Assessment of Eating Behavior

Adrian Meule
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About the Editor

Adrian Meule, PhD, is a researcher at the University Hospital of the LMU Munich and the Schoen Clinic Roseneck (Prien am Chiemsee, Germany). His major research interests include eating behavior, eating disorders, obesity, and other topics in health and clinical psychology, about which he has published more than 150 scientific articles and book chapters as well as one book. He served as editor for several scientific journals and is currently on the editorial boards of *Mental Health Science* and *Obesity Science and Practice*.

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Psychological Assessment – Science and Practice is edited with the support of the European Association of Psychological Assessment (EAPA).

Psychological Assessment – Science and Practice, Vol. 6

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Edited by
Adrian Meule

Department of Psychiatry and Psychotherapy,
University Hospital, LMU Munich, Munich, Germany;
Schoen Clinic Roseneck, Prien am Chiemsee, Germany

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Library of Congress Cataloging in Publication information for the print version of this book is available via the Library of Congress Marc Database under the LC Control Number 2023935606

Library and Archives Canada Cataloguing in Publication
Title: Assessment of eating behavior / edited by Adrian Meule (Department of Psychiatry and Psychotherapy, University Hospital, LMU Munich, Munich, Germany; Schoen Clinic Roseneck, Prien am Chiemsee, Germany).
Names: Meule, Adrian, editor.
Series: Psychological assessment--science and practice ; v. 6.
Description: Series statement: Psychological assessment--science and practice ; vol. 6 | Includes bibliographical references.
Identifiers: Canadiana (print) 20230178960 | Canadiana (ebook) 20230178987 | ISBN 9780889376168 (softcover) | ISBN 9781616766160 (PDF) | ISBN 9781613346167 (EPUB)
Subjects: LCSH: Eating disorders—Diagnosis. | LCSH: Eating disorders—Patients—Psychological testing.
Classification: LCC RC552.E18 A87 2023 | DDC 616.85/26075—dc23

http://www.hogrefe.com

PUBLISHING OFFICES

USA:	Hogrefe Publishing Corporation, 44 Merrimac St., Suite 207, Newburyport, MA 01950
	Phone (978) 255 3700; E-mail customersupport@hogrefe.com
EUROPE:	Hogrefe Publishing GmbH, Merkelstr. 3, 37085 Göttingen, Germany
	Phone +49 551 99950-0, Fax +49 551 99950-111; E-mail publishing@hogrefe.com

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CANADA:	Hogrefe Publishing, 82 Laird Drive, East York, Ontario, M4G 3V1
SWITZERLAND:	Hogrefe Publishing, Länggass-Strasse 76, 3012 Bern

Format: PDF

ISBN 978-0-88937-616-8 (print) • ISBN 978-1-61676-616-0 (PDF) • ISBN 978-1-61334-616-7 (EPUB)
https://doi.org/10.1027/00616-000

Contents

Chapter 1

Introduction

Assessment of Eating Behavior

Adrian Meule[1,2]

[1] Department of Psychiatry and Psychotherapy, University Hospital, LMU Munich, Germany
[2] Schoen Clinic Roseneck, Prien am Chiemsee, Germany

Introduction

If not prevented by food shortage, humans typically eat every day. At first glance, eating seems like a very simple behavior: if you feel hungry, you eat something until you are satiated. Yet, it is in fact a very complex behavior. Humans have to make numerous decisions each day, for example, when to eat, what to eat, and how long or how much to eat. According to a study by Wansink and Sobal (2007), people make more than 200 of such food decisions every day – most of them unconsciously. Despite this complexity, it appears that eating works quite well for most people without having to think about it much. Yet, given its complexity, eating can also go awry, potentially resulting in eating and weight disorders.

Some people do not consume enough calories or certain nutrients, leading to underweight or nutritional deficiencies. Such restrictive eating may be intentional (e.g., in persons with anorexia nervosa) but can also be unintentional (e.g., resulting from a physical illness). A much larger group of people, however, consume more energy than their body needs, resulting in them becoming overweight or obese (i.e., an excessive accumulation of body fat). As with restrictive eating, overeating can have different causes and patterns. For example, certain forms of overeating are characterized by a disinhibited eating style (e.g., binge eating episodes that are marked by a loss of control over eating). The majority of persons whose weight increases slowly over time, however, are largely unaware of living in a chronic state of positive energy balance ("passive overeating"; Davis, 2013). Figure 1.1 provides an overview of the different eating styles and eating disorders presented in Chapters 2 to 10 by arranging them according to body weight and on a continuum ranging from restrictive to disinhibited eating.

