Self-Help Interventions for the Treatment of Binge Eating

Anja Hilbert and Hans-Christian Puls

Abstract

Self-help interventions (SHIs) represent established psychological treatments for binge-eating disorder (BED) and bulimia nervosa (BN) with demonstrated short- and long-term efficacy. Implemented via self-help books, the internet, or smartphone applications, SHIs are highly accessible and may thus be suited to overcome patient- and provider-related barriers in traditional face-to-face psychological treatments. SHIs can be offered with or without professional guidance, with some evidence on more favorable outcomes with higher degrees of guidance. Key limitations of SHIs include low acceptability and participation, depicted through insufficient treatment engagement and completion as well as patient adherence, and should, therefore, be further investigated and enhanced. Predictors of outcome, including treatment-specific moderators and mediators, are largely unclear. The individual tailoring of interventions and their components to individual patients is part of the high potential of technology-based SHIs, although these remain underutilized and understudied. Cost-effectiveness compared to minimal treatment was suggested for SHIs and might be increased using complex models of care including SHIs. In sum, more research is needed to understand and further establish SHIs as psychological approaches to the treatment of BED and BN.

Keywords

Self-help · Treatment · Binge-eating disorder · Bulimia nervosa · Eating disorders · Guidance · Acceptability · Predictors of outcome · Cost-effectiveness

Learning Objectives
In this chapter, you will:

- Get familiarized with the need for alternative treatment options for a substantial number of patients with eating disorders who experience barriers to "traditional" face-to-face treatments.
- Get to know the different formats of self-help interventions (SHIs) and their respective efficacy and effectiveness for binge-eating disorder and bulimia nervosa.
- Understand the role of guidance and major limitations of SHIs, including low acceptability and participation.

(continued)

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- Learn about predictors of outcome, including treatment-specific moderators and mediators, cost-effectiveness, and the role of SHIs within complex models of care.
- Understand important questions for future research and clinical implications based on the available evidence on SHIs.

1 Introduction

Although a vast body of research has documented face-to-face cognitive-behavioral therapy (CBT) to be the most well-established treatment option for patients with binge-eating disorder (BED; Hilbert et al. 2019) and bulimia nervosa (BN; Svaldi et al. 2019), only a minority of patients receive an evidence-based psychological treatment such as CBT (Kazdin et al. 2017). Multiple reasons on both a patient and provider level may account for this "treatment gap." Patient-related reasons for not seeking or not completing face-to-face therapies include practical barriers (e.g., costs of treatment, reduced mobility, low availability of face-to-face treatments in rural areas; Ali et al. 2017; Vall and Wade 2015), the fear of stigma or shame (Corrigan et al. 2014), or patients with milder problems feeling that face-to-face therapies might be overly intense (Traviss-Turner et al. 2017). Provider-related barriers include a shortage of professionals with expertise in evidence-based treatments for eating disorders (EDs; Agras et al. 2017; Cooper and Bailey-Straebler 2015). To overcome this shortage, specialized and intensive training for mental health professionals in the field of eating disorders (EDs) is required, but not yet readily available (Wilson and Zandberg 2012). Indeed, Kazdin and Blase (2011) concluded from their analysis on the treatment gap in mental health care, that even a doubling of today's numbers of mental health providers would bring little benefit to patients with EDs.

To bypass both patient- and provider-related barriers to treatment for BED and BN, various forms of CBT-based self-help interventions (SHIs) have been designed, conducted, and reviewed. What they all have in common is the independent implementation of CBT-based treatment principles with the patient following step-by-step instructions contained in a book or via technology-assisted systems. Within SHIs, patients are provided with information on their ED and specific therapeutic skills, which they are encouraged to use in order to achieve their individual treatment goals (e.g., establish a healthy and regular eating pattern, identify triggers and overcome maintaining factors of binge eating). While some SHIs are accompanied by varying degrees of contact to a professional ("guided self-help"), others are purely self-directed ("pure self-help") and therefore do not necessarily involve a professional provider or even an institution in which it takes place. As a general advantage of SHIs, patients can work through the manual at their own time and pace, easily embedded in their everyday lives. Overall, SHIs have the clear potential to be widely accessible and, at the same time, highly cost-effective for patients with BED and BN. A further reason for integrating existing CBT manuals into SHIs was seen in the existence of a subgroup of patients, who report rather moderate, but still clinically relevant eating problems and might, therefore, benefit from a less intensive treatment approach than face-to-face CBT (Fairburn 2013; Traviss-Turner et al. 2017). Because SHIs have been shown to be inherently empowering by nature (Sánchez-Ortiz et al. 2011), they might represent starting points into more intensive treatment (e.g., face-to-face CBT), especially for patients with more severe symptoms. On the contrary, however, patients who do not feel their symptoms to be sufficiently addressed and treated by SHIs might be discouraged from seeking professional face-to-face treatment even when it is available and indicated (Beintner et al. 2014).

The purpose of this chapter is to define and to describe the main formats of CBT-based SHIs and to summarize current evidence on their efficacy and effectiveness, in order to contextualize them within the range of available treatment options for patients with BED and BN. We aim to describe the role of guidance, acceptability, predictors of

outcome, including moderators and mediators, and cost-effectiveness within SHIs. Further, the role of SHIs in complex models of care will be discussed. Finally, we will address directions for future research as well as clinical implications.

