



The associations between overweight, weight change and health related quality of life: Longitudinal data from the Stockholm Public Health Cohort 2002–2010



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ABSTRACT

Objective. Cross-sectional studies have shown that people with obesity and overweight report lower health related quality of life (HRQoL). With a lack of longitudinal studies, this study aims to assess the association between eight-year weight change and HRQoL measured by the EQ-5D instrument and to investigate whether the association differs with regard to baseline body mass index (BMI).

Method. A population-based survey was conducted among a random sample of 31,182 individuals from Stockholm County aged 18–84 years in 2002 and reassessed in 2010 and supplemented by record linkage with regional and national registers. Multivariate Poisson regression and linear regression were conducted with adjustments for socio-demographic and health-related variables and baseline BMI category as effect modifier for the association between weight change and HRQoL.

Results. Individuals with overweight and obesity respectively have 0.014 and 0.039 lower EQ-5D indexes compared to those being normal weight. Over the eight-year follow-up, 17.6% gained moderately ($\geq 5\%$ body weight) and 13.9% gained heavily ($\geq 10\%$ body weight) in weight. In the fully adjusted analysis, heavy weight gain was associated with a significantly lower overall EQ-5D index and an increased risk of reporting impairment in all but one EQ-5D dimensions irrespective of baseline BMI category. Weight reduction had no significant preventive effect.

Conclusion. Next to obesity status itself, weight gain leads to impairment in HRQoL irrespective of BMI category at baseline while eight year weight loss seems not to have the reversed effect on HRQoL, emphasizing the importance of primary prevention of weight gain.

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Introduction

Overweight and in particular obesity are a major public health concern. In Sweden, the estimated prevalence of overweight (35.2%) and obesity (11.7%) are at the highest level in recent history (SCB, 2012). Once people are overweight, they are at higher risk of developing a wide range of chronic diseases such as diabetes (Seidell, 2000), cardiovascular diseases (Hubert et al., 1983), musculoskeletal complaints (Anandacoomarasamy et al., 2008) and some types of cancer (Bianchini et al., 2002). Overweight and obesity can be considered as one of the leading preventable causes of death (Neovius et al., 2009). Preceding cross-sectional studies from both the general population and disease specific populations have consistently shown that people with obesity and overweight report lower health related quality of life

(HRQoL) compared to those with normal weight (de Zwaan et al., 2009; Dey et al., 2013; Hassan et al., 2003; Hopman et al., 2007; Huang et al., 2006; Jia and Lubetkin, 2005; Kearns et al., 2013; Kortt and Dollery, 2011; Larsson et al., 2002; Renzaho et al., 2010; Soltoft et al., 2009). While there are a few observational studies on the association between weight change and HRQoL based on selected populations (e.g. with underlying diseases, high risk profile or derived from an earlier intervention study) (Cameron et al., 2012; Leon-Munoz et al., 2005; Muller-Nordhorn et al., 2014; Seppälä et al., 2014; Verkleij et al., 2013), longitudinal analyses on the influence of weight change on HRQoL in the general population remain scarce and results are somewhat inconsistent, partly due to varying study populations, HRQoL instruments or statistical modeling (Laxy et al., 2014; Milder et al., 2014).

In the present study we estimated the associations of overweight status and weight change over eight years and HRQoL in individuals from the large population-based Stockholm Public Health Cohort followed from 2002 to 2010. Furthermore, we investigated whether the association of weight change and HRQoL differs with regard to baseline body mass index (BMI).

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Methods

Study population

In 2002, the Stockholm County Public Health Survey was sent out to a random sample of 49,909 Stockholm county residents aged 18–84 years, of which 31,182 individuals participated. Of these, 19,327 (61%) also responded to the questionnaires in 2010. The self-reported data are supplemented by record linkage to regional and national registers. Details about study design, sampling method and data collection can be found elsewhere (Svensson et al., 2013).

The study population was restricted to those with complete data on exposure variable (i.e. weight and height) and outcome variables (i.e. descriptive elements of the EQ-5D instrument) at baseline and follow-up ($n = 17,557$). In order to reduce potential bias arising from misclassification we excluded individuals with values on weight ≤ 40 kg and ≥ 150 kg and height ≤ 150 cm and ≥ 210 cm, and BMI values ≤ 14 kg/m², and ≥ 60 kg/m². An eight year BMI change larger than 15 units has also been considered as potential measurement or administrative error. In total, this led to an exclusion of 891 individuals.

Measures

BMI and weight change categories

Self-reported weight and height information was used to calculate the BMI (kg/m²). Following international definitions, individuals were then categorized as underweight (≤ 18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), or obese (≥ 30 kg/m²) (WHO, 1995). Weight change was operationalized using weight change in percentage relative to their baseline weight and categorized as heavy weight decrease ($\leq -10\%$), moderate weight decrease ($> -10\%$ – $< -5\%$), stable weight ($\geq -5\%$ – $< 5\%$), moderate weight increase ($\geq 5\%$ – $< 10\%$) and heavy weight increase ($\geq 10\%$).

HRQoL

HRQoL is assessed by the descriptive system of the EQ-5D instrument, consisting of five dimensions, i.e. mobility, self-care, usual activities, pain/discomfort and anxiety/depression with three response levels (1 = “no problems”, 2 = “some problems”, 3 = “severe problems”) defining 243 health states (EuroQol, 1990). Each health state can be converted into a single index. While an experience-based value set exists for Sweden (Burstrom et al., 2014), there is currently no population-based value set available for Sweden. In the absence of an appropriate country-specific population-based value set, the use of the UK value set is recommended (EuroQol-Group, 2013). For the current analysis, we use both the respective five dimensions (dichotomized in 0 = no problems 1 = at least some problems) and the overall weighted index as outcome measures of interest.