Following this introductory chapter, this book is organized in three parts. In *Part II: Eating Behavior Domains*, Chapters 2 to 11 describe the assessment of different eating styles and eating disorders. In *Part III: Adjacent Domains*, Chapters 12 to 16 describe the assessment of aspects that may determine or follow from the eating behaviors described in

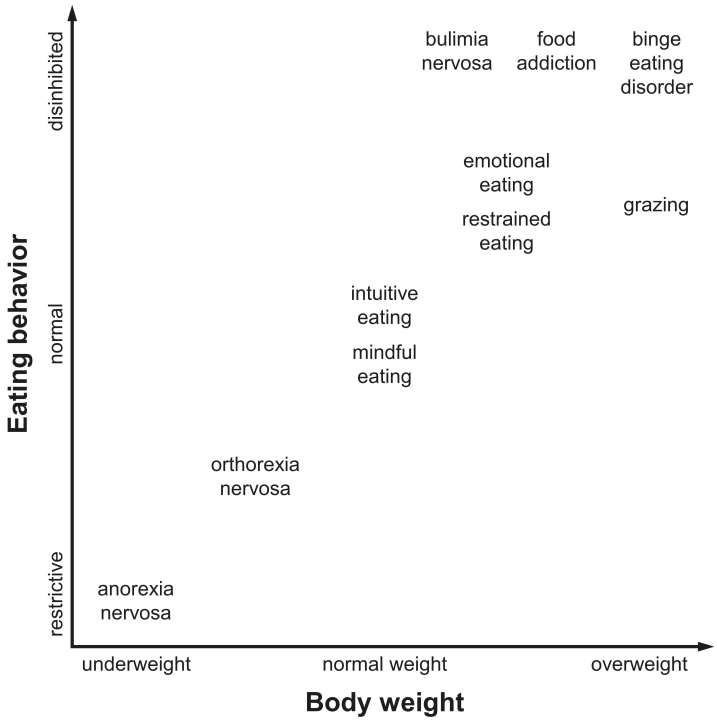

Figure 1.1. Schematic depiction of eating styles and eating disorders arranged according to eating behavior and body weight.

Part II. In *Part IV: Assessment Methods and Issues*, Chapters 17 to 20 examine methodological issues in the assessment of eating behavior and its related aspects.

Eating Behavior Domains

In Chapter 2, Polivy, Herman, and Mills describe the assessment of restrained eating and dieting. Research on restrained eating was heavily influenced – in fact, was started off – by a now classic experiment by Herman and Mack (1975). When participants had to consume a so-called preload (one or two milkshakes), unrestrained (i.e., "normal") eaters adjusted their subsequent food intake (here, ice cream) while restrained eaters (who were trying to limit their food intake) actually increased their food intake (Figure 1.2). As later research confirmed that such and other experimental manipulations can lead to a "disinhibited" food intake in restrained eaters and as restrained eating measures are usually positively correlated with body mass index (BMI), restrained eating is located somewhat in the upper right corner in Figure 1.1. However, as will be demonstrated in Chapter 2, the assessment of restrained eating and dieting is much more complex as these terms are not synonymous and it appears that there is also a subgroup of successful restrained eaters who do not show disinhibited eating or an elevated body weight (Figure 1.3).

