

Information Handout

Professional Version | US English

Starvation Syndrome – The Effects of Semi-Starvation



Description

Disordered patterns of eating play a central role in the maintenance of anorexia nervosa, bulimia nervosa, binge-eating disorder, and other specified feeding and eating disorders (OSFED). For this reason, psychoeducation regarding the consequences of abnormal patterns of eating are an important aspect of treatment.

The transdiagnostic model of eating disorders identifies several processes which contribute to disordered eating across diagnostic groups (Fairburn et al., 2003). These include:

- **Overvalued beliefs about shape, weight, eating, and control.** People with eating disorders base much of their self-worth on their ability to control their shape, weight, and eating. Other features of eating disorders are believed to stem from this 'core psychopathology', including extreme weight control behaviors (e.g., self-induced vomiting, driven exercise), body-shape checking and avoidance, and preoccupation with weight and appearance (Cooper & Dalle Grave, 2017).
- **Dietary restraint.** Overvalued beliefs about shape, weight, and eating lead individuals to establish strict dietary rules which are challenging to maintain. In restrictive eating disorders (e.g., anorexia nervosa), restraint can result in significant weight loss and a severely low body mass index (BMI) due to chronic food restriction. In eating disorders where there is a binge-eating component (e.g., bulimia nervosa), difficulties adhering to these strict dietary rules can cause people to abandon attempts to restrain their eating, resulting in episodes of binge-eating.
- **Broader maintaining factors.** These can perpetuate disordered eating for some individuals. They include:
 - Mood intolerance.
 - Interpersonal difficulties.
 - Low self-esteem.
 - Perfectionism.

Failure to meet the body's energy requirements plays an important role in disordered eating (Waller et al., 2007). When the human body is deprived of energy from food, individuals experience a range of problematic symptoms. The Minnesota Starvation Experiment (Keys et al., 1950) provides a vivid account of how food restriction affects people. Most notably, it highlights common symptoms of semi-starvation and the ways in which this 'starvation syndrome' can establish and reinforce key features of disordered eating.

The Effects of Semi-Starvation

The Minnesota Starvation Experiment is a well-known research study which explored the effects of starvation on behavior between 1944 and 1945. The project took place against the backdrop of World War II: hunger and starvation were commonplace around the globe, but relatively little was known about the effects of starvation or the process of rehabilitation following extended periods of malnutrition.

Led by the physiologist Ancel Keys, the Minnesota study began in November 1944 and ended in October 1945. The participants were 36 healthy young men who were conscientious objectors to military service. Recruitment into the project was rigorous: participants needed to be in good physical and mental health and demonstrate an ability to work well with others in difficult circumstances.

Description

The gruelling study was divided into three phases. During the first phase (lasting three months), the participants ate a normal diet while their eating patterns, behavior, and psychology were closely monitored. During the second phase of study (lasting six months), the participants' food intake was roughly halved, which caused most of them to lose around 25% of their body weight. During the third phase, the men underwent a period of rehabilitation during which they were refed and restored weight. The participants were required to engage in educational activities and exercise throughout the study.

The changes observed in the participants during the semi-starvation phase of the experiment were variable but nonetheless dramatic. Importantly, some of these changes persisted after the participants had restored weight and resumed normal eating. These side-effects of restricted eating (often referred to as 'symptoms of semi-starvation') included the following:

Biological changes:

- Increased hunger, cravings
- Reduced strength, tiredness
- Gastrointestinal pain
- Reduced need for sleep
- Headaches, dizziness
- Sensitivity to cold
- Hair loss
- Edema (swelling)
- Reduced basal metabolic rate

Psychological changes:

- Preoccupation with food (e.g., planning meals in detail)
- Impaired concentration
- Reduced alertness
- Impaired judgment and decision-making
- Rigid and obsessional thinking

Behavioral changes:

- Changes in the speed of eating (often prolonging meals)
- Urges to binge and occasional loss of control over food intake
- Highly ritualized patterns of eating
- Increased interest in food (e.g., collecting recipes)
- Desire to hoard
- Use of hunger-relief behaviors (e.g., chewing gum)
- Creating unusual 'concoctions' of food (e.g., excessive use of spices)
- Disinterest in other activities
- Neglect of personal hygiene

