22.9 | 24.1 | 23.2 | 24.4 |
| Physical activity (mins/wk), Median (IQR), n=2206 | 320 (180, 560) | 320 (190, 540) | 330 (180, 562) | 330 (190, 610) | 250 (120, 390) | 280 (160, 480) |
| Weekly PA, %, n=2 139 | | | | | | |
| Yes | 44.2 | 41.1 | 45.4 | 52.6 | 49.1 | 45.8 |
| No | 55.8 | 58.9 | 54.6 | 47.4 | 50.9 | 54.2 |
| Breakfast consumption, %, n=2 160 | | | | | | |
| Yes | 85.6 | 87.5 | 85.3 | 84.4 | 69.0 | 80.7 |
| No | 14.4 | 12.5 | 14.7 | 15.6 | 31.0 | 19.3 |
| Smoking, %, n=2 156 | | | | | | |
| Never smoked | 55.2 | 56.9 | 53.3 | 56.0 | 60.3 | 48.2 |
| Few puffs | 24.8 | 24.4 | 25.8 | 23.0 | 22.4 | 27.7 |
| Smokes | 20.0 | 18.8 | 21.0 | 20.9 | 17.2 | 24.1 |
| Alcohol, %, n= 2161 | | | | | | |
| Don’t drink | 67.2 | 71.7 | 63.7 | 63.5 | 65.5 | 61.5 |
| <once/week | 25.7 | 22.0 | 28.1 | 29.7 | 29.3 | 31.3 |
| 1 or more/week | 7.1 | 6.3 | 8.3 | 6.8 | 5.2 | 7.2 |
| Parental PA, %, n=2 152 | | | | | | |

| | Childhood to Adulthood BMI Trajectory Group | | | | | |
|---|---|---|---|---|---|---|
| | **All** | **Persistently Low** | **Persistently Average** | **Average/ Increasing** | **High/ Increasing** | **High/ Decreasing** |
| Both parents active | 23.5 | 24.8 | 24.2 | 17.6 | 24.4 | 14.3 |
| One parent active | 36.8 | 36.3 | 36.2 | 39.2 | 35.6 | 44.4 |
| Both parents inactive | 39.7 | 38.9 | 39.6 | 43.2 | 40.0 | 41.3 |
| Parental smoking, %, n=2 151 | | | | | | |
| Neither parents smoke | 57.3 | 59.9 | 56.5 | 53.1 | 55.2 | 45.8 |
| One parent smokes | 29.2 | 27.1 | 29.8 | 32.3 | 32.8 | 39.8 |
| Both parents smoke | 13.5 | 13.0 | 13.8 | 14.6 | 12.1 | 14.5 |
| Self-rated health, %, n=2 163 | | | | | | |
| Very Good | 37.2 | 40.3 | 36.7 | 29.2 | 34.5 | 27.7 |
| Good | 43.4 | 43.0 | 43.6 | 51.0 | 31.0 | 36.1 |
| Average/Poor/Very Poor | 19.4 | 16.7 | 19.7 | 19.8 | 34.5 | 36.1 |
| Age at mencarche (years), Mean (SD), n=399 | 13.7 (1.3) | 13.6 (1.3) | 13.0 (1.2) | 12.9 (1.4) | 12.5 (0.8) | 12.2 (1.1) |
| BMI (kg/m$^2$), Mean (SD), n=2 206 | 18.6 (2.8) | 17.1 (1.9) | 19.0 (2.1) | 19.8 (2.3) | 24.1 (3.1) | 25.0 (3.2) |
| **Adulthood Variables**[1] | | | | | | |
| BMI (kg/m$^2$), CDAH-1 (26-36 years), n= 2206 | 25.7 (4.7) | 22.2 (2.0) | 26.6 (2.2) | 32.9 (2.8) | 39.7 (5.4) | 29.7 (3.3) |
| BMI (kg/m$^2$), CDAH-2 (31-41 years), n=2206 | 26.5 (5.1) | 22.8 (2.2) | 27.5 (2.3) | 34.6 (3.4) | 41.6 (5.3) | 30.3 (3.3) |
| Age (years), CDAH-2, Mean (SD), n=2 206 | 37.6 (2.1) | 37.6 (2.1) | 37.7 (2.0) | 37.6 (2.2) | 37.7 (2.0) | 37.7 (2.1) |
| Highest level of education, CDAH-2, %, n=2,195 | | | | | | |
| University (Bachelors and higher) | 41.2 | 46.6 | 38.3 | 31.8 | 27.4 | 40.0 |
| Diploma, Trade/Voc., Other | 34.1 | 29.9 | 37.9 | 33.8 | 48.4 | 34.1 |
| School / No education | 24.7 | 23.5 | 23.8 | 34.4 | 24.2 | 25.9 |
| Occupation, CDAH-2, %, n=1 302 | | | | | | |
| Professional/White Collar | 73.1 | 75.6 | 69.3 | 69.7 | 84.4 | 81.8 |
| Blue Collar/Unpaid / Unemployed | 26.9 | 24.4 | 30.7 | 30.3 | 15.6 | 18.2 |
| Self-rated health, CDAH-2, %, n=2 187 | | | | | | |
| Excellent/ Very Good | 55.3 | 64.2 | 55.0 | 30.4 | 11.3 | 44.1 |

| | Childhood to Adulthood BMI Trajectory Group | | | | | |
|---|---|---|---|---|---|---|
| | **All** | **Persistently Low** | **Persistently Average** | **Average/ Increasing** | **High/ Increasing** | **High/ Decreasing** |
| Good | 34.5 | 29.1 | 35.0 | 50.5 | 53.2 | 40.5 |
| Fair/ Poor | 10.2 | 6.7 | 10.0 | 19.1 | 35.5 | 15.5 |

[1] CDAH-1: 2004-6, CDAH-2: 2009-11

**Table 2: Unadjusted associations between childhood (1985) demographic, behavioural and health-related factors and BMI trajectory group from childhood to adulthood (1985, 2004-6, 2009-11)**

| | | Childhood to Adulthood BMI Trajectory Group | | | | |
|---|---|---|---|---|---|---|
| | | RR (95% CI) | | | | p-value |
| | Reference – Persistently Average | Stable Below Average | Average/ Increasing | High/Increasing | High/Decreasing | |
| Age at Baseline | 9 | 1 | 1 | 1 | 1 | **0.1769** |
| | 10 | 1.18(1.00,1.41) | 0.61(0.36,1.03) | 0.89(0.33,2.43) | 1.19(0.56,2.53) | |
| | 11 | 1.08(0.91,1.29) | 1.04(0.67,1.60) | 1.44(0.59,3.46) | 0.72(0.31,1.68) | |
| | 12 | 1.11(0.93,1.33) | 0.58(0.34,0.97) | 1.13(0.44,2.90) | 0.75(0.32,1.77) | |
| | 13 | 1.03(0.86,1.24) | 0.71(0.43,1.16) | 1.42(0.58,3.48) | 0.69(0.29,1.66) | |
| | 14 | 0.97(0.81,1.16) | 0.70(0.44,1.14) | 1.14(0.46,2.85) | 1.75(0.89,3.45) | |
| | 15 | 1.11(0.93,1.33) | 0.93(0.59,1.46) | 0.63(0.21,1.91) | 0.84(0.37,1.92) | |
| Gender | Man | 1 | 1 | 1 | 1 | **0.0166** |
| | Woman | 1.13(1.02,1.24) | 1.08(0.83,1.41) | 1.11(0.67,1.82) | 1.28(0.84,1.96) | |
| Paternal Education | University (Bachelors and higher) | 1 | 1 | 1 | 1 | **0.0009** |
| | Diploma, Trade/Voc., Other | 0.86(0.75,0.99) | 0.92(0.59,1.46) | 1.78(0.56,5.62) | 1.78 (0.70, 4.54) | |
| | School / No education | 0.80(0.70,0.92) | 1.13(0.75,1.69) | 4.22(1.51,11.78) | 2.41 (1.01, 5.74) | |
| Maternal Education | University (Bachelors and higher) | 1 | 1 | 1 | 1 | 0.3535 |
| | Diploma, Trade/Voc., Other | 0.91(0.76,1.09) | 1.04(0.61,1.79) | 2.94(0.82,10.57) | 1.03(0.35,3.02) | |
| | School / No Education | 0.87(0.76,1.00) | 1.05(0.68,1.64) | 2.85(0.88,9.19) | 1.59(0.68,3.71) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Highest Parental Education | University (Bachelors and higher) | 1 | 1 | 1 | 1 | **0.0008** |
| | Diploma, Trade/Voc., Other | 0.88(0.78,1.01) | 0.97(0.64,1.46) | 1.91(0.74,4.92) | 1.43(0.61,3.38) | |
| | School / No Education | 0.81(0.71,0.92) | 1.11(0.76,1.64) | 3.42(1.43,8.14) | 2.65(1.23,5.71) | |
| Paternal Occupation | Professional/White Collar | 1 | 1 | 1 | 1 | **0.1574** |
| | Blue Collar/Unpaid / Unemployed | 0.93(0.83,1.04) | 1.35(0.99,1.84) | 1.29(0.74,2.26) | 1.39 (0.83, 2.32) | |
| Maternal Occupation | Professional/White Collar | 1 | 1 | 1 | 1 | **0.0303** |
| | Blue Collar/Unpaid / Unemployed | 0.90(0.81,1.01) | 0.96(0.70,1.31) | 1.50(0.85,2.64) | 2.01(1.18,3.43) | |