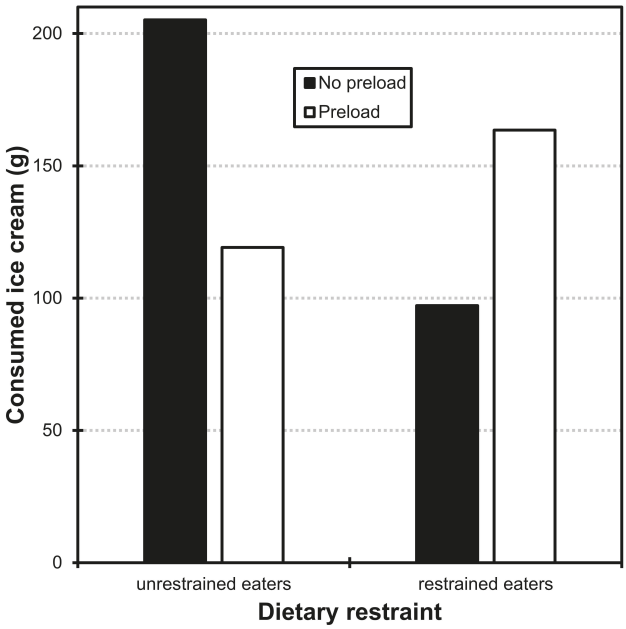

Figure 1.2. Mean consumed ice cream in grams as a function of dietary restraint and experimental condition in the classic study by Herman and Mack (1975). Note that there were actually two preload conditions (consumption of one or two milkshakes), the numbers of which are collapsed in this depiction.

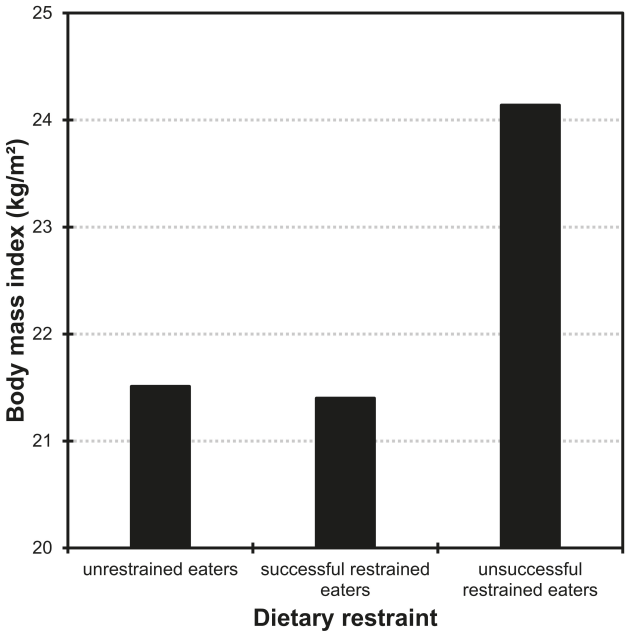

Figure 1.3. Mean body mass index in kg/m² as a function of dietary restraint. The data are based on a study reported in Meule et al. (2012), in which 499 participants were not only classified as unrestrained and restrained eaters but restrained eaters were additionally categorized as successful and unsuccessful based on their perceived self-regulatory success in weight regulation.

In Chapter 3, Evers, Michels, Verbeken, and Braet describe the assessment of emotional eating. Research on this eating style has largely focused on negative emotional states that trigger food intake and – similar to measures of restrained eating – measures of emotional eating are usually weakly, positively correlated with BMI (Frayn & Knäuper, 2018). This is why emotional eating is also located somewhat in the upper right corner in Figure 1.1, close to restrained eating. Yet again, as will be demonstrated in Chapter 3, the concept and assessment of emotional eating is much more complex than this, as it appears that certain affective states can also lead to a decrease in food intake and that self-report measures of emotional eating are not always congruent with other assessment methods.

In Chapter 4, Hoover and Gearhardt describe the assessment of food craving and food "addiction." Both concepts are strongly related, with the latter term being controversially discussed among scientists and practitioners. Food craving can refer to a transient state of a current, strong desire to consume a specific food but also to a more trait-like eating style (i.e., individuals who often experience and give into such cravings). As such, the experience of food craving is an essential component of conceptualizing certain forms of overeating as an addiction. It appears that current assessment approaches of addiction-like eating strongly overlap with established eating disorders such as bulimia nervosa and binge eating disorder (Meule & Gearhardt, 2019), which is why food addiction is located between the two in the upper right corner in Figure 1.1.

