Association of childhood obesity with female infertility in adulthood: a 25-year follow-up study

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Objective: To evaluate whether childhood obesity is associated with infertility in women's reproductive-aged life.
Design: Prospective longitudinal study.
Setting: Not applicable.
Intervention(s): None.
Patient(s): A total of 1,544 girls, aged 7–15 years in 1985, and who completed questionnaires at follow-up in 2004-2006 and/or 2009-2011.
Main Outcome Measure(s): Infertility was defined as having difficulty conceiving (had tried for ≥12 months to become pregnant without succeeding) or having seen a doctor because of trouble becoming pregnant.
Result(s): At ages from 7–11 years, girls at both the lower and upper end of the body mass index (BMI) *z* score had increased risk of infertility. Compared with normal weight girls, those with obesity at ages 7–11 years were more likely in adulthood to report infertility (adjusted relative risk [aRR] = 2.94, 95% confidence interval [CI] 1.48–5.84), difficulty conceiving (aRR = 3.89, 95% CI 1.95–7.77), or having seen a doctor because of trouble becoming pregnant (aRR = 3.65, 95% CI 1.90–7.02) after adjusting for childhood age, follow-up length, highest parental education, and marital status.
Conclusion(s): Childhood obesity before 12 years of age appears to increase the risk of female infertility in later life. (Fertil Steril® 2018;110:596-604. ©2018 by American Society for Reproductive Medicine.)
El resumen está disponible en Español al final del artículo.

Key Words: Childhood, body mass index, infertility, body composition, waist-to-height ratio

The increase in obesity among children and adolescents is of great concern around the world (1). In Australia, one in four children aged 5–17 years were overweight or obese in 2014-2015, which is twice the recorded prevalence in 1986 (2). Substantial evidence suggests that obesity in women is associated with a wide range of gynecological disorders including infertility (3, 4). Obesity during childhood and adolescence has been linked with early puberty, menstrual disorders, and polycystic ovarian syndrome (PCOS) (5). From the life course perspective of female reproductive health, it is important to determine whether childhood obesity has long-term effects on infertility in adulthood, typically defined clinically as a failure to conceive after regular unprotected intercourse or attempting pregnancy for ≥12 months (6).

Few studies have investigated the association of childhood obesity with female infertility and the findings were not consistent. In a study of 3,327 British girls, Lake and colleagues (7) reported little impact of childhood body mass index (BMI) at the age of 7 years on infertility 26 years later (defined by achieving a pregnancy after ≥12 months). However, participants were restricted to women with a live birth from their first pregnancy. The BMI cutpoints were defined using an index of relative weight (weight expressed as a percentage of the standard weight for age, height, and sex). More recently, a report (8) based on 1,061 participants in the Bogalusa Heart Study in the United States showed that girls with obesity before 12 years of age were more likely in later life to have tried to become pregnant without success. Weight status was defined according to age and gender specific BMI percentiles and based on US Centers for Disease Control and Prevention statistics (e.g., ≥95th percentile for obesity). A