2 Formats

In light of the aforementioned shortcomings of traditional face-to-face treatments for patients with BED and BN, book-based formats of established CBT manuals represented the first and forerunning format of SHIs. Researchers and clinicians with expertise in the treatment of EDs integrated the main contents of CBT into structured text-based manuals, which today, after constant review and revision, are among the most well-established and thoroughly described SHIs for the treatment of BED and BN. The two most widely used self-help manuals "Overcoming Binge Eating" by Fairburn (1995, 2013) and "Getting Better Bite by Bite" by Schmidt and Treasure (1993; Schmidt et al. 2015) stand alongside a small number of other book-based manuals (e.g., "Working to Overcome Eating Difficulties" by Traviss et al. 2011, "Bulimia Nervosa and Binge-Eating: A Guide to Recovery" by Cooper 1996). To present an example of CBT-based SHIs, "Overcoming Binge Eating" in its second edition contains a set of theoretical chapters with information on the prevalence, epidemiology, maintenance, and treatment of binge-eating behaviors as well as the actual self-help manual including the key aspects of the treatment of binge eating (e.g., treatment motivation, healthy and regular eating patterns, triggers of binge eating, problem solving, and body image). Using psychoeducation, self-monitoring, and cognitive-behavioral exercises, the reader is provided with comprehensible and applicable therapeutic content for his/her eating problem.

With the rapidly rising importance of the Internet in daily life, its relevance in mental health care is also increasing (e.g., Hilbert et al. 2018). This "E-mental health" refers to the use of information and communication technology to support and improve mental health conditions and the care of which (Riper et al. 2012), and includes the internet-based delivery of SHIs in the treatment of patients with BED and BN. Internet-based SHIs might even better overcome the obstacles in reaching patients with BED and BN compared to book-based formats. The relative anonymity of the internet and its widespread and unlimited access may result in a low threshold for patients to consider and start an internet-based SHI. These benefits apply especially to patients with BED and BN who would not otherwise seek face-to-face treatment, for example, those with experiences of being stigmatized, those living in remote or psychotherapeutically underserved areas, and young individuals in the early stages of the ED development (Corrigan et al. 2014; Fairburn and Murphy 2015; Fairburn and Patel 2014). Further, similar to other technology-enhanced psychological interventions, internet-based SHIs carry the potential to be individually customized and tailored according to the patients' needs and actions (Bauer and Moessner 2013; Loucas et al. 2014), and might be designed to exchange real-time information (e.g., using compatible smartphone applications), with expected favorable effects on participation, adherence, and outcome (Beintner et al. 2014; Hildebrandt et al. 2017; Fairburn and Patel 2014). Examples for internet-based SHIs for BED and BN include the CBT-based guided self-help program "SalutBED/SalutBN" (Carrard et al. 2011b; de Zwaan et al. 2017) and the interactive and multimedia-based guided self-help program "Overcoming Bulimia Online" (Sánchez-Ortiz et al. 2011).

Within the last few years, researchers in the ED field have become increasingly intrigued by mobile and wireless technologies, including smartphone "apps," for the treatment of EDs (Anastasiadou et al. 2018; Juarascio et al. 2015b). By design, smartphone apps benefit from the rapidly progressing usage of and access to mobile phones (Kelly and Minges 2012), while they share the advantages of book- and internet-based formats of SHIs in enhancing reach and dissemination relative to face-to-face therapy (e.g., accessibility, anonymity). Further

advantages of app-based SHIs for the treatment of EDs include their potential to customize psychological interventions to the individual patient (Agras et al. 2017), thus empowering the patient to address his/her individual problem behavior (Anastasiadou et al. 2018). App-based SHIs have been used as a sole means of support (e.g., for BED: Juarascio et al. 2015a), for relapse prevention, and as an adjunct to standard face-to-face treatment (Anastasiadou et al. 2018). Within the latter, communication between patients and clinicians, the assessment of therapeutic progress, and subsequent clinical decision-making may be improved (Juarascio et al. 2015b). App-based SHIs, in general, might be further enhanced by modern machine learning algorithms including Just-in-Time Adaptive Interventions (i.e., real-time interventions during app-identified moments of need; Juarascio et al. 2018). However, challenges and risks of app-based SHIs must be considered. An important weakness of mobile psychological interventions is that only a few of the vast number of existing apps are grounded in evidence-based treatment principles, and studies exploring their efficacy, validity, and clinical utility are scarce (Anastasiadou et al. 2018). Further, if patients use app-based SHIs in addition to face-to-face treatment, conflict between therapeutic recommendations from both treatments might emerge, possibly resulting in confusion and nonadherence by the patient (Juarascio et al. 2015b).