In Chapter 5, Oberle and Noebel describe the assessment of so-called orthorexia nervosa – another concept that has been controversially discussed in the literature. It was proposed by Bratman (1997) who argued that some people are so obsessed with eating healthily that this can even be considered as a new type of disordered eating. While persons who show orthorexic eating tendencies are not trying to limit the quantity of food intake (i.e., the amount of food or calories consumed), they are more concerned about the quality of foods. As such, however, they do exhibit a form of restriction and it appears that there is a large overlap with anorexic eating behavior (at least with currently used measures of orthorexia nervosa; Meule & Voderholzer, 2021). Because of this, orthorexia nervosa is located somewhat in the lower left corner in Figure 1.1.

In Chapter 6, Zimmer-Gembeck, Stansfield, Kerin, and Donovan describe the assessment of intuitive eating and mindful eating. Both concepts are strongly related and their definitions somewhat overlap: Intuitive eating can be defined as a tendency to follow physical hunger and satiety cues when determining when, what, and how much to eat (Tylka & Kroon Van Diest, 2013) and mindful eating can be defined as a nonjudgmental awareness of physical and emotional sensations associated with eating (Framson et al., 2009). As both intuitive and mindful eating represent functional, adaptive, and healthy eating styles that promote having a normal weight in the absence of intentional food restriction or loss-of-control eating, they are located in the center of Figure 1.1.

In Chapter 7, Conceição, de Lourdes, and Neufeld describe the assessment of grazing. Grazing is characterized by repetitive eating of small amounts of food in an unplanned manner. Although measures of grazing usually correlate only weakly with BMI, grazing appears to be a highly prevalent eating style in persons with obesity (Heriseanu et al., 2017), which is why it is located on the right-hand side in Figure 1.1. While it is a form of overeating, it is not necessarily characterized by a distinct loss of control over eating like during binge eating episodes, which is why it is located between normal and disinhibited eating in Figure 1.1.

In Chapter 8, Davis, Kells, and Wildes describe the assessment of anorexia nervosa. Although one of the first descriptions in the psychiatric literature is often attributed to Gull in 1873 (reprinted in Gull, 1997), there are also earlier reports about its symptomatology (cf. Bemporad, 1996). Anorexia nervosa is an eating disorder that is characterized by restriction of energy intake relative to requirements, leading to a significantly low body weight. Therefore, it is located in the lower left corner in Figure 1.1. However, two subtypes are commonly differentiated. The restricting type describes presentations in which weight loss is accomplished primarily through dieting, fasting, and/or excessive exercise. The binge/purge type describes presentations in which individuals engage in recurrent episodes of binge eating and purging behavior (e.g., self-induced vomiting). Thus, a subgroup of persons with anorexia nervosa do indeed show recurring disinhibited eating. Yet, it appears that at the same time they have similar levels of dietary restraint to those with restricting type anorexia nervosa (Uniacke et al., 2020), which is why this subtype is not separately depicted in Figure 1.1.

In Chapter 9, Abber, Ali, and Keel describe the assessment of bulimia nervosa. The term bulimia nervosa was coined by Russell (1979) but there are also earlier reports about its symptomatology (cf. Vandereycken, 1994). Bulimia nervosa is an eating disorder that is characterized by recurrent episodes of binge eating and inappropriate compensatory behaviors in order to prevent weight gain (e.g., self-induced vomiting). In contrast to persons with binge/purge type anorexia nervosa, however, persons with bulimia nervosa typically have normal weight or are slightly overweight. Therefore, bulimia nervosa is located at the top in Figure 1.1 and somewhat at the border from normal weight to overweight.

In Chapter 10, Egbert and Goldschmidt describe the assessment of binge eating disorder. Binge eating was first described as an eating pattern among obese persons by Stunkard (1959) although it appears that earlier case reports even date back to the 1930s (Stunkard, 1990; Wulff, 1932). Binge eating disorder is an eating disorder that is characterized by recurrent episodes of binge eating. Unlike persons with bulimia nervosa, however, persons with binge eating disorder do not engage in inappropriate compensatory behaviors to prevent weight gain. Accordingly, the majority of persons with binge eating disorder are overweight or obese. Therefore, binge eating disorder is located in the upper right corner in Figure 1.1.

In Chapter 11, Allison describes the assessment of other eating disorders, namely night eating syndrome, avoidant/restrictive food intake disorder (ARFID), rumination disorder, and pica. Night eating syndrome is characterized by recurrent episodes of night eating, as manifested by eating after awakening from sleep or by excessive food consumption after the evening meal. Similar to binge eating disorder, night eating syndrome was first described by Stunkard as early as the 1950s (Stunkard et al., 1955) but has not been included in diagnostic classification systems until 2013 (American Psychiatric Association, 2013). ARFID can be defined as an eating or feeding disturbance that is manifested by persistent failure to meet appropriate nutritional or energy needs. Rumination disorder is marked by repeated regurgitation of food that may be rechewed, reswallowed, or spit out. Pica is characterized by persistent eating of nonnutritive, nonfood substances. Locating these eating disorders on a spectrum from underweight to overweight and from restrictive to disinhibited eating is not straightforward. For example, although night eating syndrome has originally been conceptualized as an eating behavior among persons with obesity, its relationship with body weight is ambiguous (Meule et al., 2014). While ARFID is often associated with a low body weight, this is not the result of an intentional

food restriction driven by weight and shape concerns (i.e., unlike in persons with anorexia nervosa). Similarly, regurgitation of food in rumination disorder is not driven by an intention to lose weight or prevent weight gain (i.e., unlike self-induced vomiting in persons with bulimia nervosa). Finally, the essential feature of pica refers to the nature of consumed substances. Therefore, these eating disorders are not represented in Figure 1.1.

Adjacent Domains

In Chapter 12, Arkenau -Kathmann, Quittkat, and Vocks describe the assessment of body image. Body image refers to a person's perception of their body and shape as well as attitudes and feelings toward their body. There is also a behavioral component, that is, body-related behaviors (e.g., body checking) that result from – and in turn can influence (Shafran et al., 2007) – a person's body image. Marked weight and shape concerns and a disturbed body image are key features of eating disorders such as anorexia nervosa and bulimia nervosa and drive intentions to restrict eating. However, the relationship between body image and eating behavior is bidirectional. For example, weight and shape concerns can also be the result of weight gain after a longer period of excess energy intake.

In Chapter 13, Lampe and Gorrell describe the assessment of physical activity. Although not included as a diagnostic criterion, excessive or compulsive exercise can often be observed in persons with eating disorders such as anorexia nervosa and bulimia nervosa. The relationship between physical activity and eating behavior, however, is not restricted to persons with eating disorders and, similar to body image, is bidirectional. For example, eating behavior (e.g., carbohydrate intake) influences exercise performance. Vice versa, physical activity also influences eating behavior as it seems that acute exercise is associated with a short-term suppression of hunger and energy intake and exercising regularly appears to be associated with better appetite control (Drenowatz et al., 2019).

In Chapter 14, Casanova, O'Driscoll, Finlayson, Stubbs, and Hopkins describe the assessment of body composition and energy expenditure. By taking a person's height into account, BMI is a fairly good estimator of a person's percent body fat, at least in certain groups of individuals (e.g., young adult women; Meule & Platte, 2018). However, it is less precise in others, particularly athletes with a large amount of muscle mass, children and adolescents, pregnant or breastfeeding women, and elderly persons. As will be described in this chapter, there are several methods to measure body composition more precisely, for example, by differentiating fat and fat-free mass. Besides physical activity, body composition (particularly fat-free mass) is a major determinant of energy expenditure, yet it also relates to appetite and energy intake. Thus, similar to the previous chapters on adjacent domains, there is a bidirectional relationship: eating behavior influences body composition and energy expenditure and vice versa.

In Chapter 15, Hartmann and van der Horst describe the assessment of food neophobia and disgust sensitivity. Food neophobia refers to the fear or reluctance to eat unfamiliar or novel foods. In children, it has been suggested that food neophobia can be considered as lying on the continuum ranging from food neophobia to picky/fussy eating to ARFID (Dovey, 2018). Disgust sensitivity refers to the predisposition for experiencing disgust. At first glance, both concepts seem quite similar: In relation to food, both neophobia and the experience of disgust result in the avoidance of consuming a particular food. How-

ever, it seems that they can indeed influence food selection and consumption independently. In one study, for example, food neophobia and disgust sensitivity were uncorrelated with each other and both concepts independently predicted lower intentions to eat insect-based foods (La Barbera et al., 2018).

