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# Perceived negative social influence related to weight loss: development of a questionnaire and exploratory factor analysis

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## Abstract

**Background** Weight loss is often unsuccessful in the long term. The social environment plays a role in lapses and relapses. Perceived negative social influence is still underexplored in the context of weight loss. The aim of this study was to develop a questionnaire to measure perceived negative social influence related to weight loss.

**Methods** A cross-sectional study with an online survey was conducted ($n = 368$). Questions were constructed on the basis of answers from 47 respondents to an open question about sabotage in a pilot study. An exploratory factor analysis was performed, internal consistency was determined.

**Results** Three subscales were identified: Normative and Verbal Pressure to Eat or Drink, Creating a Tempting Environment, Doubting the Need for Weight Loss. Cronbach's alpha varied from 0.84 – 0.89 for the subscales and 0.92 for the overall questionnaire.

**Conclusions** The present study provides a preliminary questionnaire to measure perceived negative social influence related to weight loss. Future studies are needed to gain insight into the prevalence of these factors among people trying to lose weight and to identify additional potential negative social influences related to weight loss.

**Keywords** Social influence, Social norms, Overweight, Weight loss, Weight loss maintenance

## Introduction

The prevalence of overweight and obesity in the Netherlands is still high, as it is in many other countries. In 2021, around half of the Dutch adult population were overweight. In addition, the prevalence of obesity was 12.0% for men and 16.7% for women [1]. Excess weight increases the risk of several health problems. Firstly, psychological problems - including depression and low quality of life [2]. Secondly, social problems - including social isolation and stigma [3]. Lastly, physical problems - including increased risk of several non-communicable diseases, such as type 2 diabetes mellitus, ischemic heart disease and certain types of cancers [4]. These health problems can be prevented or reduced when people who are overweight or obese lose weight. A 5% loss of weight improves health outcomes and is often the goal of weight loss interventions [5]. However, only a small number of people are successful at maintaining weight loss in the long term [6–8].

In addition to factors such as self-efficacy and self-monitoring, for which there is already sufficient evidence,

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the social environment is expected to influence weight loss maintenance [9]. However, in the systematic review of Varkevisser et al., it was concluded that there is too little evidence available to draw conclusions on the social determinants of weight loss maintenance [9]. Potential drivers of the relationship between the social environment and weight control are - amongst others - social selection and social influence, however, specific underlying mechanisms remain unclear [10]. Social selection refers to the hypothesis that people who are overweight also interact more with people who are also overweight. Processes of social influence that might be important are social support, social comparison, social norms and behavioral modeling [10].

The social environment can both hinder and support behavior change. In the literature, social influence processes are mostly described in relation to promoting the healthy behavior, in this case weight loss (maintenance). This means the processes function as facilitators for weight loss goals [11–13]. Participating in a maintenance support group [14] and receiving positive support in the form of compliments and active participation (instead of reminders and verbal instructions) were associated with better weight loss maintenance [15]. However, in an ecological momentary assessment (EMA) study, lack of social support was not found to be predictive of a lapse in dietary behavior [16].

Also, social comparison, for example by perceiving oneself as heavier than salient others can work as a motivator for weight loss [13]. This type of comparison is also called upward social comparison. Downward social comparison occurs when people compare themselves to individuals who are achieving less than they are [10]. This type of comparison can also work as a motivator to prevent ending up like the ones who are achieving less [17]. However, downward social comparison, where individuals perceive themselves to be thinner than those around them, can also reduce the likelihood of engaging in weight loss behaviors, even if they are overweight. When people compare themselves to others who are heavier, their own excess weight becomes normalized [13].