3 Efficacy

Beginning with the publication of "Overcoming Binge-Eating" as the first book-based SHI (Fairburn 1995), a mounting body of research has since documented the efficacy of SHIs in the treatment of EDs (e.g., Barakat et al. 2017; de Zwaan et al. 2017; Grilo et al. 2013; Kelly and Carter 2015; Wagner et al. 2015; Wilson et al. 2010) and was summarized in systematic reviews and meta-analyses (e.g., Beintner et al. 2014; Hilbert et al. 2019; Linardon and Wade 2018; Svaldi et al. 2019; Traviss-Turner et al. 2017). While SHIs are contraindicated for patients with anorexia nervosa with their greater medical needs compared to patients with other EDs (Wilson and Zandberg 2012; Yim and Schmidt 2019), studies focused on the efficacy of SHIs in the treatment of BED and BN. In the following, we will provide a chronological overview on the efficacy of SHIs, moving from review papers to meta-analyses, first for BED and second for BN.

3.1 Binge-Eating Disorder

The National Institute for Health and Care Excellence (NICE) guideline recommendations (2004), in which SHIs were listed as recommended treatment options for BED, represented a starting point for the pertinent review paper on CBT-based SHIs for the treatment of EDs by Wilson and Zandberg (2012). A previous review by Sysko and Walsh (2008) including 26 controlled and uncontrolled studies on SHIs for BED and BN (6 of which related to BED alone) had concluded that CBT-based SHIs are significantly superior to wait-list control condition in reducing binge-eating frequency and producing abstinence from binge eating, especially in patients with BED. However, Sysko and Walsh (2008) noted little evidence for the efficacy of SHIs in comparison to active control conditions (i.e., other treatments). Thus, Wilson and Zandberg (2012) reviewed active treatment comparisons in a total of 10 controlled studies that compared book- and internet-based guided SHIs to other treatments for BED, such as interpersonal psychotherapy, pure SHIs, guided SHIs in combination with anti-obesity medication, or behavioral weight-loss treatment. Despite the limited evidence, the authors concluded that SHIs have specific effects in treating BED, consistently reducing binge-eating episodes, ED psychopathology, and mental comorbidity at post treatment and follow-up assessments (Wilson and Zandberg 2012). However, the examined SHIs did not yield significant weight loss in patients with BED and overweight or obesity, which is consistent with results of face-to-face CBT (e.g., Grilo et al. 2011). Body weight usually is considered a secondary outcome criterion in psychological

intervention research in BED, while binge-eating frequency or abstinence commonly represents the primary outcome criterion (Hilbert et al. 2019).

In their comprehensive systematic review and meta-regression analysis on the participation and outcome in SHIs for BED and BN, Beintner et al. (2014) examined 50 SHI trials published through 2012 ($N = 2586$), 33 of which were randomized controlled trials (RCTs). Of the 62 analyzed SHI conditions, 29 conditions included patients with BED, and 43 conditions were supported by guidance. Book-, CD-ROM-, and internet-based SHIs were all administered. Overall, considerable effects of SHIs on the reduction of binge-eating frequency and ED psychopathology were found, whereas rates of abstinence from binge eating ranged widely at post treatment. Specifically, studies focusing on patients with BED compared to BN or mixed samples were likely to produce greater effects in all outcome measures (including higher participation and lower dropout rates), leading to the conclusion that SHIs may be especially well-suited for the treatment of BED. These results were expanded in the systematic review and meta-analysis by Traviss-Turner et al. (2017), who aggregated 30 RCTs on book- and internet-based guided SHIs for the treatment of EDs ($N = 2601$), 17 of which related to BED. In comparison to active and inactive control conditions (e.g., wait-list), guided SHIs showed significant effects of small-to-medium size in achieving abstinence from binge eating (effect size: 0.20) and reducing ED psychopathology (effect size: 0.46), respectively. As in Beintner et al. (2014), a meta-regression analysis suggested patients with BED to be more likely to achieve abstinence from binge eating in guided SHIs than those with BN.

More recently, Ghaderi et al. (2018) conducted a meta-analysis on 45 RCTs for the treatment of BED, 8 of which related to guided SHIs ($N = 282–384$, depending on the outcome variable). In comparison to wait-list, SHIs produced significantly higher abstinence from binge eating (small effect) and reduced binge-eating episodes, ED psychopathology, and depressive symptoms (medium effects), while there was no significant effect on body weight. Further, a meta-analysis on various psychological and medical treatments for BED included 81 RCTs with 138 active intervention conditions, 14 conditions of which addressed guided or pure SHIs ($N = 498$; Hilbert et al. 2019). Compared to inactive control conditions, SHIs promoted abstinence from binge eating with a large effect (pooled abstinence rate: 46%) and reduced binge-eating frequency and ED psychopathology at post treatment with medium effects, while no significant effects on depressive symptoms or body weight were found, with the latter results being consistent with previous meta-analytic evidence (e.g., Ghaderi et al. 2018; Vocks et al. 2010). Interestingly, compared to active control conditions, SHIs involved significantly lower odds for abstinence from binge eating at 3- to 6-month follow-up and higher odds for dropout than face-to-face CBT, but no other short- and long-term differences were found for ED or general psychopathology. Further, a meta-regression analysis on a small number of studies did not suggest any differences between guided and pure SHIs in bringing about abstinence and reducing the number of binge-eating episodes.