In Chapter 16, Lindloff and Meadows describe the assessment of weight-related stigmatization. Weight stigmatization refers to negative attitudes, beliefs, and behaviors towards persons who are overweight because of their weight or size. Similar terms include weight discrimination, weight bias, antifat bias, or antifat attitudes. Besides the assessment of stigmatizing attitudes in nonoverweight persons towards persons who are overweight, an important line of research in this field is the self-stigmatization or internalization of weight bias in these persons with overweight. Experiences of weight stigma and higher levels of weight bias internalization have been linked to a range of adverse outcomes, including physical, psychological, and social detriments (Pearl, 2018).

Assessment Methods and Issues

In Chapter 17, Higgs describes how food intake can be measured in the laboratory. The majority of measures described in Parts II and III of this book are self-report questionnaires. While such measures are widely used, they are susceptible to be biased (e.g., due to social desirability or recall bias). Measuring food intake in the laboratory may, therefore, be a more "objective" approach in eating behavior research. For example, it allows for examining not only amount, calories, or macronutrients of consumed food but also food choice (if several foods are offered) and eating microstructure (e.g., eating rate, duration). Measuring food intake in the laboratory is often disguised as a taste test in an attempt to avoid that participants feel that their eating is being observed. While there is support that such bogus taste tests can validly be used as a measure of food intake, there are numerous aspects that need to be considered when planning and conducting such studies (Best et al., 2018; Buckland & Dalton, 2018; Hetherington & Rolls, 2018; Meule, 2018; Robinson et al., 2018; Stubbs & Finlayson, 2018).

In Chapter 18, Zhang, Mason, and Smith describe ecological momentary assessment of eating behavior. Similar to measuring food intake in the laboratory, ecological momentary assessment can avoid biases inherent in self-report questionnaires. Here, participants answer questions about their food intake and other information (e.g., hunger, mood) usually several times a day. Thus, ecological momentary assessment allows the capturing of this information almost in real time, thus avoiding recall biases. In contrast to measuring food intake in the laboratory, it also allows for capturing dynamic changes in eating and associated aspects and – as eating is assessed in daily life – avoids the artificial situation inherent in laboratory studies. Yet, although it solves many issues compared with other assessment methods, there are also caveats as ecological momentary assessment may itself change eating behavior. For example, it has been found that keeping a daily snack diary suffices to decrease unhealthy snacking (Verhoeven et al., 2014).

In Chapter 19, Masterton and Jones describe behavioral tasks for measuring and changing reactions to food. Reactions to food that are often automatic, implicit, and unconscious are a strong force that drives eating behavior. In this chapter, the authors focus on three main domains that have been of increased interest in recent years: inhibitory control, approach–avoidance tendencies, and attentional biases. Moreover, research indi-

cates that these reactions to food (or other) stimuli cannot only be measured but can also be modified by adapting reaction time tasks as trainings, which is done by simply altering stimulus–response contingencies (Kemps & Tiggemann, 2021; Tiggemann & Kemps, 2020). As of yet, however, studies have produced inconsistent findings whether this cognitive bias modification also results in changes of real-world consumption behaviors.

In Chapter 20, Lutz, van Dyck, and Vögele describe psychophysiological measures in eating behavior research. Physiology is, obviously, highly relevant to eating behavior. The digestion of food represents an interplay of complex physiological processes. Yet, physiological reactions occur even before food has been ingested. For example, salivary flow increases merely in response to seeing or smelling food, with more salivation being related to a stronger craving for the food (Meule & Hormes, 2015). In addition, there are numerous psychophysiological methods that have been used in eating behavior research that measure physiological responses that are not part of the digestive system. Among others, these include measuring brain activity, facial muscular activity, eye movements, or cardiovascular activity.

