

Citation:

Sorensen TIA, Rissanen A, Korkeila M, Kaprio J. Intention to lose weight, weight changes and 18-year mortality in overweight individuals without co-morbidities. *PLoS Med.* 2005; 2: e171.

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Study Design:

Prospective Cohort Study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To investigate the influence of intention to lose weight and subsequent weight changes among overweight individuals without known co-morbidities on mortality.

Inclusion Criteria:

- Member of the Finnish Twin Cohort (all same-sex twin pairs born in Finland before 1958 in which both twins were alive in 1967) who responded to both the 1975 and 1981 questionnaires
- Alive at the end of 1981
- Age 24-60 years
- Overweight or obese in 1975; defined as self-reported BMI $\geq 25.0\text{kg/m}^2$ in 1975.

Exclusion Criteria:

- Participants self-reporting in 1981 physician diagnosis of any of the following conditions:
 - Angina pectoris (according to physician diagnosis or standard chest pain history questionnaires)
 - Myocardial infarction (MI)
 - Diabetes
- Participants listed on the national hospital discharge register with inpatient admissions between 1972 and 1982 for any of the following conditions:
 - Diabetes
 - Cardiovascular disease (not including hypertension or venous disease)
 - Chronic obstructive lung disease
- Participants listed on a national drug prescription register who had been granted reimbursable medication for somatic or psychiatric diseases prior to 1983
- Participants listed on a national drug prescription register who had received prescriptions for

all major chronic diseases except hypertension prior to 1983

- Participants diagnosed with cancer prior to 1983 according to the Finnish Cancer Registry
- Participants not working in 1981, defined as being on early or disability pension or unemployed)
- Participants with missing data on disease indicators
- Participants with missing covariate data
- Not overweight or obese in 1975 (BMI <25.0kg/m²).

Description of Study Protocol:

- *Recruitment:* Participants in the Finnish Twin Cohort alive in 1981
- *Design:* Prospective cohort
- *Dietary intake/Dietary assessment methodology:* Not applicable
- *Blinding used:* Not applicable
- *Intervention:* Not applicable
- *Statistical analysis:*
 - Cox proportional hazards regression model for analysis of total mortality from 1982 to 1999
 - Two models analyzed: Basic and multivariate-adjusted.

Data Collection Summary:

Timing of Measurements

- Total mortality measured from 1982 through 1999
- 1975 questionnaire assessed:
 - Self-reported BMI; used for determination of weight status (see inclusion and exclusion criteria)
 - Intention to lose weight, defined as currently (in 1975) attempting to lose weight
- 1981 questionnaire assessed:
 - Presence of disease or other ill health during 1975-1982 (used for exclusion criteria)
 - Employment status in 1981
 - Self-reported BMI (used to determine BMI change from 1975)
- 1975 and 1981 questionnaires assessed:
 - Smoking habits
 - Alcohol consumption
 - Physical activity levels
 - Life satisfaction.

Dependent Variables

- Total mortality between 1982 and 1999 (268 deaths)
 - Causes of death obtained from Statistics Finland
 - Forensic autopsy obtained in 40% of deaths.

Independent Variables

- BMI change from 1975 to 1981
 - Calculated from self-reported height and weight in 1975 and self-reported weight in

1981

- BMI change categorized as loss, gain or stable for analysis
- Intention to lose weight in 1975
 - Self-reported on questionnaire
 - Coded as yes/no for analysis
- Interaction between BMI change from 1975 to 1981 and intention to lose weight in 1975.

Control Variables

Note, covariates (bullets three to six below) were categorized in the analyses as: Both present in 1975 and 1981, present only in 1975, present only in 1981, neither present in 1975 nor 1981.

- Age and sex
- BMI in 1975
- Smoking habits (yes/no)
- Alcohol consumption, defined as:
 - Yes/no; yes at least five bottles of beer, one bottle of wine or 1/2 bottle of spirits on a single occasion at least once per month
 - Average grams per day
- Physical activity level (yes/no; yes means engaging in physical activity more than intense walking)
- Life satisfaction (yes/no based on dissatisfaction scale)
- Work status and income level in 1975
- Presence of drug-treated arterial hypertension
- Within twin-pair correlations of phenotypes.

Description of Actual Data Sample:

- *Initial N*: 19,993
- *Attrition (final N)*: 2,957
 - 1,946 males
 - 1,011 females
- *Age*: 24-60 years in 1981
- *Ethnicity*: Not reported
- *Other relevant demographics*: 445 same-sex twin pairs (N=890) included in analyses
- *Anthropometrics*: All participants had self reported BMI $\geq 25.0\text{kg/m}^2$ in 1975
- *Location*: Finland.

Summary of Results:

- Intention to lose weight had no influence on mortality in the follow-up period
- Both those who gained weight and those who lost weight had increased mortality compared with the weight-stable group.