| Highest Parental Occupation | Professional/White Collar | 1 | 1 | 1 | 1 | **0.0538** |
| | Blue Collar/Unpaid / Unemployed | 0.90(0.79,1.02) | 1.00(0.70,1.41) | 1.42(0.80,2.53) | 2.01 (1.20, 3.36) | |
| Area-level SES | Quartile 1 | 1 | 1 | 1 | 1 | **0.0283** |
| | Quartile 2 | 0.99(0.87,1.11) | 1.46(0.97,2.19) | 1.51(0.63,3.61) | 1.24(0.68,2.26) | |
| | Quartile 3 | 0.86(0.76,0.96) | 1.62(1.11,2.36) | 2.63(1.22,5.66) | 1.17(0.66,2.06) | |
| | Quartile 4 | 0.85(0.69,1.05) | 1.26(0.68,2.32) | 1.27(0.34,4.73) | 1.32(0.56,3.10) | |
| English at Home | Yes | 1 | 1 | 1 | 1 | **0.0368** |
| | No | 0.85(0.71,1.01) | 0.73(0.44,1.21) | 1.37(0.66,2.85) | 1.89(1.10,3.25) | |
| Urban-Rural | Urban | 1 | 1 | 1 | 1 | 0.6937 |
| | Rural | 0.92(0.82,1.03) | 1.12(0.82,1.54) | 1.07(0.58,1.97) | 1.14(0.70,1.87) | |
| Physical Activity (mins/wk)(n=2206 ) | | 1.00(1.00,1.03) | 1.01(0.99,1.03) | 0.94(0.89,0.99) | 0.95(0.92,1.00) | **0.0104** |
| Weekly Physical Activity (n=2139) | Yes | 1 | 1 | 1 | 1 | **0.0353** |
| | No | 1.14(1.14,1.25) | 0.71(0.54,0.94) | 0.82(0.49,1.37) | 0.94(0.61,1.43) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Breakfast Consumption (n=2160) | Yes | 1 | 1 | 1 | 1 | **0.0048** |
| | No | 0.85(0.85,0.98) | 1.10(0.76,1.59) | 2.67(1.55,4.59) | 1.41(0.83,2.41) | |
| Smoking (n=2156) | Never smoked | 1 | 1 | 1 | 1 | 0.7241 |
| | Few puffs | 0.95(0.95,1.06) | 0.91(0.65,1.28) | 0.83(0.44,1.55) | 1.28(0.77,2.11) | |
| | Smokes | 0.91(0.91,1.03) | 1.03(0.73,1.45) | 0.79(0.39,1.57) | 1.38(0.81,2.33) | |
| Alcohol (n=2161) | Don't drink | 1 | 1 | 1 | 1 | **0.0241** |
| | < Once/week | 0.80(0.80,0.91) | 1.22(0.91,1.65) | 1.17(0.67,2.06) | 1.33(0.84,2.12) | |
| | 1 or more/week | 0.83(0.83,1.02) | 1.00(0.58,1.74) | 0.74(0.23,2.38) | 1.11(0.48,2.54) | |
| Parental Physical Activity (n=2152) | Both parents inactive | 1 | 1 | 1 | 1 | 0.3526 |
| | One parent active | 1.01(1.01,1.12) | 1.11(0.83,1.48) | 0.99(0.56,1.74) | 0.98(0.63,1.54) | |
| | Both parents active | 1.09(1.09,1.24) | 0.72(0.48,1.11) | 1.03(0.51,2.06) | 0.53(0.26,1.08) | |
| Parental Smoking (n=2151) | Neither parents smoke | 1 | 1 | 1 | 1 | 0.537 |
| | Mother smokes | 0.92(0.92,1.04) | 1.16(0.81,1.65) | 1.16(0.61,2.24) | 1.71(1.02,2.89) | |
| | Father smokes | 0.83(0.83,0.99) | 1.25(0.82,1.91) | 1.16(0.52,2.60) | 1.68(0.89,3.16) | |
| | Both parents smoke | 0.92(0.92,1.07) | 1.17(0.78,1.74) | 0.93(0.41,2.08) | 1.34(0.71,2.53) | |
| Self-Rated Health | Very Good/Good | 1 | 1 | 1 | 1 | **0.0001** |
| | Average/Poor/Very Poor | 0.83(0.73,0.95) | 1.02(0.73,1.44) | 2.18(1.28,3.71) | 2.35(1.52,3.63) | |
| Menarche age (years) | | 1.18(1.14, 1.22) | 0.79(0.69, 0.92) | 0.60(0.47, 0.77) | 0.61(0.48, 0.76) | **0.0000** |