Conclusions

This volume treats the assessment of many different eating styles and eating disorders, describes the assessment of domains that are adjacent to eating behavior, and discusses methodological topics. As eating behavior is so multifaceted, however, it cannot fully cover all aspects that might be relevant to eating behavior research. For example, as the focus of this book is more on psychological aspects of eating behavior, it does not include a detailed description of dietary intake assessment – that is, how to assess consumed macro- and micronutrients in daily life – as would be required during nutrition counseling. Other omissions include the assessment of certain forms of nutrition (e.g., vegetarianism, pescetarianism, veganism) and their motivational and attitudinal aspects (e.g., attitudes towards meat consumption and animal welfare). These are just a few examples but there are probably many more aspects that could be mentioned here. Yet, with the topics covered in this book, readers – both researchers and practitioners – will be well-equipped for the assessment of eating behavior and its related aspects.

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Chapter 3

Assessment of Emotional Eating

Catharine Evers,[1] Nathalie Michels,[2] Sandra Verbeken,[2] and Caroline Braet[2]

[1] Department of Social, Health, and Organizational Psychology, Utrecht University, The Netherlands
[2] Department of Developmental, Personality and Social Psychology, Ghent University, Belgium

Introduction

Emotional eating is a popular concept reflecting problems with regulating one's eating behavior. However, the concept is difficult to capture. Most often, it refers to subjectively experienced reports (Strien, 2018; Strien et al., 1986). However, according to recent insights this does not always reflect objective observations (Bongers & Jansen, 2016), while others argue that it is a multicomponent construct (Macht, 2008). Therefore, all attempts to measure emotional eating in all its facets should be applauded. The current chapter will explore and evaluate different operationalizations and measures that can contribute to making a deliberate choice how to measure emotional eating.

The phenomenon of emotional eating is often defined as "eating in response to stress or negative/positive affective states" (Bongers & Jansen, 2016). It is seen as problematic behavior because it hinders weight control and it often initiates feelings of shame and guilt. Emotional eating can also be characterized by different facets of food consumption. Examples are: type of food, often so-called comfort food representing high-fat and energy-dense food (Macht, 2008); the amount of food that is problematic; the feeling that leads to craving or overeating (Tomiyama, 2019); or the timing of food consumption, as it mostly occurs in the absence of hunger. In contrast with the many different assumed characteristics related to emotional eating, in the literature more consensus has been reached on explaining why emotional eating occurs. According to the well-researched affect regulation model, people suffering from stress and related negative affective states regulate their affect by eating (Grilo & Shiffman, 1994; Burton et al., 2007). So, emotional eating is seen as a coping mechanism, regulating emotions and/or arousal (Aparicio et al., 2016; Evers et al., 2010; Vandewalle et al., 2017). Of note, the differentiation with emotion regulation is not straightforward and triggers questions like: Do we have to see emotional eating as an emotion regulation strategy or is emotional eating a