Positive perceived social norms for weight control and healthy eating are associated with greater weight loss intentions [18]. However, social norms can also function as barriers for weight loss goals when they promote unhealthy eating and drinking behaviors [11]. This depends on the perceived norms in social groups [19]. Social norms are defined as "*implicit codes of conduct that provide a guide to appropriate action*" [20] and can be divided into two types. The first type is the 'perceived descriptive norm' which refers to someone's perception of how most people behave, perceiving this as normal modelled behavior. Evidence shows that individuals model the eating behaviors of people they eat with, leading to increased food intake when their eating companion eats more and decreased food intake when their eating companion eats less [21]. Perceived descriptive norms for eating foods that do not fit in their diet plans were found to be predictive of dietary lapses in an EMA study [16]. The second type is the 'perceived injunctive norm', which refers to someone's perception of other people's beliefs regarding certain behavior [22]. When unhealthy food is perceived to be accepted by others, the intake of unhealthy food increases [23]. Leahey and colleagues found that obesogenic norms, such as the perceived acceptability to eat unhealthily, predicted less favorable weight loss treatment outcomes [24]. Perceived injunctive norms, e.g. the feeling that others expected someone trying to lose weight to eat or drink something that does not fit in their diet plans, was predictive for dietary lapses in an EMA-study [16].

Another process of social influence that could be related to weight control and which is still an underexplored construct is sabotage, which can be divided into two types, namely self-sabotage [25, 26], and sabotage by others (hereafter referred to as sabotage). Sabotage has been studied very rarely in the field of weight loss. A qualitative study by Rogerson et al. [12] found that family members and friends can act as saboteurs of the weight loss efforts by individuals, for example, by eating unhealthy food around them or by tempting them with unhealthy foods. In the course of this sabotage, they do not consider the challenges, emotions and motivations of the person who is trying to lose weight. Social pressure or persuasion to eat or drink something that does not fit in someone's diet plans are also reported [27, 28]. Sriram et al. [29] found that offering food was perceived as part of hospitality, which made people feel obligated to accept the food that was offered in a social setting. These situations could sabotage people's efforts to eat healthily, due to the amount and type of food available. The study also described difficulties in changing eating patterns due to the rest of the household's reluctance to change. Hardcastle & Hagger [30] reported 'weight loss sabotage' (i.e. sabotage by way of lack of social support) and found that people trying to lose weight felt sabotaged if close family members did not join them in or were reluctant about new healthy behavior they wanted to adopt.

Ogden & McFarlane [31] proposed a new model about the negative side to social support. In this model, sabotage is described as 'an active and intentional form of negative social support designed to undermine an individual's health goals'. Being a feeder (providing food even when someone else is not hungry or does not want to eat) occurs for various reasons (i.e. waste avoidance or as a sign of love) and is an important part of the concept of sabotage [31].

In conclusion, social influence processes are important in weight loss and weight loss maintenance. The focus of this study is on social influence processes that hinder weight loss. In order to gain further insight in this topic, a measurement instrument is needed. The aim of this study is to develop a questionnaire that measures perceived negative social influence related to weight loss.

## Methods

### Study design

A cross-sectional study was conducted. Data collection took place from March 2022 until May 2022. Respondents were asked to complete an online survey aimed at gaining more insight into the behavioral determinants of weight loss and weight loss maintenance. The data used in this study was a subsample of a larger data set, which comprised more variables (i.e. physical activity, self-talk during weight loss, portion control behaviors). This is the first paper that has been written based on this dataset, the data has not yet been published elsewhere.

### Population and procedure

Dutch adults aged between 18 and 65 years old who deliberately lost some weight at some point during the last year. There were no specific criteria for the amount or duration of weight loss. Participants were excluded if they underwent surgery to help them lose weight (e.g. a gastric bypass, gastric band etc.) or were not resident in the Netherlands. Due to changes in body composition and different BMI cut-off points, BMI is a less reliable measure for the older adults [32]. Therefore, they were not included in this study.

Participants were recruited via social media and professionals such as dieticians and nutrition coaches or lifestyle coaches. The professionals were recruited based on convenience. The participants received a flyer containing information about the aim of the study, the inclusion and exclusion criteria, the privacy policy, and the research team contact details. Access to the survey was provided via a link to Qualtrics XM. Inclusion criteria were checked by asking some questions to be answered with 'yes' or 'no', before respondents could start the survey. The survey could only be started if all inclusion criteria were met. The entire survey was pilot-studied using 10 test respondents and the survey took approximately 40 minutes to finish. Based on this, no changes were required to be made to the questions used in the current study. Every respondent who completed the survey had a chance to win one of five gift vouchers worth 30 euros. In addition, a small amount was donated to a charity for each completed survey, to be chosen by the respondent.