NB: bold text indicates variables that demonstrated an association with trajectory group membership at the $p<0.25$ level and were considered for inclusion in the fully adjusted model

**Table 3: Adjusted[1] associations between childhood (1985) demographic, behavioural and health-related factors and BMI trajectory group from childhood to adulthood (1985, 2004-6, 2009-11)**

| | Childhood to Adulthood BMI Trajectory Groups (N=1,503) | | | |
|---|---|---|---|---|
| **Persistently Average*** | **Persistently Low** RR (95% CI) | **Average/Increasing** RR (95% CI) | **High/Increasing** RR (95% CI) | **High/Decreasing** RR (95% CI) |
| **Highest Paternal Education** | | | | |
| University (Bachelors and higher) | 1 | 1 | 1 | 1 |
| Diploma, Trade/Voc., Other | **0.86 (0.74, 0.98)** | 1.01 (0.64, 1.59) | 1.54 (0.48, 4.93) | 1.90 (0.70, 5.14) |
| School / No education | **0.81 (0.71, 0.93)** | 1.17 (0.77, 1.76) | **3.81 (1.36, 10.66)** | 2.29 (0.90, 5.87) |
| **English at Home** | | | | |
| Yes | 1 | 1 | 1 | 1 |
| No | **0.80 (0.64, 0.99)** | **0.47 (0.22, 0.99)** | 0.90 (0.36, 2.22) | **2.18 (1.13, 4.21)** |
| **Alcohol** | | | | |
| Don't drink | 1 | 1 | 1 | 1 |
| < Once/week | **0.78 (0.68, 0.90)** | 1.30 (0.92, 1.84) | 1.08 (0.58, 2.02) | 1.46 (0.83, 2.58) |
| 1 or more/week | 0.85 (0.67, 1.07) | 1.16 (0.63, 2.16) | 0.70 (0.17, 2.81) | 0.67 (0.17, 2.67) |
| **Self-Rated Health** | | | | |
| Very Good | 1 | 1 | 1 | 1 |
| Good | 0.94 (0.84, 1.06) | 1.43 (0.99, 2.09) | 0.58 (0.28, 1.20) | 0.95 (0.44, 2.03) |
| Average/Poor/Very Poor | **0.77 (0.65, 0.92)** | 1.31 (0.82, 2.08) | **1.95 (1.02, 3.75)** | **3.50 (1.77, 6.90)** |