In summary, SHIs, especially if based on CBT, have consistently documented efficacy for improving binge eating and ED psychopathology in patients with BED. In light of some evidence suggesting inferiority in relation to face-to-face CBT, SHIs may be considered as a treatment option when face-to-face CBT is not available or not acceptable (Hilbert et al. 2019). The importance of SHIs in the treatment of BED is also reflected in the updated NICE guidelines (NICE 2017), even recommending CBT-based guided SHIs as a first-line treatment for BED, given their established efficacy and low costs.

3.2 Bulimia Nervosa

The efficacy of SHIs for the treatment of BN is well-established when compared to inactive control conditions (Linardon and Wade 2018; Svaldi et al. 2019). As in BED, evidence on efficacy and consideration of costs led the NICE guidelines

(2017) to recommend CBT-based guided SHIs as the first-line treatment for BN (NICE 2017). The meta-regression analysis by Beintner et al. (2014) found CBT-based SHIs to be associated with smaller but significant improvements in BN compared to BED regarding abstinence from binge eating, frequency of binge-eating episodes, and ED psychopathology. Likewise, treatment completion and participation in SHIs were lower in BN compared to BED. The authors concluded that patients with BED are more likely to complete and thus benefit from SHIs than patients with BN, who might feel that their therapeutic goals (i.e., normalization of eating behavior through a reduction of restrictive eating) are harder to accomplish and might thus not be sufficiently addressed by SHIs. The meta-analysis by Traviss-Turner et al. (2017) supported this conclusion, as described above.

Further meta-analytic evidence on the efficacy of SHIs in the treatment of BN was presented by Linardon et al. (2017b), who included 37 RCTs on CBT for BN, four of which consisted of CBT-based SHIs alone, and found SHIs to be significantly more efficacious in producing abstinence from binge eating and compensatory behaviors, and reducing ED psychopathology, than inactive control conditions (medium effects). In a subsequent meta-analysis, Linardon and Wade (2018) examined 54 RCTs with 78 active intervention conditions for the treatment of BN, nine of which were focused on CBT-based guided SHIs. The authors found post treatment abstinence from binge eating and compensatory behaviors to be lower in guided SHIs than in treatments with greater involvement of a clinician (e.g., individual or group-based face-to-face CBT), while this effect was not observed at follow-up. Thus, guided SHIs were discussed to take longer to achieve therapeutic effects than, for example, face-to-face CBT. In contrast, the authors found no association between the number of treatment sessions and abstinence rates; thus, they assumed no effect of the amount of therapist contact. These results suggest that patients with BN benefit more, and more quickly, from intensive treatments in which the course and content of therapy are directed by a therapist, rather than by the patients themselves.

Most recently, Svaldi et al. (2019) conducted a comprehensive meta-analysis on the efficacy of a range of psychological and medical treatments for BN, including 79 RCTs with 127 active intervention conditions, with 10 conditions specifically focused on guided and pure SHIs ($N = 562$), mostly CBT-based. Compared to inactive control conditions, SHIs produced abstinence from binge eating with a medium-to-large effect size (OR = 5.60) and abstinence from compensatory behaviors with a medium effect (OR = 4.23). Further, SHIs were efficacious in reducing binge-eating frequency (medium-to-large effect), compensatory behaviors (medium-to-large effect), ED psychopathology (large effect), and depressive symptoms (small effect). Compared to active control conditions (e.g., CBT or combined treatment), SHIs showed medium-to-large effects regarding all aforementioned outcome measures. Of note, SHIs were associated with the greatest dropout rates (33%) from all treatments examined. Evidence from one included study supported the maintenance of effects at 3- and 6-month follow-up (Banasiak et al. 2005). The authors concluded that guided CBT-based SHIs are an alternative treatment option when face-to-face CBT, the method of choice, is not available. Notwithstanding, as with BED, more high-quality clinical studies comparing SHIs to other evidence-based interventions in a long-term perspective are still warranted (e.g., Linardon and Wade 2018; Svaldi et al. 2019).

4 Effectiveness

Moving from efficacy to effectiveness research, a number of studies focused on the transportability of efficacious CBT-based SHIs "from the lab to real world settings" (i.e., aiming to maximize their external validity by including any design, RCTs, nonrandomized controlled, and uncontrolled trials, Hans and Hiller 2013; e.g., DeBar et al. 2011; Grilo et al. 2013; Hildebrandt et al. 2017; Högdahl et al. 2013; Kazdin et al. 2017; Lynch et al. 2010; Striegel-Moore et al.

2010). Wilson and Zandberg (2012) evaluated their reviewed evidence with regard to effectiveness and concluded that the evidence base remains methodologically limited, but also that CBT-based SHIs were effective for the treatment of BED and BN in a number of different settings. The authors also underlined the point made by Kazdin and Blase (2011) that a treatment with a smaller effect on therapeutic outcome but with greater reach and scalability would nevertheless decrease the overall health burden of patients with EDs, thus decisively "addressing the unmet needs of countless individuals suffering from eating disorders" (Wilson and Zandberg 2012, p. 351).