### Measurements

#### *Demographic and anthropometric variables*

Demographic data measured during the study consisted of date of birth, gender (male, female or other), and educational level (no education, elementary school, preparatory secondary vocational education, general secondary education, post-secondary vocational education, higher general and pre-university education, higher vocational education, academic education). Self-reported anthropometric data consisted of height (in centimeters), current body weight (in kilograms), body weight before weight loss (in kilograms), and lowest body weight after weight loss (in kilograms).

#### *Perceived negative social influence*

**Development of the questionnaire** In preparation for this study, different forms of perceived negative social influence were identified on the basis of qualitative data collected in a previous study. Dutch adults who succeeded in a deliberate attempt to lose (any) weight ($n = 152$) were asked an open-ended question as part of an online survey (unpublished data, collected in 2021) about the ways participants were thwarted in their attempts to lose weight. This open question was answered by 31% of participants, $n = 47$. The answers given were solely related to eating and drinking behaviors and did not include hinder with regard to physical activity. Therefore, the present study did not include sabotage related to physical activity. Based on the data obtained from the open-ended question, sabotage was divided into seven main categories (see Table 1). After reading all the open answers, IS made the preliminary categorization, after which it was discussed with LtB. Adjustments were made based on this. This categorization was then presented to the other researchers for further feedback/validation. There was no predetermined number of categories.

Based on Tables 1 and 20 items were constructed by the research team with the aim of reflecting all categories in the items. A five-point Likert scale was used, ranging from almost never (1) to very often (5) (e.g. 'Do friends, family or colleagues ever say that losing weight is unnecessary? ). IS, MV, and LtB constructed the items in several joint meetings. The items were part of a larger questionnaire. CR provided feedback on the questionnaire. It was pretested with 10 respondents for comprehensibility and length. This did not lead to any adjustments in the questions regarding perceived negative social influence. The questionnaire has been developed in the Dutch language. A professional language agency translated the questions regarding perceived negative social influence into English, after which two researchers (IS, LtB) went through the translation and, if necessary, adapted it to its substantive meaning. IS, CR and WK are senior researchers with

**Table 1** Perceived ways in which individuals attempting to lose weight were hindered by others, based on qualitative data ($n = 47$)

| Category | Examples |
|---|---|
| Verbal persuasion to eat or drink | Insisting on taking something to eat with a cup of coffee<br>Stating that 1 occasion or consumption should be possible (e.g. "One snack does not make a difference")<br>Suggesting other moments to stick to your diet and eat or drink now |
| Doubting the need for weight loss | Stating there is no need for the other person to lose weight<br>'Warning' the other person not to lose more or too much weight<br>Giving compliments (e.g. "you look fine already")<br>Diminishing the value of weight loss/a healthy body weight |
| Doubting the effectiveness of weight loss attempt | Warning about relapse (e.g. "It's a waste of time, you will relapse anyway. It's useless.") |
| Negative association | Linking weight loss (attempt) to negative characteristic or behavior (e.g. unsociable) |
| Relate weight loss (behaviors) to personal relationship | Feeling insulted when refusing food or drinks<br>Stating that an extra effort was made (e.g. "I made/bought it especially for you") |
| Bring in temptations | Buying tempting foods<br>Cooking energy-dense dinners<br>Ordering unhealthy foods<br>Bringing treats<br>Offering foods and drinks<br>Putting palatable food at the table |
| Social conventions | Leftovers (e.g. offering them or dividing leftovers of a meal among the persons present and urging them to eat it (instead of wasting it))<br>The 'obligation' to drink alcohol at certain occasions<br>Stating that one should finish their plate |

over 20 years of experience in studies on overweight and obesity. LtB is an experienced dietitian and a mid-career researcher in health sciences. MV worked as an intern on this project.