[1] Final adjusted model contains only those variables presented in the table, which were identified through a process of deleting, re-fitting and verifying models until the most parsimonious model was established

* excluded group.

RR: relative risk, CI: confidence interval. Bold text indicates confidence intervals that do not cross 1.0

**Table 4: Characteristics of the qualitative sample**

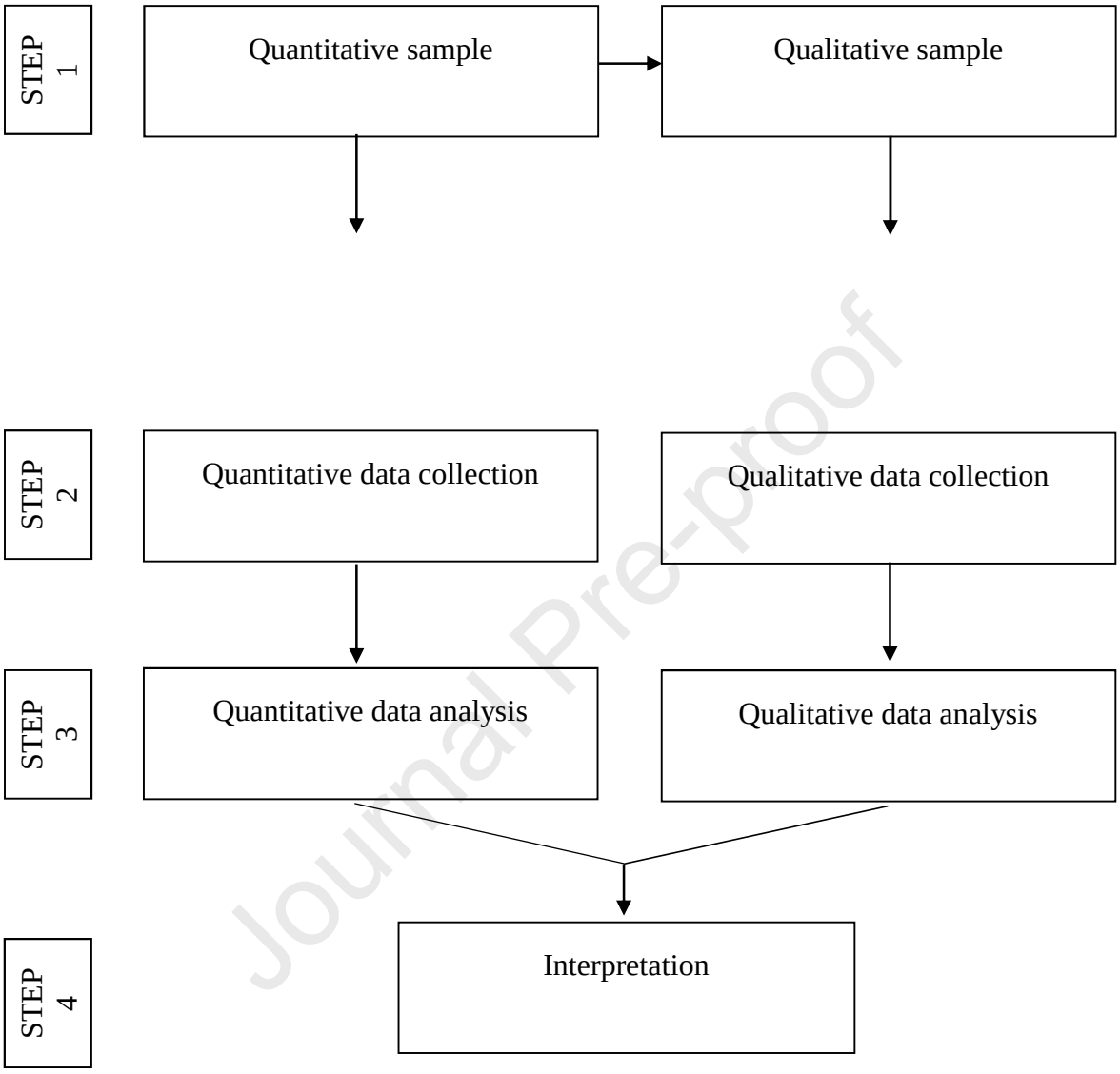
| | Childhood to Adulthood BMI Trajectory Groups | | | | | |
|---|---|---|---|---|---|---|
| | **All** (n=50) | **Persistently Low** (n=11) | **Persistently Average** (n=12) | **Average/ Increasing** (n=10) | **High/ Increasing** (n=6) | **High/ Decreasing** (n=11) |
| Women, n (%) | 29 (58) | 5 (50) | 7 (58) | 7 (64) | 5 (83) | 5 (45) |
| Current Age *(years)*, mean (SD) | 41.0 (2.8) | 41.9 (2.5) | 41.8 (2.3) | 39.9 (3.6) | 41.0 (2.8) | 40.3 (2.6) |
| Highest level of education, n (%) | | | | | | |
| University (Bachelors and higher) | 28 (56) | 7 (70) | 5 (42) | 5 (45) | 1 (17) | 10 (91) |
| Diploma, Trade/Voc., Other | 8 (16) | 1 (10) | 1 (8) | 4 (36) | 2 (33) | 0 (0) |