Covariates

From the surveys conducted in 2002 and 2010 we included information on self-reported smoking (yes/no/ex-smoker), chronic disease (yes/no) occupational class and mental health status. Occupational class was classified according to the Swedish socioeconomic classification, developed by Statistics Sweden (SCB, 1982). For the present study, individuals were grouped in three categories: manual workers, non-manual employees, and self-employed. Mental health status was assessed via the 12-item version of the General Health Questionnaire (GHQ-12) (Goldberg and Hillier, 1979). Participants were classified as having mental health problems if they have responded to at least 3 out of 12 closed-ended questions on mental symptoms within the last weeks with the answering option “worse than usual” or “much worse than usual”. These cut-off points have shown to be consistent with the presence of a mental disorder in the Swedish population (Sconfienza, 1998). Through record linkage to national registers we had additional information on age, sex, civil status, and highest obtained education.

Statistical analysis

To estimate the association between overweight status and the domain specific HRQoL we pooled the observations from 2002 and 2010. We modeled the cross-sectional association using Poisson regression with a log link and robust variance to retrieve a direct estimate of relative risk instead of odds ratio (Zou, 2004). To model the association between overweight status and EQ-5D index as continuous outcome variable, we used linear regression with generalized estimation equation (GEE) and adjusted standard errors (Freedman, 2006). The analyses were adjusted for sex, age, chronic disease, mental problems, smoking status, occupational group, highest obtained education and survey year. As

there was no statistical significant indication for an interaction between BMI and sex or BMI and age in our cohort, we have not further stratified our analysis and results are presented for men and women and age groups combined.

Furthermore, we estimated the effect of weight change between 2002 and 2010 on reporting to have at least some problems in each of the five EQ-5D domains in the Stockholm Public Health Cohort in 2010, using generalized linear model with Poisson distribution and log link function. In addition to the abovementioned covariates, an interaction term (weight change in percentage * baseline BMI category) was included to allow the effect of weight change to differ with respect to baseline BMI category. The interaction was significant in all statistical models but the model for the effect of weight change on reporting problems in the domain of anxiety/depression (p -value = 0.3624). To facilitate the comparison between domains, the results are presented stratified by baseline BMI category for all domains.

To explore whether diseases associated with unintended weight change experienced prior to baseline assessment influenced the association between overweight and HRQoL, we linked the cohort to the Swedish Inpatient Registry and Cancer Registry and excluded in sensitivity analysis those with malignant cancers or hospitalization with a diagnosis related to diseases of the circulatory system (ICD code I00–I99), diabetes (ICD code E11–E14) or mood affective disorders (ICD code F30–F39) at most five years before baseline.

Results

There were 16,666 eligible participants included in this study. At baseline, participants had a mean age of 47 years ($sd = 15.07$) and 56.6% were female. Individuals had a mean BMI of 24.8 ($sd = 3.7$) kg/m² and a mean EQ-5D index of 0.839 ($sd = 0.192$). At baseline, 56.6% of participants were normal weight and 42.0% were overweight or obese. Among all participants, 7.4% reported to have at least some problems with mobility at baseline, 0.9% reported problems with self-care, 8.1% with usual activities, 45.2% with pain/discomfort and 35% reported to have problems with anxiety/depression. In addition, 28% reported to suffer from long lasting diseases and 21% of respondents reported at least three problems related to mental health (Table 1).

With regard to the overall EQ-5D index, fully adjusted pooled linear regression models showed that overweight and obese individuals, respectively, had 0.014 (95% CI: -0.018 ; -0.010) and 0.039 (95% CI: -0.047 ; -0.031) lower EQ-5D indexes compared to those being normal weight (Table 2).

For all but one domain (i.e. anxiety/depression domain) the results showed significant elevated risks for reporting problems in the respective domains among those being overweight or obese compared to those normal weight. People with obesity had a two-fold risk of reporting problems in the domain of mobility compared to those with normal weight. Also for the domains of self-care and usual activity, obese individuals had a significant increased risk for reporting problems (RR = 1.87, 95% CI: 1.43; 2.44 and RR = 1.34, 95% CI: 1.21; 1.47, respectively). In the domain of pain/discomfort we observed a significant increased risk, however less pronounced, for those being obese compared to their normal weight counterparts, RR = 1.17 (95% CI: 1.13; 1.21). When looking at those with only overweight, we find only marginal, but statistically significant increased risk compared to those with normal weight in the domains of self-care, activity and pain/discomfort.

During the eight years of follow-up, 54.7% of the cohort remained stable in weight, 31.6% gained more than 5% of in weight and 13.9% gained more than 10% of their body weight at baseline (Table 3).

The overall EQ-5D index score was 0.026 lower among those who had normal body weight at baseline and gained 10% in weight during follow-up compared to those remained stable in the normal weight category (Table 4). Weight gain among those who were overweight and obese at baseline is significantly associated with 0.032 and 0.033 respectively lower values in EQ-5D compared to those who remained stable in weight. When looking at the specific HRQoL domains separately, weight gain of more than 10% is associated with increased risk of reporting problems in the domains of mobility, usual activity and pain/discomfort

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