### Statistical analysis

Educational level was recoded as low, medium, high according to the common classification in the Netherlands [33]. BMI was calculated twice (weight (kg) / height$^2$), for body weight before weight loss and current bodyweight. Descriptive statistics (mean, SD) were used to describe the sample characteristics. An exploratory factor analysis (EFA) was performed to determine the distribution of items among components, with a principal components analysis with eigenvalues and varimax rotation. Items with extraction communalities loadings of 0.40 or less were discussed between researchers and, if needed, excluded from the final version of the developed questionnaire [34]. Items that cross-loaded on more than one component were discussed between researchers and admitted to the component it was most applicable to. Cronbach's alpha was calculated to measure the internal consistency of the developed questionnaire and identified subscales. Descriptive statistics were used to describe the scores on the total questionnaire and the identified subscales. Data were analyzed using IBM Statistics SPSS 25 (SPSS Inc., Chicago IL, USA).

### Ethics

Ethical review for compliance with the code of ethics for research in human participants that does not fall under the Medical Research Act (WMO), was completed by the Research Ethics Review Committee of the Faculty of Science of the Vrije Universiteit Amsterdam (ref no 2022.003). The study was conducted in accordance with the principles of the Declaration of Helsinki. All participants provided informed consent prior to completing the survey.

## Results

### Respondents

A total number of 964 people responded to the survey, of which 209 respondents were excluded, because they did not meet the inclusion criteria. The remaining 755 respondents started the survey, of which 212 were excluded due to presumably incorrect or missing body weight values (i.e. < 30 kg or > 300 kg). Another 175 respondents were excluded from the remaining 543 due to incomplete data on the perceived sabotage and negative social norms questionnaire, leaving 368 respondents included in the study (see also Fig. 1).

Table 2 shows participant characteristics. Most participants were female (86.4%) and more than half had a higher educational level (56.5%). The mean age of the respondents was 43.6 years (SD = 13.6). Before weight loss, most respondents fell into the overweight (41.8%) or obese (41.3%) BMI category ($n = 154$). Mean BMI before weight loss was 29.8 (SD = 5.5) kg/m$^2$. After weight loss, most respondents fell into the healthy weight BMI range (45.9%) and had a mean BMI of 26.4 (SD = 4.6) kg/m$^2$.

### Exploratory factor analysis (EFA)

Three components were obtained during the EFA. The components were named 'Normative and Verbal Pressure to Eat or Drink', 'Creating a Tempting Environment', and 'Doubting the Need for Weight Loss'. Normative and Verbal Pressure to Eat or Drink contained items that specifically stated that others verbally expressed something related to norms with respect to eating and drinking, such as 'Urging you to eat/drink'. This component consisted of nine items (items 1 to 8 and item 13). Creating a Tempting Environment contained items about actions of others that could tempt someone to eat or drink unhealthily, such as 'Others buy tempting foods'. This