| School / No education | 14 (28) | 2 (20) | 6 (50) | 2 (18) | 3 (50) | 1 (9) |
| Currently Employed †, n (%) | 46 (92) | 9 (90) | 11 (92) | 10 (91) | 5 (83) | 11 (100) |
| Current Self-Rated Health, n (%)^ | | | | | | |
| Very Good | 4 (14.8) | 2 (40.0) | 1 (16.7) | 1 (11.1) | 0 (0) | 0 (0) |
| Good | 13 (48.2) | 3 (60.0) | 3 (50.0) | 7 (77.8) | 0 (0) | 0 (0) |
| Average/Poor/Very Poor | 10 (37.0) | 0 (0) | 2 (33.3) | 1 (11.1) | 6 (100) | 1 (100) |
| BMI kg/$m^2$, mean (SD) | | | | | | |
| ASHFS 1985 (7-15 years) | 19.8 (3.4) | 17.1 (1.2) | 20.4 (2.5) | 18.0 (3.4) | 20.8 (3.1) | 23.0 (3.1) |
| CDAH-1 2004-6 (26-36 years) | 28.4 (6.1) | 21.7 (2.0) | 26.6 (1.8) | 32.8 (3.3) | 39.3 (4.0) | 27.0 (3.6) |
| CDAH-2 2009-11 (31-41 years) | 29.3 (6.8) | 22.2 (3.1) | 27.4 (2.5) | 33.2 (3.6) | 42.5 (3.4) | 28.0 (3.4) |
| CDAH-3 2014-18 (36-46 years) | 29.7 (7.2) | 22.0 (1.8) | 27.3 (2.8) | 37.0 (4.4) | 40.9 (4.0) | 27.2 (3.4) |

† For two participants work status was uncertain, but both were counted as unemployed because unemployment was implied in the transcripts

^ Data not available for 27 participants who did not complete this question at CDAH-2