To illustrate effectiveness approaches, Grilo et al. (2013) randomly assigned 48 patients with BED and obesity to either a CBT-related, book-based pure SHI (i.e., without any guidance, see Sect. 5) or treatment as usual, within a university-based medical health care center. To enhance the generalizability and applicability, only a few exclusion criteria were applied, and the initial visit for handing out and explaining the SHI book was performed by primary care physicians, who were not specifically trained in the treatment of EDs. While abstinence rates from binge eating at post treatment did not differ significantly between pure SHI (25%) and usual care (8%), monthly assessments of self-reported binge-eating frequency showed a significant reduction in the SHI condition, but not in usual care. Thus, pure SHIs may not have specific effectiveness when compared to usual care for patients with BED and obesity. In another example, a CBT-derived, book-based SHI with internet-based guidance was offered to 48 patients with BN from a specialized ED clinic, and its effects were compared to a nonrandomized control group ($N = 48$) undergoing a 16-week psychodynamic day patient program (Högdahl et al. 2013). The approximate clinician involvement was 11 h per patient in the SHI condition and more than 200 h in the day patient program. As anticipated, effects on binge eating, compensatory behaviors, and ED psychopathology tended to be larger in the day patient program than in the SHI condition, but there were no significant differences at post treatment between conditions. The results suggested book-based SHIs with internet-based guidance to be an option for offering effective treatment with scarce CBT resources in clinical environments, which should be bolstered by future adequately powered effectiveness research.

5 The Role of Guidance

All formats of SHIs might be implemented with or without professional guidance and support at varying levels, with the common feature that possible guidance is primarily supportive and facilitating, thus being significantly less intensive than, for example, the therapeutic relationship within face-to-face CBT. The vast amount of different forms of professional guidance within SHIs can be classified by whom it is provided, and via its intensity and modality. The professional background of guides within SHIs for BED and BN have ranged from nurses without experience in the treatment of EDs (Walsh et al. 2004) to graduate students in clinical psychology with little or no experience in CBT (Wilson et al. 2010), to Master's- or Doctoral-level therapists (e.g., Peterson et al. 2009; Striegel-Moore et al. 2010). Varying in intensity, guidance can be administered by telephone, via the internet, or through face-to-face sessions (Traviss-Turner et al. 2017; Wilson and Zandberg 2012). Personally guided sessions were conducted in primary care (Carter and Fairburn 1998; Walsh et al. 2004) or in university-based, specialty ED clinics (e.g., Wilson et al. 2010), in individual or group format. For example, in an RCT pointing to the efficacy of a book-based SHI following CBT principles for the treatment of BED and BN (Hildebrandt et al. 2017), guidance was administered face-to-face, via one initial 60-min meeting with a therapist (i.e., psychologist or graduate student), followed by eight 25-min sessions. Another example can be found in a RCT proving the efficacy of internet-based SHI using CBT principles for the treatment of BED (INTERBED study; de Zwaan et al. 2017), in which guidance was implemented through

two 90-min face-to-face sessions before and after treatment as well as weekly feedback via e-mail, provided by trained psychologists and physicians.

The question of whether guidance is necessary for a favorable treatment outcome in SHIs has been intensively discussed and must be answered regarding the ED to be treated. For BED, in the meta-analysis by Hilbert et al. (2019), a direct comparison between guided and pure SHIs for BED did not show significant differences regarding any of the outcome measures. Thus, in the treatment of BED, guidance might be of minor importance for a favorable outcome. Likely related to methodological differences, meta-regression analyses based on indirect comparisons estimated greater treatment effects and higher intervention completion rates in guided than unguided SHIs for both BED and BN (Beintner et al. 2014), but effects were stronger when focusing on BN alone. Thus, patients with BN compared to those with BED may need greater support to successfully work through CBT-based SHIs.

Further discussion topics represent the optimal form and pattern of guidance regarding its provider, intensity, and modality. In their review on CBT-based guided SHIs for EDs, Wilson and Zandberg (2012) pointed out that, based on some of their reviewed SHI studies, providers with lesser professional experience in the treatment of BED (e.g., Master's level psychologists with no prior experience in treating EDs; Striegel-Moore et al. 2010) achieved comparable outcomes to those with more experience. However, in their meta-regression analysis, Beintner et al. (2014) found that, with regard to the treatment of both BED and BN, guidance by an ED or mental health specialist or CBT therapist within CBT-based SHIs may yield a greater reduction of ED symptoms and higher intervention completion than guidance by nurses or general practitioners. Further, higher intervention completion rates were found to be achieved in CBT-based SHIs with face-to-face guidance compared to e-mail guidance. Overall, future research is warranted to identify the optimal type and dosage of guidance.

6 Acceptability

In contrast to the promising results demonstrating the efficacy of SHIs in the treatment of BED and BN, low levels of participation represent a major area of concern. High acceptability to patients and thus a sufficient level of participation within SHIs are essential for their scalability, dissemination, and implementation. Here, it is central to consider not only the engagement in an SHI and treatment or assessment completion, but also patients' adherence to the intervention.

Regarding treatment engagement, in a systematic review of 4 RCTs of internet-based CBT for EDs, which were guided SHIs (Fairburn and Murphy 2015), 16% to 24% of patients did not take up the intervention and, while treatment completion definitions differed between studies, completion rates were unsatisfactory. Further, a large variability of treatment dropout, ranging from 1% to 88% in RCTs and non-RCTs on guided and pure SHIs for BED and BN, was documented in the meta-regression analysis by Beintner et al. (2014). When comparing the different formats of SHIs, highest participation as defined by the completion of at least half of the intervention was suggested for book-based SHIs (65%), followed by CD-ROM- (38%) and internet-based SHIs (37%; Beintner et al. 2014). In their systematic review on app-based SHIs for AN, BN, and BED, Anastasiadou et al. (2018) documented satisfactory values regarding patient-reported acceptability and participation, but only one-third of the included RCTs, non-RCTs, and uncontrolled studies reported participation, which thus needs to be systematically reported in SHIs, including app-based formats.