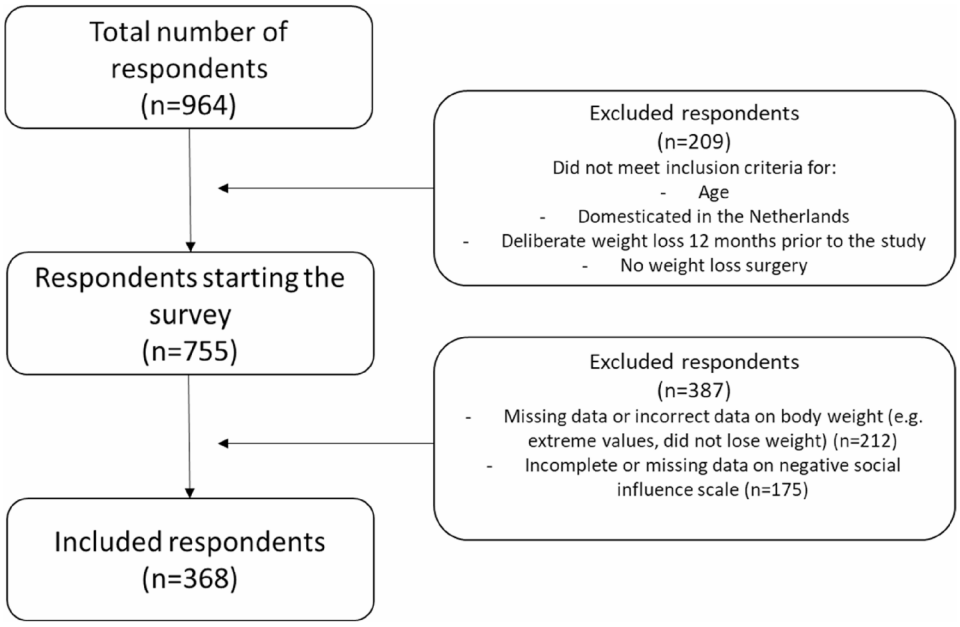



**Fig. 1** Flowchart

**Table 2** Characteristics of included respondents

| (total*n* = 368) | *n* | % |
|---|---|---|
| Gender | | |
| Male | 49 | 13.3 |
| Female | 318 | 86.4 |
| Other | 1 | |
| Educational level | | |
| Low | 24 | 6.5 |
| Middle | 135 | 36.7 |
| High | 208 | 56.5 |
| BMI category before weight loss | | |
| Healthy body weight (< 25 kg/m$^2$) | 62 | 16.8 |
| Overweight (25–29.9 kg/m$^2$) | 154 | 41.8 |
| Obese (≥ 30 kg/m$^2$) | 152 | 41.3 |
| BMI category after weight loss | | |
| Healthy body weight (< 25 kg/m$^2$) | 169 | 45.9 |
| Overweight (25–29.9 kg/m$^2$) | 126 | 34.2 |
| Obese (≥ 30 kg/m$^2$) | 73 | 18.8 |
| | Mean | SD |
| Age (years) | 43.6 | 13.6 |
| BMI before weight loss (kg/m$^2$) | 29.8 | 5.5 |
| BMI after weight loss (kg/m$^2$) | 26.4 | 4.6 |

component consisted of five items (items 9 to 12 and item 14). Doubting the Need for Weight Loss contained items that stated others diminished the need to lose weight, such as 'Stating there is no need to lose weight'. This component also consisted of five items (items 15 to 19). EFA led to three items with extraction communalities loadings of 0.40 or less (see Table 3). As a result of the discussion between researchers, one item was deleted from the questionnaire, because in retrospect the item did not fit in with the other items. This item was about doubting the effectiveness of weight loss because weight regain is unavoidable. The other two (items 8 and 14) remained in the questionnaire, because the researchers believed they were relevant for measuring perceived sabotage and social norms promoting unhealthy eating and drinking behaviors. Item 8 is about others stating to have bought/prepared food/drinks especially for you. Item 14 is about others drinking alcohol and you feeling obliged to join in. Some items cross-loaded on more than one component (items 4, 7, 8, 12, 13, and 17). These items were discussed between researchers and admitted to the component they were most applicable to (items 4,7,8 and 13 to Normative and Verbal Pressure to Eat or Drink, item 12 to Creating a Tempting Environment, item 17 to Doubting the Need for Weight Loss). See Appendix 1 for the final questionnaire.

### Internal consistency

Cronbach's alpha was 0.89 for the subscale Normative and Verbal Pressure to Eat or Drink, and 0.84 for both other subscales. The overall Cronbach's alpha of the questionnaire was 0.92.