BMI: body mass index; SD: standard deviation

**Figure 1: A convergent parallel mixed method design**



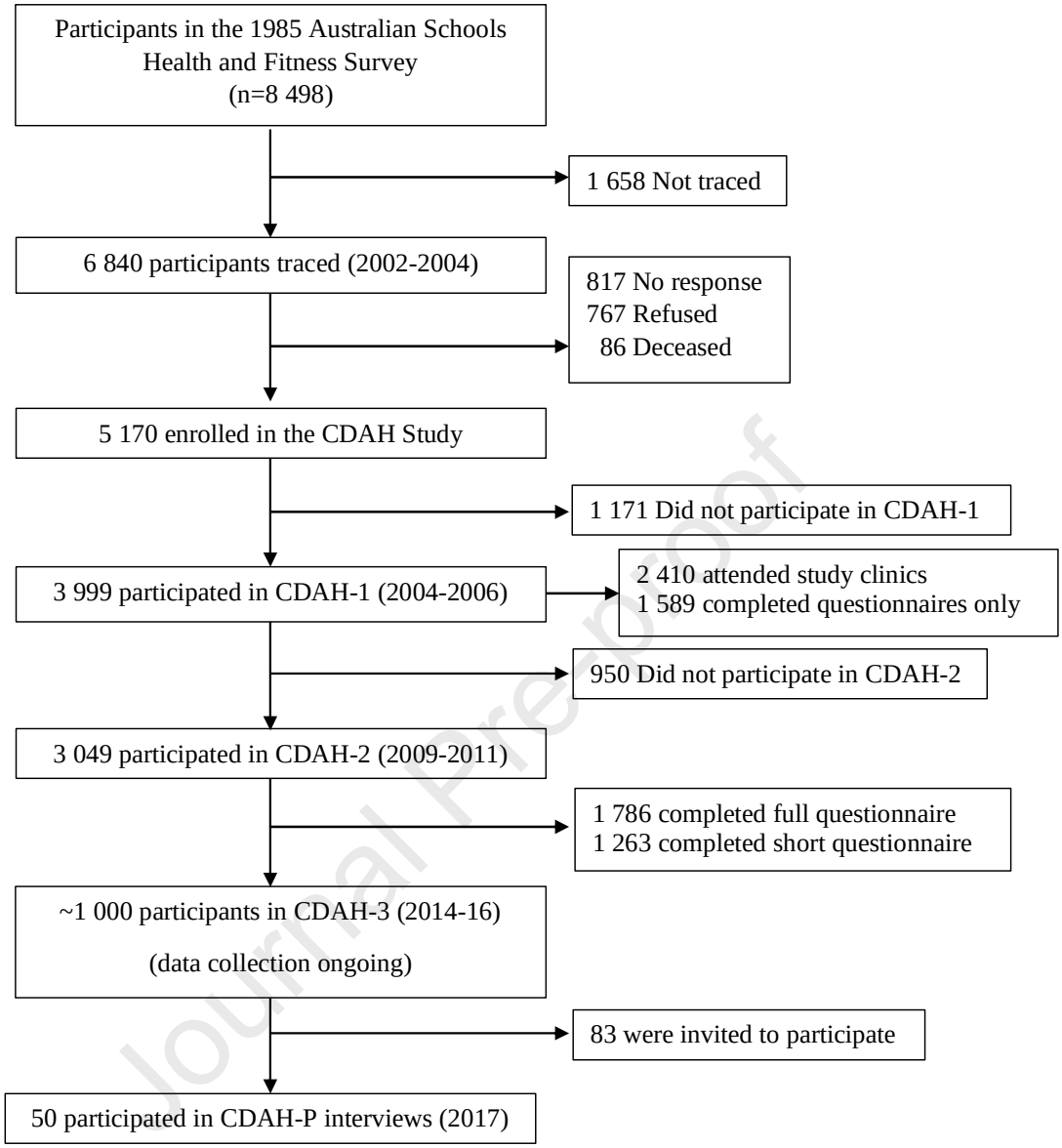
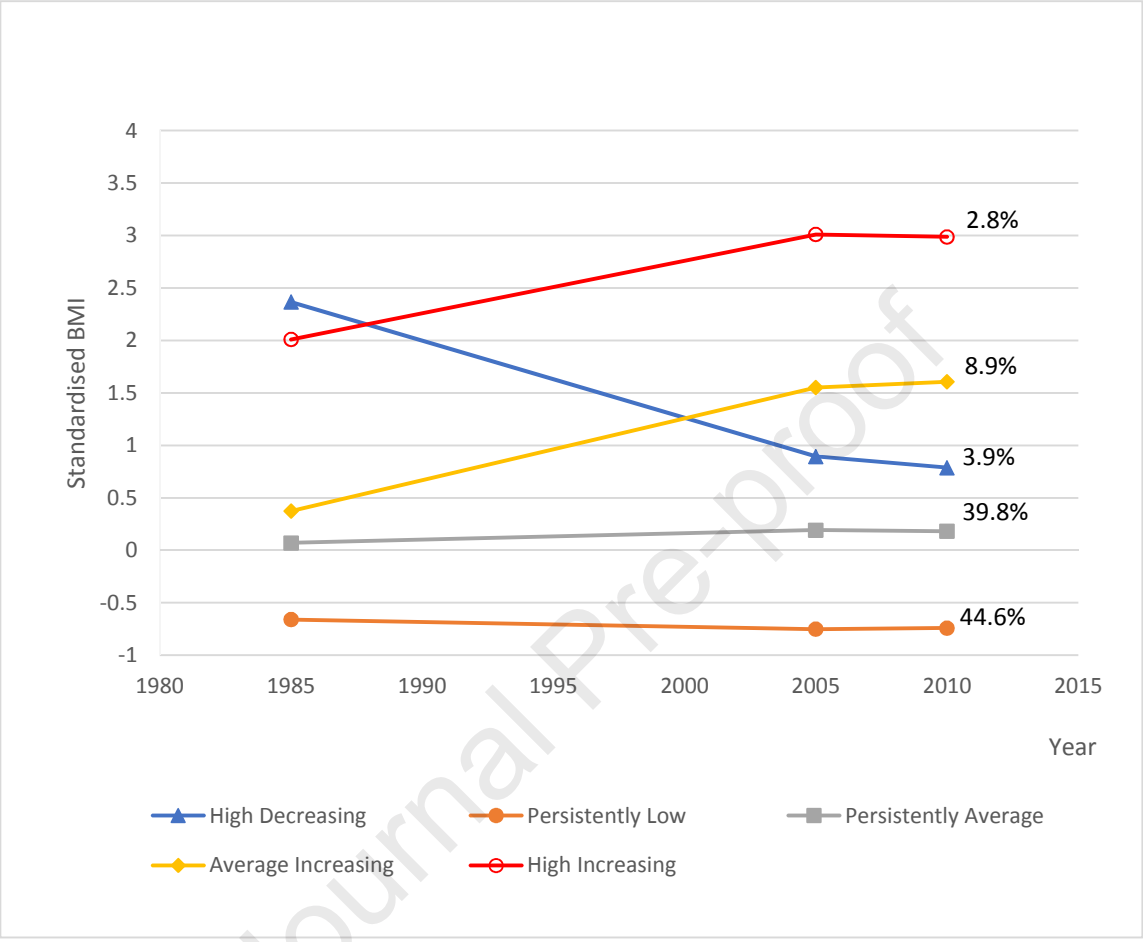



**Figure 2. Flowchart of participation**

**Figure 3: BMI trajectory groups from ASHFS (1985 at average age 12 years), CDAH-1 (2004-6 at average age 31.7 years) to CDAH-2 (2009-11 at average age 37.6 years)**



- This study integrated quantitative prospective data with nested qualitative data
- It enabled unique insights into childhood factors related to lifecourse BMI trajectories
- Childhood paternal education, language, alcohol and self-rated health predicted BMI trajectory
- Parental lifestyles and attitudes had lasting impacts for stable or high/decreasing BMI groups
- Parents play a key role in shaping children's physical activity and diet across the lifecourse