Regarding reasons for low acceptability and thus insufficient participation within the various forms of SHIs, Walsh et al. (2004) pointed out that the low-intensity character of SHIs might yield in patients' low confidence that the treatment will be successful. Further reasons include the lack of personal contact (Robinson et al. 2006), motivation, time, and technical issues (Leung et al. 2013). In contrast, baseline treatment motivation might be positively associated

with participation within SHIs (Leung et al. 2013). As noted above, participation can be depicted through patients' adherence to the SHI, which was positively associated with favorable treatment outcomes within internet-based SHIs (Carrard et al. 2011a; Manwaring et al. 2008). Importantly, adherence to internet- or app-based SHIs, such as the frequency of logins, can be easily assessed via automatic systems (Bauer and Moessner 2012). Therefore, adherence might be regularly monitored and should be fostered by suitable additional intervention components (e.g., more professional guidance) in case of decreasing levels of adherence in individual patients (Puls et al. 2019). Among others, this could be an important step in the direction of more personalized treatments, with likely benefits for participation and outcome within SHIs for BED and BN (Loucas et al. 2014).

7 Predictors, Moderators, and Mediators

In order to increase the efficacy of SHIs for patients with BED and BN, it is important to understand how, why, and for whom treatments work (Kraemer 2015). To this end, predictors of outcome, treatment-specific moderators (i.e., baseline variables interacting with the treatment type and associated with outcome) and mediators (i.e., variables changing due to treatment and thus interacting with outcome) need to be investigated. In their systematic review, Linardon et al. (2017a) summarized 65 RCTs and non-RCTs on CBT-based treatments for BED, BN, AN, and mixed samples, 14 of which were related to guided SHIs. Regarding baseline predictors, a history of AN in patients with BN as well as a higher frequency of compensatory behaviors and higher body mass index (BMI, kg/m^2) in mixed samples were associated with less favorable outcomes after guided SHIs. Moderators of guided SHIs were only studied for BED samples, showing that, among a range of clinical and sociodemographic variables, only higher binge-eating frequency was associated with less favorable outcomes within CBT-based guided SHIs but with better outcomes within individual CBT. Similarly, there was no evidence for mediators in guided SHIs from BN samples. However, within BED, rapid response in binge eating (defined as a 65–70% reduction in binge eating by treatment week 4) predicted greater abstinence from binge eating at post treatment and 6-, 12-, and 18-month follow-up in CBT-based guided SHI, but not in behavioral weight loss treatment or interpersonal psychotherapy (Hilbert et al. 2015). Overall, the evidence on predictors, moderators, and mediators of SHI remains limited, so more research is needed to support the matching and tailoring of specific interventions to individual patients.

8 Cost-Effectiveness

Cost-effectiveness describes the degree to which an intervention's effectiveness is justified by its societal costs (Gray 2011; Ramsey et al. 2015), which comprises its direct costs (i.e., resulting from utilization of medical, psychological, or social services, nursing or informal care, or treatment-related travel) and indirect costs (i.e., resulting from loss of productivity, time spent for treatment, or sick leave). Thus, an intervention can be considered cost-effective if "it either is equally effective and associated with lower costs compared to the control intervention or if it is superior and the (additional) costs are considered reasonable given the additional health gain" (König et al. 2018, p. 156). As noted above, higher cost-effectiveness and thus enhanced scalability were discussed as major advantages of SHIs compared to traditional face-to-face treatments (e.g., Beintner et al. 2014; Wilson and Zandberg 2012; Yim and Schmidt 2019). In addition to their assumed lower societal costs and lower therapist involvement, guided SHIs may be conducted by a broader range of health care providers compared to traditional psychological face-to-face treatments (Fairburn and Patel 2014; see Sect. 5), which also might contribute to the cost-effectiveness of SHIs.

Focusing on the few studies providing specific evidence regarding CBT-based SHIs, König et al. (2018) conducted a comparative analysis on the cost-effectiveness of internet-based guided SHI and face-to-face CBT for BED ($N = 147$) and found no clear evidence for one treatment being more cost-effective. In the entire sample (i.e., including dropouts), the SHI condition was associated with lower costs but also with lower intervention effects than face-to-face CBT. Further, Aardoom et al. (2017) evaluated the cost-effectiveness of an internet-based SHI following CBT principles—psychoeducation and a fully-automated monitoring and feedback system, with three varying levels of therapist support—for patients with self-reported ED symptoms in comparison to wait-list ($N = 354$). The authors found no significant differences between the four conditions regarding societal costs and intervention effects (i.e., quality-adjusted life-years). While the mean societal costs per patient increased with higher therapist support within the SHI conditions, they were highest in the wait-list condition, due to an increased uptake of other medical treatments (e.g., inpatient mental health care). Thus, the authors suggested cost-effectiveness of SHIs compared to wait-list (Aardoom et al. 2017). This suggestion found support in the results from a study by Lynch et al. (2010), who analyzed the societal costs of a CBT-related, book-based guided SHI plus treatment as usual compared to treatment as usual alone for BN, BED, and recurrent binge eating ($N = 123$). Herein, greater intervention effects in the SHI condition and lower societal costs due to reduced use of other medical services in this condition were revealed. In sum, while these few studies are suggestive of greater cost-effectiveness of SHIs for patients with BED and BN compared to minimal treatment, but not compared to face-to-face CBT, the evidence remains scarce and inconclusive. Further research is therefore urgently needed to investigate the cost-effectiveness of SHIs in the treatment of BED and BN.