### Scores on the perceived negative social influence related to weight loss questionnaire

Table 4 shows mean scores on the total questionnaire as well as the three subscales. Doubting the need for weight loss has the highest mean score, namely 2.8 (SD 1.1) on a five-point Likert scale. In addition, 16.3% of respondents had a mean score of 4 or higher on this subscale, while 12% had a mean score of 4 or higher on the 'Creating a

**Table 3** Exploratory factor analysis of the perceived negative social influence related to weight loss questionnaire: factor loadings from the rotated component matrix

| ***n*** **= 368** | **Component** | | |
|---|---|---|---|
| **Item** | **Normative and Verbal Pressure to Eat or Drink** | **Creating a Tempting Environment** | **Doubting the Need for Weight Loss** |
| 1. Classifying you as less sociable, when you are careful about what you eat | 0.80 | | |
| 2. Classifying you as being fussy when you are careful about what you eat | 0.78 | | |
| 3. Others stating they feel offended if you do not want food or drink | 0.77 | | |
| 4. Persuading you to eat/drink | 0.64 | 0.37 | |
| 5. Persuading you to finish your plate | 0.63 | | |
| 6. Suggesting that you forget your diet and stick to it another time | 0.60 | | |
| 7. Stating that leftovers should be eaten | 0.55 | 0.39 | |
| 8. Stating they bought/prepared food/drinks especially for you | 0.41 | 0.31 | |
| 9. Others buying tempting foods | | 0.82 | |
| 10. Others getting unhealthy foods for you | | 0.80 | |
| 11. Others cooking/ordering unhealthy foods | | 0.78 | |
| 12. Others offering unhealthy foods | 0.31 | 0.75 | |
| 13. Suggesting eating or drinking unhealthily once in a while never hurts anyone | 0.44 | 0.45 | 0.32 |
| 14. Others drinking alcohol and you feeling obligated to do join in | | 0.40 | |
| 15. Stating you should not care about your weight so much | | | 0.80 |
| 16. Stating you look great and therefore do not need to lose weight | | | 0.79 |
| 17. Stating you should not care so much about weight loss | 0.32 | | 0.78 |
| 18. Stating that losing weight is unnecessary | | | 0.71 |
| 19. Warning you not to lose more weight | | | 0.63 |
| *Doubting the effectiveness of weight loss, because regain is unavoidable | 0.40 | | 0.36 |

*Item deleted from the final questionnaire

Tempting Environment' subscale, and 4.3% on the 'Normative and verbal pressure to eat and drink' subscale.

## Discussion

The aim of this study was to develop a questionnaire measuring perceived negative social influence with regard to weight loss. Items were developed based on qualitative data and subsequently tested in a quantitative study. Results of the factor analysis showed that the developed questionnaire consisted of three subscales, namely Normative and Verbal Pressure to Eat or Drink, Creating a Tempting Environment, and Doubting the Need for Weight Loss. The internal consistency of the questionnaire and subscales was good.

With the increasing interest in socio-ecological models in the field of lifestyle and behavior change, the role of the social environment in lifestyle is also receiving increasing attention. In addition to intrapersonal factors, interpersonal relationships are the next level that influences the individual's attitudes and behavior [35]. Although the role of social support in weight loss is not yet entirely clear, social support seems to be beneficial to weight management (i.e. [15, 36]). However, it is also relevant to not only look at the positive side of social influence on lifestyle change, but at the potentially negative influence of the social environment as well. Previous qualitative studies also showed that this is potentially relevant with regard to weight loss (i.e. [12, 27]). However, in order to be able to study this in a larger population, a measuring instrument is needed, which was not yet available. It is distinctly different from measuring instruments that focus more on social support related to weight loss.

The developed questionnaire includes subscales that relate to results from previous studies. For example, Hardcastle and Hagger [30] also reported perceived negative social influence due to temptations being present in the environment because of family members. We also identified components that have previously been reported in studies on other lifestyle behaviors, such as smoking (i.e.[ 37]). These studies mentioned that smokers verbally pressurize people who are trying to quit smoking into smoking a cigarette, causing high social pressure and the fear of losing their smoking friends. This sabotaged their smoking cessation [37]. In the current study, this is reflected in the Normative and Verbal Pressure to Eat or Drink subscale.