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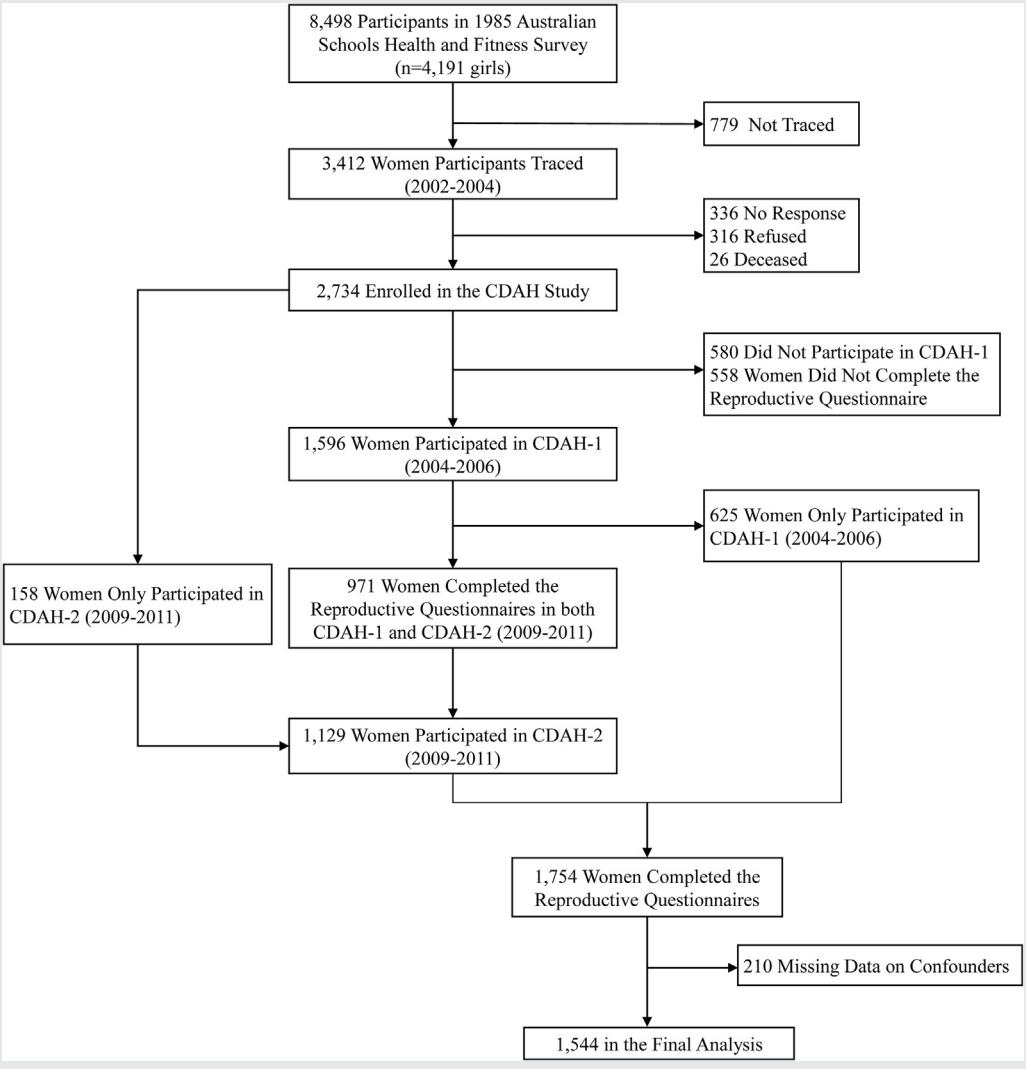
FIGURE 1



Selection of participants for the Childhood Determinants of Adult Health (CDAH) study, Australia, 1985–2011.

He. Childhood obesity and infertility. Fertil Steril 2018.

limitation of this study is that it determined whether participants had "ever tried to become pregnant and were unable to" but did not specify a time interval and may have resulted in misclassification of infertility. In addition, male factors (e.g., poor semen quality) are commonly reported causes of infertility (9) and not the outcome of interest. Neither of these studies was able to exclude them. The aim of the present study was to examine the association between different measures of body composition at ages 7–15 years and infertility at ages 26–41 years in a large population-based sample of Australian women with consideration of a wide range of potential confounders.

MATERIALS AND METHODS

Participants

The Childhood Determinants of Adult Health (CDAH) study is a follow-up of 8,498 children, which included 4,191 girls who participated in the 1985 Australian Schools Health and Fitness Survey, a nationally representative sample of Australian school children aged 7–15 years (herein referred to as "baseline") (10). At baseline, all children had physical assessments and those aged 9–15 years completed questionnaires. During 2002-2004, 3,412 women participants were traced and 2,734 women agreed to participate in the CDAH study (Fig. 1). During 2004-2006, when the participants were aged 26–36 years, 1,596 women completed questions on reproductive health (CDAH-1). The second follow-up (CDAH-2) was conducted during 2009-2011, when participants were aged 31–41 years and 1,129 women completed questions on reproductive health. After combining the two follow-ups, a total of 1,754 women who answered reproductive health questions at CDAH-1 or CDAH-2 or both were eligible for the study.

The study was approved by the Southern Tasmania Health and Medical Human Research Ethics Committee. Written informed consent was obtained at both time points.