9 Self-Help Interventions in Complex Models of Care

In addition to the evaluation of CBT-based SHIs as a stand-alone approach to the treatment of BED and BN, SHIs have been tested within complex models of care conceptualizing the combination of different treatments on multiple steps of the care pathway (e.g., Tasca et al. 2019). Especially within such models, feasible and cost-effective ways to direct the adequate amount of treatment to subgroups of patients with specific symptom levels or treatment response patterns (e.g., patients with chronic EDs, at risk for dropout from treatment, with high levels of health care use, rapid responders) were demanded (Kazdin et al. 2017). Such tailored treatment allocation procedures were discussed to improve effectiveness and cost-effectiveness of psychological treatments (Agras et al. 2017; van Furth et al. 2016), however, the evidence remains very limited.

An example for a complex model of care with tailored treatment allocation is the three-level stepped care model (Jones et al. 2014; Wilfley et al. 2013), according to which 1551 college students were screened and allocated to one of four groups: (1) individuals at low ED risk were offered an internet- and CBT-based universal preventive pure SHI (entitled "StayingFit"; Taylor et al. 2012); (2) individuals at high ED risk were offered an internet-based selective preventive guided SHI ("StudentBodies—Targeted"; Beintner et al. 2012); (3) individuals with a clinical or subclinical ED other than full-syndrome AN were offered an internet-based guided SHI ("StudentBodies—Eating Disorders"; Jacobi et al. 2012), and individuals with full-syndrome AN or other medical concerns were referred to face-to-face treatment (e.g., CBT, interpersonal psychotherapy). Additionally, if individuals showed no considerable symptom reduction in their intervention category, they were directed to a more intensive intervention. Cost-effectiveness estimates suggested that the proposed model was less costly and resulted in fewer college students in need of face-to-face treatment compared to standard care (Kass et al. 2017). Another example

of tailored treatment allocation within a complex model of care can be found in a multisite RCT comparing individual CBT with CBT-oriented, book-based guided SHI, in which 293 patients with BN were identified as responders or nonresponders, depending on the level of symptom reduction at treatment week 6 out of 18 (Mitchell et al. 2011). Nonresponders were offered antidepressant treatment with fluoxetine in addition to their ongoing treatment. While abstinence from binge eating did not differ between the two conditions at post treatment, medication use was lower in the SHI condition, and, at follow-up, the SHI condition led to a greater reduction of binge eating and compensatory behaviors than CBT.

An example for SHIs within a complex model of care for BED without tailored treatment allocation was provided by Tasca et al. (2019): A total of 135 patients received a book-based pure SHI, using CBT principles, followed by either 16 weeks of group psychodynamic-interpersonal psychotherapy or a no-treatment control condition. The pure SHI produced significant reductions in binge-eating frequency and ED psychopathology, but the effect of the subsequently added psychotherapy on ED symptoms was not significantly different from the control condition. However, compared to the control condition, subsequent psychotherapy yielded significantly greater improvements in interpersonal problems and attachment avoidance, which are relevant maintenance factors of binge eating (Ivanova et al. 2015). In sum, complex models of care that include pure or guided SHIs as a first-step intervention might represent cost-effective approaches for the treatment of patients with BED or BN, but further research in this area is clearly needed, especially to elucidate the utility of tailored treatment allocation procedures.

An example for SHIs in relapse prevention after ED treatment was provided by Jacobi et al. (2017), who conducted an RCT comparing a 9-month internet-based guided SHI using CBT principles with treatment as usual following inpatient treatment for BN ($N = 253$). In general, the two conditions did not significantly differ in abstinence from binge eating, compensatory behaviors, and binge-eating frequency at post treatment and follow-up. The SHI significantly reduced the frequency of vomiting episodes at post treatment compared to treatment as usual, but this difference was no longer significant at follow-up. Interestingly, in patients who still reported binge-eating and compensatory behaviors at the end of inpatient treatment, differences between conditions in favor of the SHI were larger at post treatment and follow-up. These results suggest that SHIs for relapse prevention might be especially suited for nonresponders in inpatient treatment of BN.