Emotional changes:

- Depression
- Anxiety
- Irritability and angry outbursts
- Impatience
- Interpersonal sensitivity
- Apathy
- Brief periods of elation

Description

Social changes:

- Withdrawing from others
- Isolation
- Feelings of social inadequacy
- Strained relationships (e.g., conflicts)
- Disinterest in sex
- Loss of sense of humor

For some participants, the effects of semi-starvation were extreme: two were briefly admitted to a local psychiatric facility and one admitted to eating scraps of food out of garbage cans (Kalm & Semba, 2005).

The results of the Minnesota Starvation Experiment reveal a great deal about the consequences of food restriction and weight loss. In the context of eating disorders, the results have several important implications.

- **Symptoms of starvation and symptoms of eating disorders are very similar.** This suggests that starvation plays a central role in the experience of eating disorders including anorexia nervosa, bulimia nervosa, binge-eating disorder, and other eating difficulties.
- **Starvation symptoms are universal and understandable.** All the participants in Minnesota study began the experiment in physically and psychologically healthy states, but this changed as a result of food restriction. Many disordered eating behaviors that initially seem unusual, frustrating, or shameful may stem from universal effects of starvation, rather than reflecting anything deeper about the people who carry them out.

- **Semi-starvation drives eating disorder symptoms.** Restricted eating leads to many of the symptoms that individuals with eating disorders struggle with (e.g., preoccupation with food, urges to binge). For this reason, normalizing food intake and reaching a healthy weight play a vital role in recovery from an eating disorder.
- **Semi-starvation maintains eating disorder symptoms.** Symptoms of semi-starvation are likely to perpetuate aspects of eating disorders. For example, social isolation may lead to increased preoccupation with weight and eating, while starvation-related emotional distress may fuel disordered eating (e.g., restricting or binge-eating in response to distress).
- **Severe food restriction is not the only cause of semi-starvation.** Symptoms of semi-starvation can also arise when people eat irregularly or intermittently, limit their intake of energy-rich foods (most notably, carbohydrates), or engage in compensatory behaviors which reduce energy absorption and storage (e.g., self-induced vomiting or driven exercise).
- **Starvation effects sometimes persist.** Some participants in the Minnesota study continued to struggle with symptoms after their weight and eating had returned to normal. This suggests that learning to regulate food intake and eat intuitively may take some time after food intake has begun to normalize.

The *Starvation Syndrome – Effects of Semi-Starvation* handout provides an overview of the Minnesota Starvation Experiment and common symptoms of semi-starvation. It describes how disordered patterns of eating can cause semi-starvation and the benefits of normalizing food intake through regular eating.

Instructions

Suggested Questions



Research shows that how we eat and how much we eat can have a big impact on the way we think, feel, and behave. The reason scientists know a lot about this is because of a famous study called the Minnesota Starvation Experiment, which explored the effects of starvation. Can we look at this handout together? I think it could be relevant to the difficulties you are experiencing.

- *Which symptoms of semi-starvation do you relate to? What problems do they cause you?*
- *What does the Minnesota study suggest might be causing those symptoms?*
- *Semi-starvation can be a result of long periods of restriction, eating irregularly, avoiding foods like carbohydrates, or compensating after eating. How does that fit your pattern of eating?*
- *The researchers found that many of the participants' symptoms of semi-starvation reversed when they ate more regularly and restored weight. How might things improve for you if you tried that?*
- *How would you feel about eating more regularly / restoring weight and finding out what happens?*

References

Kalm, L. M., & Semba, R. D. (2005). They starved so that others be better fed: remembering Ancel Keys and the Minnesota experiment. *The Journal of Nutrition*, 135, 1347-1352.

Keys, A., Brozek, J., Henschel, A., Mickelsen, O., & Taylor, H. L. (1950). *The biology of human starvation*. University of Minnesota Press.

Waller, G., Cordery, H., Corstorphine, E., Hinrichsen, H., Lawson, R., Mountford, V., & Russell, K. (2007). *Cognitive behavioral therapy for eating disorders: A comprehensive treatment guide*. Cambridge University Press.