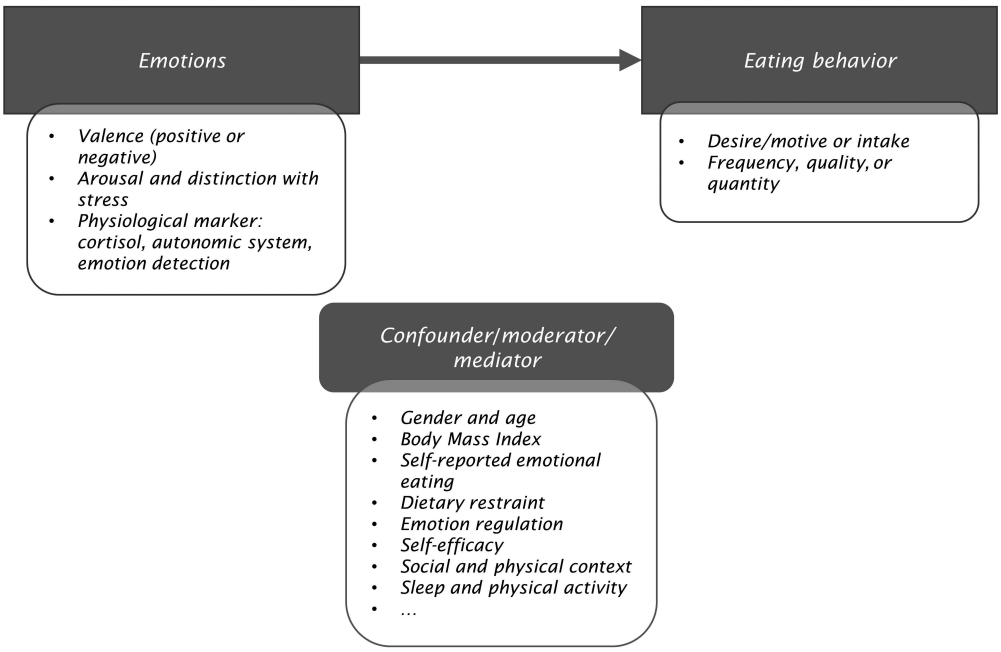

Figure 3.1. Key concepts in assessing the impact of emotions on eating behavior

ments (EMA) and discuss their abilities to assess the many different facets of emotional eating. A summary of the key concepts in emotional eating assessment is shown in Figure 3.1.

Emotional Eating Questionnaires

Several questionnaires have been developed to measure emotional eating. Table 3.1 provides an overview of all currently available emotional eating questionnaires and relevant characteristics, such as number of items, example items, subscales, and internal reliability. They diverge in how emotions and eating behaviors are assessed. Older scales mostly center on negative emotions only, while more recent scales have added positive emotions. Also the type of eating behavior varies, from the extent to which individuals eat when being emotional to the amount of (over)eating and the tendency, desire, or urge to eat when being emotional.

Table 3.1 reveals that the internal reliability of all (sub)scales is satisfactory to good. References to validity information can be found in this table as well. Overall, validity has been tested for most of the emotional eating questionnaires, and the results typically provide (preliminary) support for validity. Noteworthy is that validity has often been claimed based on the finding that the questionnaires successfully predict eating-related indicators, like body mass index (BMI), weight gain, or unsuccessful dieting. A point of concern, however, is that high scores on these questionnaires are not validated in terms of actual eating behavior in response to emotions. The studies that did so typically illustrate that these scales lack predictive validity. For example, a review on emotional eating scales amongst experimental and naturalistic studies (Bongers & Jansen, 2016) re-

Chapter 7

Assessment of Grazing

Eva M. Conceição,[1] Marta de Lourdes,[1] and Carmen Beatriz Neufeld[2]

[1] School of Psychology, University of Minho, Portugal
[2] Department of Psychology, Faculty of Philosophy, Sciences and Languages, Ribeirão Preto of University of São Paulo, Brazil

Introduction

Grazing: Definition and Nomenclature

Over the past two decades, different authors have described and investigated an eating pattern generally characterized by eating repetitively. Being an understudied clinical entity, a variety of nomenclatures, defining criteria, and assessment tools have been published in the literature (Conceição et al., 2014; Heriseanu et al., 2017). Terms such as grazing, picking or nibbling, or snacking have been used with little consensus or research supporting them (Teodoro et al., 2021).

Given the rising clinical interest in this eating behavior, Conceição et al. (2014) surveyed different experts in the field to propose a nomenclature/definition for this behavior. They proposed that grazing is defined as *repetitively* eating small/modest amounts of food in an *unplanned* manner throughout a rather extended period of time (e.g., morning, late afternoon, day). Grazing does not occur in response to hunger or satiety. Two subtypes were proposed: compulsive grazing – when it is associated with the feeling that one cannot resist going back to eat even if trying not to eat – and noncompulsive grazing – characterized by mindless eating without paying attention to what and how much one is eating (Conceição et al., 2014). An example of compulsive grazing would be eating a piece of cake and not resisting going back several times for yet another piece (usually ending up eating more than wanted). An example of noncompulsive grazing would be repetitively eating whatever food is available without paying attention to how much one is eating or what one is doing.

The key aspects of grazing are being unplanned and happening repetitively. Accordingly, grazing should be distinguished from other eating patterns, for instance, when following a diet with plans to eat small meals several times during the day. Grazing is also different from binge eating episodes, which are described as eating in a setting or relatively circumscribed period of time (e.g., 2 hours) and what the individual feels to be a large amount of food. In some cases, extremely large amounts of food are ingested during a