10 Future Directions

Despite the potential of CBT-based SHIs to overcome barriers to "traditional" care for the treatment of BED and BN, more research is needed to address remaining questions: Further studies should compare CBT-based SHIs with established face-to-face treatments regarding efficacy, acceptability, participation, and cost-effectiveness, (Beintner et al. 2014; Wilson and Zandberg 2012; Yim and Schmidt 2019). Identifying reliable predictors of outcome within SHIs may allow to answer the question "what works best for whom?" and, subsequently, to tailor specific intervention components to individual patients (Loucas et al. 2014). The benefits of the different formats of SHIs should be further investigated, especially with regard to specific patient groups (e.g., app-based SHIs for the treatment of younger patients), and the role of guidance needs to be further elucidated, focusing on amount, providers, and settings of guidance (Hilbert et al. 2019). Participation and adverse events should routinely be assessed and reported in studies on SHIs for BED and BN. The latter is particularly important in SHIs without any form of guidance and monitoring of clinical risk. Finally, of specific interest is the use of SHIs for universal or selective prevention, treatment, and relapse prevention based on a conceptualization of complex models of care and using tailored allocation (Yim and Schmidt 2019), in order to offer care to "the vast majority of individuals in

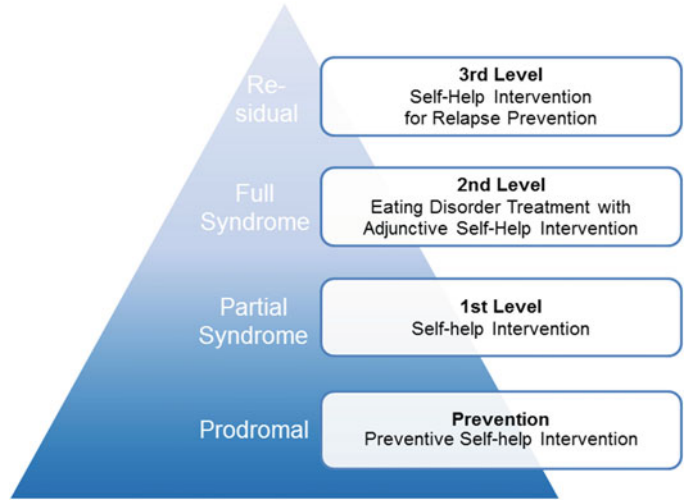

Fig. 1 Intervention pyramid of self-help interventions: Possible use in the prevention and treatment of binge-eating disorder and bulimia nervosa according to their symptom severity and course of illness

need of services for EDs who are not otherwise served" (Kazdin et al. 2017, p. 21).

As noted above, growing evidence and clinical guideline recommendations (NICE 2017) justify the use of SHIs in the treatment of BED and BN, especially if CBT-based. However, depending on national health care policies, SHIs remain largely underutilized (Fitzsimmons-Craft et al. 2019) and their potential to reduce the "treatment gap" (see Sect. 1) is not yet exhausted. Thus, systematic research on the dissemination and implementation of psychological treatments, including CBT-based SHIs, to EDs is therefore highly warranted (Agras et al. 2017; Kazdin et al. 2017). Importantly, to inform health care policies with evidence from high-quality research, a mutual exchange between researchers and policy makers was demanded (Brownell and Roberto 2015).

Practically, if clinicians wish to use CBT-based SHIs, they may consider symptom severity of an individual patient to guide their treatment-related decision-making, for example, offering a higher level of care corresponding to the patient's need. Figure 1 illustrates a possible use of SHIs according to the eating disorder symptom severity, ranging from a preventive or early interventive use in case of eating disorder risk or partial syndrome to an adjunctive or relapse preventive use in case of full syndrome or residual symptoms. As noted above, further clinical decision points include other baseline characteristics (e.g., patient expectations and practical aspects) and process-related aspects (e.g., use of guidance, early symptom change, and patients' adherence). For example, for some patients with full-syndrome BED or BN, those with lower symptom severity, high skills for SHI use, good adherence, and early symptom reduction, SHIs, particularly if guided, may be sufficient for achieving symptom remission. In general, however, given the current evidence, SHIs may be considered for the treatment of BED and BN if face-to-face psychological treatment such as CBT is not available. In any use of SHIs, clinicians should transparently communicate goals, utilization, and outcomes of SHIs to their patients (Yim and Schmidt 2019). Importantly, patients should be thoroughly advised how to use the SHI in the best possible way, especially if it is technology based. A general requirement is that SHIs should be free of any disturbances, such as technical problems, inconvenient handling, or non-fitting expectations of the patient.

11 Summary

After more than two decades of research, CBT-based SHIs today represent a well-supported treatment option for patients with

BED and BN. A growing body of research documented not only their efficacy, but also, to a lesser extent, their comparative efficacy and their effectiveness. Especially in the treatment of BN, professional guidance seems to be an important component of CBT-based SHIs. Guidance was in some studies associated with better treatment outcomes and higher levels of participation. Acceptability and participation might be linked; regardless, they represent key aspects for the design and conduct of SHIs, and should, therefore, be systematically monitored, consistently described, and further enhanced. In this context, individual tailoring of interventions and their components could be a critical line of action for the further development of SHIs. Cost-effectiveness of SHIs compared to minimal treatment was suggested by some studies. Placing SHIs in complex models of care was discussed to increase effectiveness and cost-effectiveness of SHIs. Finally, despite the promising evidence on the efficacy of CBT-based SHIs, more efforts leading to optimal dissemination and implementation of evidence-based SHIs in the treatment of patients with BED and BN are urgently needed.

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