Starvation Syndrome – The Effects Of Semi-Starvation

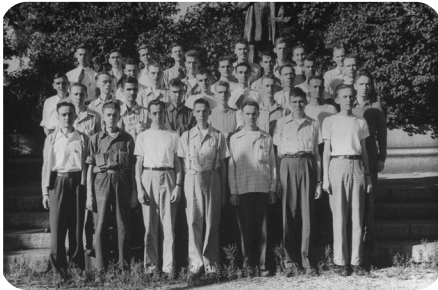
Food gives our body the energy it needs to function normally. If people limit their food intake for extended periods of time, they experience specific side-effects. These symptoms of food restriction are sometimes called 'starvation syndrome' or 'semi-starvation'.



Everybody experiences symptoms of semi-starvation when they don't eat enough, but if you struggle with an eating disorder you might experience them intensely or very often. In fact, many symptoms of an eating disorder appear to be a direct result of starvation syndrome.

The Minnesota Starvation Experiment

In 1944, thirty-six healthy men took part in a year-long experiment called the Minnesota Starvation Experiment. For several months, these men volunteered to have their food intake limited to about half of their normal amount for six months. They all lost significant amounts of weight (around 25% of their original body weight). The researchers found that food restriction had dramatic effects on the men, both physically and psychologically.



Biological changes

- Tiredness, weakness;
- Intense hunger, cravings;
- Headaches, stomach pains;
- Reduced or disrupted sleep;
- Sensitivity to the cold.



Psychological changes

- Thinking about food a lot;
- Difficulties concentrating;
- Difficulties making decisions;
- Impaired judgment;
- Rigid, obsessional thinking.



Behavioral changes

- Urges to binge-eat;
- Eating in a ritualized way;
- Desire to hoard;
- Eating very slowly or quickly;
- Less interest in other things.



Emotional changes

- Anxiety;
- Depression;
- Irritability;
- Impatience;
- Apathy.



Social changes

- Withdrawing from other people;
- Isolation;
- Relationship problems;
- Reduced sense of humor;
- Reduced sex drive.

Do you experience any of these symptoms? If you do, they may be a consequence of not eating enough. The good news is that you can start to reverse the effects of starvation by eating regularly and returning to a healthy weight (if you are underweight).

It's important to remember that prolonged food restriction isn't the only cause of starvation syndrome: people also experience symptoms of semi-starvation if they eat irregularly, limit their intake of certain foods (e.g., carbohydrates), or reduce the energy available to their body (e.g., purging after eating or heavy exercise).

Psychology Tools develops and publishes evidence-based psychotherapy resources. We support mental health professionals to deliver effective therapy, whatever their theoretical orientation or level of experience.

Our digital library encompasses information handouts, worksheets, workbooks, exercises, guides, and audio skills-development resources.

Our tools are flexible enough to be used both in-session and between-session, and during all stages of assessment, formulation, and intervention. Written by highly qualified clinicians and academics, materials are available in digital and printable formats across a wide range of languages.



Resource details

Title: Starvation Syndrome – The Effects Of Semi-Starvation
 Type: Information Handout
 Language: English (US)
 Translated title: Starvation Syndrome – The Effects Of Semi-Starvation

URL: <https://www.psychologytools.com/resource/starvation-syndrome-the-effects-of-semi-starvation>
 Resource format: Professional
 Version: 20230721
 Last updated by: JP

Terms & conditions

This resource may be used by licensed members of Psychology Tools and their clients. Resources must be used in accordance with our terms and conditions which can be found at: <https://www.psychologytools.com/terms-and-conditions/>

Disclaimer

Your use of this resource is not intended to be, and should not be relied on, as a substitute for professional medical advice, diagnosis, or treatment. If you are suffering from any mental health issues we recommend that you seek formal medical advice before using these resources. We make no warranties that this information is correct, complete, reliable or suitable for any purpose. As a professional user, you should work within the bounds of your own competencies, using your own skill and knowledge, and therefore the resources should be used to support good practice, not to replace it.

Copyright

Unless otherwise stated, this resource is Copyright © 2023 Psychology Tools Limited. All rights reserved.