The reason that people pressure and sabotage others could be explained through the Cognitive Dissonance Theory [38]. When someone tries to lose weight and is working on a lifestyle change, it can cause an unpleasant feeling in someone who is not but who should actually be doing it themselves too. This dissonance can be resolved

**Table 4** Mean scores on the perceived negative social influence related to weight loss questionnaire

| **(total *n* = 368)** | **Mean (SD)** |
|---|---|
| Total score (1–5) | 2.6 (0.8) |
| Normative and verbal pressure to eat or drink (1–5) | 2.4 (0.9) |
| Creating a Tempting Environment (1–5) | 2.7 (1.0) |
| Doubting the need for weight loss (1–5) | 2.8 (1.1) |
| Normative and verbal pressure to eat or drink (all items 1–5) | |
| 1. Do friends, family or colleagues ever find you less sociable if you are careful about what you eat? | 2.1 (1.2) |
| 2. Do friends, family or colleagues think you're being fussy if you are careful about what you eat? | 2.2 (1.3) |
| 3. Do friends, family or colleagues ever feel offended of you do not want food or drink? | 2.0 (1.2) |
| 4. Do friends, family or colleagues ever try and persuade you to eat or drink something? | 2.6 (1.4) |
| 5. Do friends, family or colleagues ever try and persuade you to finish your plate? | 1.7 (1.1) |
| 6. Do friends, family or colleagues ever suggest you forget your diet at that moment, and stick to it another time? | 2.6 (1.4) |
| 7. Do friends, family or colleagues ever say that leftovers should be eaten (because it is a shame to throw them away, for example)? | 2.3 (1.3) |
| 8. Do friends, family or colleagues ever say that they bought or prepared some foods or drinks especially for you? | 2.4 (1.3) |
| 9. Do friends, family or colleagues ever say that eating or drinking unhealthily once in a while never hurt anyone? | 3.4 (1.4) |
| Creating a tempting environment (all items 1–5) | |
| 1. Do friends, family or colleagues ever buy food that tempts you to eat unhealthily? | 3.1 (1.3) |
| 2. Do friends, family or colleagues ever get unhealthy food for you? | 2.5 (1.3) |
| 3. Do friends, family or colleagues ever cook or order unhealthy food for you even though you're trying to lose weight? | 2.7 (1.4) |
| 4. Do friends, family or colleagues ever offer you unhealthy food? | 3.1 (1.2) |
| 5. Do friends, family or colleagues ever drink alcohol, making you feel obliged to join in? | 2.1 (1.3) |
| Doubting the need for weight loss (all items 1–5) | |
| 1. Do friends, family or colleagues ever tell you not to care about your weight so much? | 2.8 (1.4) |
| 2. Do friends, family or colleagues ever say that you look great and therefore you do not need to lose weight? | 3.3 (1.4) |
| 3. Do friends, family or colleagues ever tell you not to care so much about losing weight? | 2.6 (1.4) |
| 4. Do friends, family or colleagues ever say that losing weight is unnecessary? | 3.1 (1.4) |
| 5. Do friends, family or colleagues ever warn you not to lose any more weight? | 2.1 (1.4) |

if the person in the social environment adopts a healthier lifestyle as well. However, this is complex, and a difficult goal to achieve, and requires a lot of effort. An easier way for the person in the social environment to resolve the dissonance is to doubt the need for weight loss. A respondent in our first - qualitative - study described this as follows: "*My spouse is afraid that I will lose too much weight because she is overweight herself.*"

### Strengths and limitations

In this study, a questionnaire was developed that measures the perceived negative social influence on weight loss. Qualitative data was used to develop a questionnaire that aligned well with people's experiences (and perceptions) when losing weight. The questionnaire is innovative because it pays attention to the potentially negative influence from the social environment on weight loss.

The present study also had some limitations. An important limitation of this study is that the categorization of the open-ended responses was not based on a formal qualitative analysis method. Instead, an iterative consensus process was used, in which the preliminary categorization was developed by one researcher and subsequently refined through discussion and feedback from the research team. As a result, the categorization relied on researcher judgement, which may have influenced both the identified categories and the subsequent development of questionnaire items.

Furthermore, the sample included people who deliberately lost weight during the last year. The period during which weight loss took place differed between the respondents. This means that some respondents could have lost weight recently, while for others it could have been months ago and some weight regain might have occurred as well. Recall bias could therefore have influenced the data. In addition, the sample only included people who actually lost weight, while negative social influence may be much more prevalent in people who have tried to lose weight but have failed to do so. As a result, certain relevant factors may have been overlooked. For example, these could include factors such as the social environment hindering help-seeking or undermining self-esteem through stigmatizing comments [31].

Also, women and people with a higher educational level were overrepresented in the sample. In many weight loss studies, women are often overrepresented. Women may prioritize weight loss and health-promoting behaviors more than men and are also more likely to seek help in their pursuit of weight loss [39]. It is possible that men face different social barriers during weight loss. Whether the developed questionnaire is also valid and reliable for men, or if it needs adjustments, requires further investigation.

Another limitation is that the developed questionnaire consists of three components. However, the number of items are not equally distributed across the components. This could lead to the privilege of a certain subscale in the total score. Finally, the questionnaire is mainly focused

on the frequency of perceived negative social influence, reflected by the response options (almost never – very often) we used. However, this does mean the severity or intensity is not fully taken into account. In future studies, questions could be added on this topic, with a response scale that more accurately reflects the severity or intensity of negative social influence related to weight loss.

### Recommendations

Follow-up studies are needed to better understand how many people who are trying to lose weight are affected by negative social influences and for whom this is influencing results in particular. In addition, it is important to have a representative sample of the people who are trying to lose weight, including those who do not succeed. The current questionnaire focuses mainly on eating and drinking behavior and directly on the weight loss itself. Although sabotage in physical activity did not emerge in the qualitative question, it is important to find out whether there are other relevant behaviors for weight management in addition to eating and drinking behavior in which a negative social environment plays a role. In the qualitative study of Hardcastle and Hagger - for example - lack of social support for performing physical activities such as going for a walk was perceived as a barrier and a sabotaging action [30].

Also, follow-up research into the psychometric qualities of the developed questionnaire is needed, such as a test-retest procedure.

If follow-up research shows that negative social influence plays a significant role in weight loss, targeted interventions can be developed. On the one hand, these should be interventions that teach people to cope with negative social influence and 'bolster' them against it. On the other hand, interventions can be developed that aim to redirect negative social norms to more supportive norms and support.

## Conclusions

The present study provides a preliminary questionnaire to measure perceived negative social influence with respect to weight loss, with good internal consistency. Pressure to eat or drink, tempting behaviors of others and doubting the need for weight loss appeared to be relevant factors. Future studies are needed to gain insight in the prevalence of these factors among people trying to lose weight and to identify additional potential negative social influences related to weight loss.

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-026-28790-3.

Additional file 1. Perceived Negative Social Influence Related to Weight Loss Questionnaire. Additional file 1 contains the final version of the Perceived Negative Social Influence Related to Weight Loss Questionnaire. The questionnaire consists of 19 items assessing perceived negative social influence from friends, family members, and colleagues that may hinder weight loss efforts. Items are grouped into three subscales: Normative and Verbal Pressure to Eat or Drink (9 items), Creating a Tempting Environment (5 items), and Doubting the Need for Weight Loss (5 items). All items are scored on a 5-point Likert scale ranging from 1 (Almost never) to 5 (Very often). The original questionnaire was developed in Dutch; the English version presented here was produced through professional translation and subsequently reviewed by the authors to ensure conceptual equivalence.

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### Authors' contributions

All authors contributed to the study conception and design. The study was conceived by I.S., C.R., W.K. and LtB. Preparation of resources, data collection and analysis were performed by M.V., supervised by I.S. and LtB. The first draft of the manuscript was written by I.S. and M.V. and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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### Data availability

The dataset used and analysed during the current study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

Ethical review for compliance with the code of ethics for research in human participants that does not fall under the Medical Research Act (WMO), was completed by the Research Ethics Review Committee of the Faculty of Science of the Vrije Universiteit Amsterdam (ref no 2022.003). All participants provided informed consent prior to completing the survey.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

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