Hazard Ratios (HR) with 95% CI of Total Mortality 1982-1999 by Intention to Lose Weight in 1975 and Weight Change Between 1975 and 1981.*

Intention to Lose Weight and Weight Change	Basic Regression Model	Multivariate Adjusted Regression Model
	HR (95% CI), P-value	HR (95% CI), P-value
Intention to lose weight (N)		
Yes (1,058)	0.86 (0.66-1.92)	1.0 (0.75-1.32)
No (1,899)	1.0	1.0
Weight change		
Loss (1,126)	1.43 (1.06-1.92)	1.40 (1.04-1.90)
Stable (889)	1.0	1.0
Gain (942)	1.46 (1.06-2.02)	1.38 (1.00-1.92)
Weight change (entered as continuous variable)		
Loss (1,126)	1.12 (1.00-1.26)	1.11 (0.99-1.24)
Gain (942)	1.13 (1.02-1.25)	1.11 (1.00-1.23)
Intention to lose weight x weight change (N)		
Yes, loss (398)	1.49 (0.99-2.26), P=0.06	1.87 (1.22-1.87), P=0.004
Yes, stable (303)	0.69 (0.40-1.19) P=0.19	0.84 (0.49-1.48), P=0.56
Yes, gain (357)	0.93 (0.57-1.53), P=0.78	0.93 (0.55-1.56), P=0.78
No, loss (728)	1.20 (0.84-1.70), P=0.32	1.17 (0.82-1.66), P=0.40
No, stable (586)	1.0	1.0
No, gain (585)	1.56 (1.07-2.25), P=0.02	1.58 (1.08-2.30), P=0.02

*Weight loss defined as a decrease in BMI from 1975 to 1981, weight gain defined as an increased in BMI >1.0kg/m² from 1975 to 1981.

Among the participants intending to lose weight, those who lost weight showed excess mortality compared with those maintaining stable weight.

Hazard Ratios (HR) with 95% CI of Total Mortality 1982-1999 Within Those Intending to Lose Weight in 1975 by Weight Change Between 1975 and 1981.

Intention to Lose Weight and Weight Change	Multivariate Adjusted Regression Model
	HR (95% CI)

Intention to lose weight x weight change	
Yes, loss	2.13 (1.22-3.71)
Yes, stable	1.0
Yes, gain	1.06 (0.56-2.01)

- Among the participants not intending to lose weight, those who gained weight showed excess mortality compared with those with stable weight
- Those who lost weight did not differ significantly from those with stable weight.

Hazard Ratios (HR) With 95% CI of Total Mortality 1982-1999 Within Those Intending to Lose Weight in 1975 by Weight Change Between 1975 and 1981.

Intention to Lose Weight and Weight Change	Multivariate Adjusted Regression Model
	HR (95% CI)
Intention to lose weight x weight change	
No, loss	1.19 (0.83-1.72)
No, stable	1.0
No, gain	1.64-1.12-2.42)

Among participants losing weight, those who intended to lose weight compared with those who did not intend to lose showed a significantly increased mortality; however, this relationship was not significant after adjusting for confounders.

Hazard Ratios (HR) with 95% CI of Total Mortality 1982-1999 Within Those Who Lost Weight Between 1975 and 1982 by Intention to Lose Weight in 1975.

Intention to Lose Weight and Weight Change	Multivariate Adjusted Regression Model
	HR (95% CI)
Weight change x intention to lose weight	
Loss, yes	1.65 (1.09-2.50)
Loss, no	1.0

Among participants who gained weight, those who had intended to lose weight had a lower mortality than those who did not intend to lose weight.

Hazard Ratios (HR) with 95% CI of Total Mortality 1982-1999 Within Those Who Gained Weight Between 1975 and 1982 by Intention to Lose Weight in 1975

Intention to Lose Weight and Weight Change	Multivariate Adjusted Regression Model
	HR (95% CI)
Weight change x intention to lose weight	

Gain, yes	0.55 (0.33-0.93)
Gain, no	1.0

Other Findings

- Total mortality: N=268
- Weight (BMI) change was similar irrespective of intention to lose weight and whether participants died during follow-up
- The distribution of the causes of death was not different between the six intention to lose weight x weight loss groups.

Author Conclusion:

- The long-term effects of weight loss are complex. The findings of this study suggest that deliberate weight loss in overweight individuals without known co-morbidities may be hazardous in the long-term. However, the observed associations in this study can only be interpreted as conservative predictions of the effects of intentional weight loss on long-term mortality
- More research to determine the risk/benefit ratio of short-term planned weight loss vs. possible long-term risks of planned weight loss in overweight individuals without known co-morbidities is indicated.

Reviewer Comments:

Selection of Volunteers and Study Groups

- *Exclusion of potential participants with underlying health condition that may influence weight change relied primarily on self-report which may be biased. Likewise, 246 potential participants were excluded due to missing covariate data; the authors do not state whether this group differed in any way from the group used in the analysis*
- *It is unclear whether a cohort of twins is truly representative of the general population. Inclusion of twins (N=445 twin pairs) in the analysis may have confounding effects on the results despite statistically adjusting for within-pair correlations. Further, no mention of the distribution of the twin-pairs within intent to lose weight and weight change categories was made*
- *Race, ethnicity and sociodemographic characteristics were not included in the analyses*
- *Finally, excepting age and initial BMI, the distribution of covariates within intent to lose weight and weight change groups was not presented.*

Independent Variables

- *The authors do not establish the reliability of using "currently attempting to lose weight" at one time-point as an indicator of intent to lose weight or subsequent weight loss efforts over the ensuing six years*
- *Further, weight change over six years calculated from measurements taken only at the beginning and end of that period does not take into account any effects of weight-cycling during the same time period.*

Total Mortality

Total mortality (N=268) was low suggesting the period of observation may have been insufficient.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | Yes |

Validity Questions

- | | | |
|-----------|---|-----|
| 1. | Was the research question clearly stated? | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| 2. | Was the selection of study subjects/patients free from bias? | Yes |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | Yes |
| 2.2. | Were criteria applied equally to all study groups? | Yes |
| 2.3. | Were health, demographics, and other characteristics of subjects described? | No |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | ??? |
| 3. | Were study groups comparable? | Yes |
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | Yes |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | ??? |

3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A

6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	N/A
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes

8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes