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Home treatment as an add-on to family-based treatment in adolescents with anorexia nervosa: A pilot study

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Abstract

Objective: This pilot study examines the feasibility and the effectiveness of add-on home treatment (HT) to family-based treatment (FBT) in adolescents with anorexia nervosa (AN). The HT intervention is delivered by specialised nurses and aims at supporting patients and parents to re-establish family meals in the home environment.

Method: We performed a 3-month study in AN patients with a waiting-list control design comparing 45 (43 females, 2 males) adolescents receiving FBT augmented with HT compared to 22 (21 females, 1 male) participants receiving FBT alone on the waiting list for additional HT. Eating disorder diagnosis, psychopathology and severity of clinical symptoms were assessed using the Eating Disorder Examination (EDE) interview, the Eating Disorders Inventory (EDI-2) and clinical parameters (BMI, menstrual status, level of over-exercising) at baseline and after 3 months.

Results: After 3 months of treatment, both treatment groups showed a significant early weight gain, a reduction in the rate of AN diagnoses assessed with the EDE interview and a reduction in EDI-2 total scores. The combined HT/FBT group showed a significantly greater increase in BMI than the FBT-only group. In the combined HT/FBT group, none of the patients had to be admitted to hospital, while three (13.6%) of the FBT-only group had to be referred to inpatient treatment.

Discussion: Our results suggest that HT augmented FBT might be useful compared to FBT alone in terms of early weight gain and might reduce the risk of hospital admission in adolescent AN.

KEYWORDS
adolescents, anorexia nervosa, eating disorders, family-based treatment, home treatment

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Key points

- Home treatment as an add-on to family-based treatment seems to be a well-accepted and very effective method for the treatment of eating disorders in adolescence.
- Combining family-based treatment with home treatment thus seems to even enhance the therapy effectiveness of FBT in terms of initial weight gain as well as psychopathology

1 | INTRODUCTION

Anorexia nervosa (AN) causes a considerable burden of disease for patients and their families (Weissman & Rosselli, 2017). Treatment is challenging for both therapists and families due to a lack of motivation in a substantial proportion of those affected (Pauli et al., 2017). A significant proportion of patients do not recover when treated with the available psychotherapeutic approaches (Zeeck et al., 2018). Therapeutic strategies that involve parents in their child's feeding are helpful in adolescent patients with AN (Forsberg & Lock, 2015). Recent reviews suggest that family-based treatment (FBT) is currently the strongest evidence-based treatment approach in adolescents with AN with an increasing number of controlled trials (Fisher et al., 2019; Herpertz-Dahlmann, 2017; Jewell et al., 2016; Zeeck et al., 2018; Zipfel et al., 2015). FBT is a non-blaming approach that involves parents in the treatment of their child with AN as a resource, targeting eating-related behaviours and meal structure (Forsberg & Lock, 2015). FBT has been shown to be more effective when the intervention leads to an early weight gain in the first 4 weeks of treatment (Doyle et al., 2010). Further evidence suggests that FBT with a focus on eating disorder behaviour and weight gain is more effective than therapies focussing on more general family processes (Lock, 2015). Depending on the remission criteria, which are either defined as weight-related only or additionally include psychopathology as a variable, the remission rate of adolescents with anorexia after FBT treatment is 60%–90% (Lock et al., 2006). However, only about 30% of adolescents with AN showed a full remission defined as a weight greater than 95% of expected body weight and an EDE global score within 1 SD of community means at long-term follow-up of FBT treatment at 3–5 years (Le Grange, Lock, et al., 2014). Furthermore, families with high parental expressed emotion show even poorer outcomes in FBT (Allan et al., 2018). Therefore, a better understanding of the moderators and mediators of FBT treatment effects is needed to identify what additional therapies may need to be offered when standard treatment is not sufficient

(Jewell et al., 2016). Some studies examined possible add-on effects of additional treatments to FBT in adolescents with AN who did not respond sufficiently in the first phase of the FBT treatment. In one study, a combination of cognitive remediation therapy or art therapy with FBT was examined in a pilot study. Both add-on treatments were found to be feasible and accepted with a dropout rate of 16.6% and acceptable ratings of expectancy, suitability and therapeutic relationship (Lock et al., 2018). One study with 45 patients showed that an intensive parental coaching which emphasises on the importance of early weight gain and includes an additional family meal resulted in a significantly greater increase in BMI at the end of treatment (Lock & Le Grange., 2015).

Home treatment (HT) is an approach that provides supportive interventions carried out by healthcare workers who visit the families in their homes. It is based on the assumption that sustainable change of symptoms and positive development can best be supported by a change that takes place in the adolescents' family and community environment (Woolston et al., 1998). It empowers parents and other family members, minimises the burden of care, and helps adolescents to stay in their familiar surroundings (Darwish et al., 2006). Several HT programmes for adolescents with psychiatric disorders have been established (Boege, Schepker, et al., 2015; Lamb, 2009). One randomized trial demonstrated the cost-effectiveness of a cross-diagnosis HT programme as an alternative to residential treatment (Boege, Corpus, et al., 2015).

A recent qualitative study examined parents' perceived stress when their child's symptoms persist during FBT treatment (Wufong et al., 2018). HT could be a supportive element to reassure parents in their tasks prescribed in the FBT sessions and help the family to (re-)establish more beneficial family interactions and supportive relationships within the family. Only few studies exist on HT for adolescents with eating disorders and their families. Two studies showed a positive effect on hospital admission rates (Darwish et al., 2006; Jaffa & Percival, 2004). Recently, a pilot study was conducted to examine HT as an approach to shorten inpatient

treatment. HT was found to be a feasible, safe and well-accepted approach that can reduce the time of hospitalisation (Herpertz-Dahlmann et al., 2020).

The current study investigates the feasibility and effectiveness of HT as an add-on to FBT in an outpatient setting. We performed a comparison between the combined HT/FBT and the FBT-only group to examine the possible add-on effects of HT in combination with FBT on early weight gain, symptom severity, hospital admission rates and frequency of AN diagnosis after 3 months of treatment.

2 | METHODS

2.1 | Participant characteristics, treatment allocation and procedure

The study was carried out in our specialised eating disorders clinic at the Department of Child and Adolescent Psychiatry, University of Zurich. Out of 91 patients consecutively referred to our outpatient eating disorder unit between 2017 and 2019, 75 (82.4%) fulfilled ICD 10 criteria of AN or atypical AN. Sixty-seven of these agreed to take part in the study and receive HT additional to regular outpatient treatment. Out of these 67 study participants, a total of 52 (77.6%) met ICD 10 criteria for AN, whereas the remaining 15 (22.4%) met ICD 10 criteria for atypical AN. The sample consisted of 64 (95.5%) females and 3 males (4.5%) with a mean age of 15.6 years (SD 1.8; range 10.7–19.6). Mean BMI of the entire study sample was 17.1 (SD 1.78, range 13.0–23.2). At time of referral of the 67 study participants, eight (8.9%) were diagnosed with comorbid mood disorder and seven (10.45%) with obsessive compulsive disorder. Eleven (16.4%) of the patients had received therapy for their ED before taking part in the study, but none had previously been treated with FBT or HT.

All study participants received manualised FBT by FBT-trained therapists. Of the 67 patients, 45 (67.2%) received HT as an add-on to FBT (the combined HT/FBT-group). The remaining 22 (32.8%) could not be treated with HT due to a full occupancy of our HT team at the time of their referral. If an HT nurse was available at the time of referral, the allocation to HT as an add-on to FBT was offered for every patient treated with FBT independently of the severity of the case. Thus, allocation to the treatment groups was not randomised but occurred naturalistically based on the availability of HT healthcare professionals and was not based on clinical characteristics or preferences of patients, carers or therapists. The study was approved by the local ethics committee.

2.2 | Measures

2.2.1 | Clinical parameters

The primary outcome measure was weight gain between baseline and 3 months, measured by BMI change scores. Further clinical parameters such as menstrual status and level of over-exercising were assessed by trained clinicians that were not involved in the treatment. In addition, each participant was asked to take part in the EDE interview and complete the Eating Disorder Inventory (EDI-2) questionnaire at the beginning of treatment (T0) and 3 months after baseline (T1).

2.2.2 | Eating Disorder Examination interview

The Eating Disorder Examination (EDE) is a semi-structured interview to confirm AN diagnosis and to characterise specific eating disorder psychopathologies. It addresses attitudes in four domains: *eating concern*, *restrained eating*, *weight concern* and *shape concern* (Cooper & Fairburn, 1987). We assessed the global and the domain scores at baseline and after 3 months. A global score of 2.77 is used as a clinical cut-off for AN diagnosis. The interviews in our study were conducted by ED specialists who were not involved in the treatment of the study participants.

2.2.3 | Eating Disorder Inventory

The EDI-2 is internationally regarded as a standard method for multidimensional description of specific psychopathologies of patients with eating disorders. The 91-item self-report measure assesses a broad variety of symptoms and attitudes related to eating disorders. It consists of 11 subscales (*drive for thinness*, *bulimia*, *body dissatisfaction*, *effectiveness*, *perfectionism*, *distrust*, *interoceptive awareness*, *maturity fear*s, *asceticism*, *impulse regulations* and *social insecurity*). The EDI-2 shows good psychometric properties in both the original and the German version (Garner, 1991; Thiel et al., 1997).

2.3 | Intervention

FBT and HT were conducted at the specialist eating disorders clinic at the Department of Child and Adolescent Psychiatry, University of Zurich. FBT was carried out by trained eating disorder specialists using

the manual for the treatment of adolescents with AN (Lock & Le Grange, 2015). The HT intervention was carried out by child and adolescent clinical healthcare nurses especially trained in the treatment of eating disorders. The special training for the nurses consisted of a training in FBT for adolescents with AN (Lock & Le Grange, 2015) as well as in HT strategies directly related to the FBT manual. This included supporting parents at mealtimes to increase their authority in feeding their child, as well as helpful communication strategies. The training was followed by monthly supervision by an experienced clinician (NF) certified in FBT. The HT nurses took part in at least one FBT session where the goals were set and interchanged information with the FBT therapist during the whole treatment period by phone or email.

HT was a 12-week programme of 1–4 sessions per week, each lasting for approximately 60 min in addition to regular FBT. The frequency of the HT sessions was adapted to the individual case and the number of sessions was recorded. The HT intervention started immediately after referral and was used for patients diagnosed with AN as well as atypical AN. Patients with atypical anorexia were included because they usually present with AN-typical psychopathology and rapid weight loss with a weight that has not yet reached the threshold for AN. The HT intervention starts with a diagnostic part to assess the individual eating-disorder maintaining factors (e.g. body-checking, frequent self-weighing) or family interactions that maintain the eating disorder (e.g. parental criticism, unhelpful family communication around meal times). Subsequently, the individual goals of the HT are set involving the patient and the parents as well as the FBT-therapist that works with the HT-nurses. The intervention is then carried out with regular visits in which the HT-nurse takes part in family meals. The HT-nurse addresses crucial issues and advises the patient and the parents on how to overcome problems in their interaction. The main aim is to provide practical support for parents so they can fulfil their task of the first phase of FBT, namely to refeed their adolescent. Another important part of the intervention is to foster the patients and families' resilience factors and support resources of the patient in everyday social life (e.g., restart hobbies, meet friends). HT sessions required the participation of at least one parent and could be administered in different settings involving the patient, siblings or other significant people of the environment.

The follow-up time point of 3 months after baseline was chosen because by this time all families had completed the HT intervention.

2.4 | Statistical analysis

A clear age-related cut-off point is needed to define underweight in adolescence, considering the fact that BMI in childhood and adolescence changes substantially with age (Cole et al., 2000). Therefore, we used the LMS method as described by Cameron (2007) and Cole et al. (2007). This method summarises the data in terms of three smooth age-specific curves called L (lambda), M (mu) and S (sigma). The assumption underlying the LMS method is that after BoxCox power transformation data for each age group is normally distributed and standardized z-scores (age-corrected body mass indices) can be obtained. This procedure allows the definition of thinness in different age groups and the joint analyses and comparisons of different age cohorts. The original data on the LMS parameters and on the percentiles stem from the American National Centre for Health Statistics for ages 5–19 years, and have been adapted to Switzerland (Braegger et al., 2011).

Data analysis was conducted using the SPSS 23 software. First, the two groups were compared at T0 in terms of BMI, age-corrected body mass indices BMI (z), age, age of illness onset, duration of illness, total score of EDE interview and EDI-2, using a two-sample t-test including Levene's test of homogeneity of variances. Menstruation status, level of over-exercising and educational level were compared using a chi-square test. Furthermore, a generalized estimating equation (GEE) approach was used to test for treatment effects on outcome parameters (BMI, z-BMI, amenorrhoea, over-exercising, EDE total scores, EDI-2 total scores). Using t-tests, effect sizes were calculated and were corrected for group size by using the difference between *Hedge's g* of the different treatment groups (Lenhard & Lenhard, 2016). GEE allows for time-dependent predictors in the model and can also be applied to dichotomous outcome variables, in this case, menstrual status and over-exercising. For the continuous variables (BMI, z-BMI, EDE total scores, EDI-2 total scores), the outcome was modelled based on the identity link function and standard Gaussian error distribution. For the two dichotomous outcomes, amenorrhoea and over-exercising, GEE logistic regression models with logit function and binomial error distribution were used. Group (FBT/HT vs. FBT only) and time (T0 and T1) were added as between-subject factors, allowing the assessment of improvements over time as well as the effects of the different treatments. For all analyses, an unstructured working correlation structure was assumed, and all analyses were adjusted for disease duration, age of onset and EDE total scores. The GEE logistic regression model for amenorrhoea was additionally adjusted for changes in

TABLE 1 Demographic and clinical data at T0

At T0	All patients (N = 67) M, SD, min, max	FBT/HT (N = 45)	FBT only (N = 22)	Group differences (T/χ^2/)
Age (years; months)	15.6 ± 1.8 (10.7, 19.6)	15.6 ± 1.8 (10.7, 19.6)	15.6 ± 1.8 (11, 18.3)	0.17
Comorbid psychiatric diagnoses total number	15 (22.4%)	11 (24.4%)	4 (18.2%)	0.33
Mood disorder	8 (11.9%)	7 (15.6%)	1 (4.5%)	1.7
Obsessive compulsive disorder	7 (10.4%)	4 (8.9%)	3 (13.6%)	0.35
Pre-treatment	11 (16.4%)	9 (20%)	2 (9.1%)	1.2
BMI (kg/m^2)	17.1 ± 1.8 (13.0, 23.2)	17.2 ± 1.9 (13, 23.2)	17.1 ± 1.6 (13.8, 20.2)	0.21
BMI z-score	−1.6 ± 1.4 (−6.5, 0.1)	−1.6 ± 1.4 (−6.5, 0.5)	−1.6 ± 1.3 (−5.3, 0.1)	0.05
Amenorrhoea (%)	67.7 (N = 62)[a]	70.7 (N = 41)[a]	61.9 (N = 21)[a]	0.49
Over-exercising (%)	40 (N = 65)[a]	37.2 (N = 43)[a]	40.9 (N = 22)[a]	0.41
EDE interview (total score)	2.8 ± 1.2 (0.4; 5.7) (N = 60)[a]	2.7 ± 1.2 (0.4; 5.7) (N = 43)[a]	3.41 ± 1 (1.7; 5.2) (N = 17)[a]	2.35*
EDI-2 (total score)	273.7 ± 63.1 (91; 379) (N = 48)[a]	264 ± 66.5 (91; 379) (N = 35)[a]	299.8 ± 45.4 (210; 356) (N = 13)[a]	1.78
Age of onset (years; months)	14.3 ± 1.7 (10, 17)	14.3 ± 1.6 (10; 17) (N = 45)[a]	14.1 ± 1.8 (10; 17) (N = 22)[a]	0.47
Educational level[b]				2.43
Compulsory (1–9 years)	24 (35.8%)	15 (33.3%)	9 (40.9%)	
Gymnasium (10–12 years)	35 (52.2%)	25 (55.6%)	10 (45.5%)	
University/tertiary	3 (4.5%)	1 (2.2%)	2 (9.1%)	
Vocational apprenticeship	5 (7.5%)	4 (8.9%)	1 (4.5%)	

[a]Data available from subset of patients.

[b]Fisher's Exact Test.

*Significant on $p < 0.05$; **$p < 0.01$.

BMI. To test for treatment effects in a completer-analysis and calculate effect sizes, a two-way ANOVA with the within-subject factor *time* (pre vs. post) and the between-subject factor *group* (FBT/HT vs. FBT only) was calculated. The dependent variable was the BMI, and the analysis was adjusted for the duration of the disease and the EDE total scores.

The significance level was set at $p < 0.05$ (two-tailed).

3 | RESULTS

3.1 | Descriptive demographics and clinical data at T0

Descriptive statistics for demographics and clinical data at T0 for the combined HT/FBT and the FBT-only group are reported in Table 1. The mean age of the total sample at T0 was 15.6 (SD 1.8) years and the mean duration of the AN was 18.1 (SD 15.15) months. Mean BMI was 17.1 (SD 1.8).

The two treatment groups did not differ significantly with respect to age (t (65) = 0.17; p = 0.86) and educational level (Fisher's Exact = 2.43, p = 0.51). There was no significant difference between the two groups in the total number of comorbid diagnoses (χ^2 > 0.33, p > 0.56) as well as in the subgroups mood disorder and obsessive compulsive disorder (both χ^2's > 0.35, both p's > 0.55). Additionally, BMI (t (65) = 0.22; p = 0.827), age of onset (t(65) = 0.47; p = 0.645), level of over-exercising and menstrual status (both χ^2's > 0.41, both p's > 0.482) showed no significant differences between the two groups. Finally, the groups did not differ in terms of the EDI-2 total scores (t(46) = 1.78; p = 0.08).

However, the FBT-only group showed higher total scores in the EDE compared to the combined HT/FBT group (t(58) = 2.35; p = 0.02).

3.2 | Treatment modalities and adherence

The total number of FBT sessions in the FBT-only group and in the HT/FBT group was 12. In the HT/FBT group, HT was applied on average twice a week, resulting in an average of 21.6 sessions per patient during the treatment period of 3 months. The possibility of up to four sessions a week did not prove to be feasible to fit in the time schedule of the families. Sixty-four patients (95.5%) were treated in the outpatient unit during the study period from T0 to T1 without needing inpatient treatment. Only three patients (4.5% of the total sample) had to be admitted to an inpatient unit because of persistent weight loss with medical instability. All of these patients were in the FBT-only group (corresponding to 13.6% of this group) and none in the combined HT/FBT group. The three patients who had to be admitted to hospital were included in the follow-up of the FBT-only group after 3 months.

There were no patients in either group that dropped out of the treatment and the study during the study period.

3.3 | Weight gain, amenorrhoea, over-exercising and psychopathology from T0 to T1

Changes in BMI and clinical symptoms are listed in Table 2. Using the diagnostic cut-off of the EDE interview at T1, 47 (70.2%) of the 67 patients no longer fulfilled diagnostic criteria for AN/atypical AN. Of the remaining 20 (29.8%) patients, 11 (16.4%) patients fulfilled the diagnostic criteria for AN, and 9 (13.4%) patients were diagnosed with an atypical AN (see Table 2).

A GEE analysis was run on the BMI, adjusted for the EDE interview total scores as well as the duration of the disease and the age of onset (see Table 2). The mean BMI at T1 was 18.5 (SD 1.8), which is a significant improvement for the total sample (Wald $\chi2 = 33.30$, $p < 0.001$). t-Test calculation confirmed the significant increase of mean BMI with a medium effect size (t $(66) = 7.46$; $p < 0.001$), ($d_{corr} = 0.57$).

A significant time-by-group interaction revealed a significantly higher increase of BMI ($\beta = 1.84$, SE = 0.27, $p < 0.001$) as well as of BMI z-scores ($\beta = 0.91$, SE = 0.17, $p < 0.001$) in the combined HT/FBT group compared to the FBT-only group (see Figure 1). ANOVA calculation confirmed the significantly greater BMI-increase in the combined HT/FBT group than in the FBT-only group with a medium effect size ($F(1,65) = 6.34$; $p = 0.014$), ($\eta^2 = 0.09$, $d = 0.63$).

At baseline, 13 (61.9%) of the FBT-only and 29 (70.7%) of the HT/FBT-group suffered amenorrhoea. None of the patients were taking oral contraceptives. This proportion remained stable in the FBT-only group, while the combined HT/FBT group showed a 28.6% reduction (time-by-group interaction: Wald $\chi2 = 6.89$, $p = 0.009$). The odd's ratio to regain menstruation at follow-up was 5.24 in the combined HT/FBT group and 0.70 in the FBT-only group. Increase in BMI (OR = 1.38, $p = 0.024$) and higher age of illness onset (OR = 0.67, $p = 0.012$) were associated with the regaining of menstruation (Figure 2).

Over-exercising reduced from 9 (40.9%) to 7 (31.8%) in the FBT-only and from 16 (37.2%) to 5 (12.8%) in the

TABLE 2 Treatment effects in BMI and Psychopathology

All patients	Pre-treatment T0 (*M*, SD)	Post-treatment T1 (*M*, SD)	Time/Wald χ^2	Treatment × Time /Wald χ^2
BMI (kg/m^2)	17.1 ± 1.8	18.5 ± 1.8	33.30**	8.90**
BMI z-score	−1.6 ± 1.4	−0.9 ± 1.2	23.68**	7.27**
Amenorrhoea (%)	67.7 (*N* = 62)	41.4 (*N* = 56)	2.66	6.89**
Over-exercising (%)	40 (*N* = 65)	24.2 (*N* = 62)	4.68*	1.25
EDE (total score)	2.8 ± 1.2 (*N* = 60)[a]	2.1 ± 1.4 (*N* = 59)[a]	19.34**	0.41
EDI-2 (total score)	272.2 ± 53.5 (*N* = 48)[a]	232.4 ± 45.5 (*N* = 21)[a]	11.29**	0.05
Diagnosis				
AN	52 (77.6%)	11 (16.4%)		
AN atypical	15 (22.4%)	9 (13.4%)		
Partial remission		46 (68.7%)		
Full remission		1 (1.5%)		

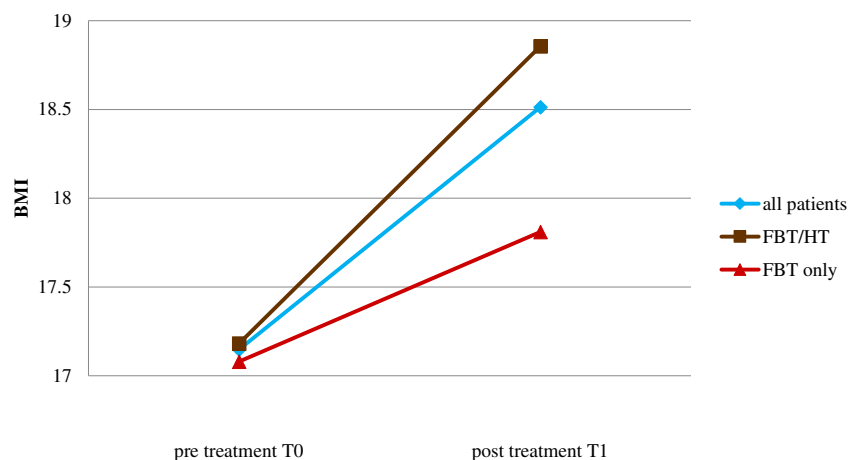[a]Data available from subset of patients.

*$p < 0.05$; **$p < 0.01$.

FIGURE 1 BMI increase between T0 and T1 [Colour figure can be viewed at wileyonlinelibrary.com]
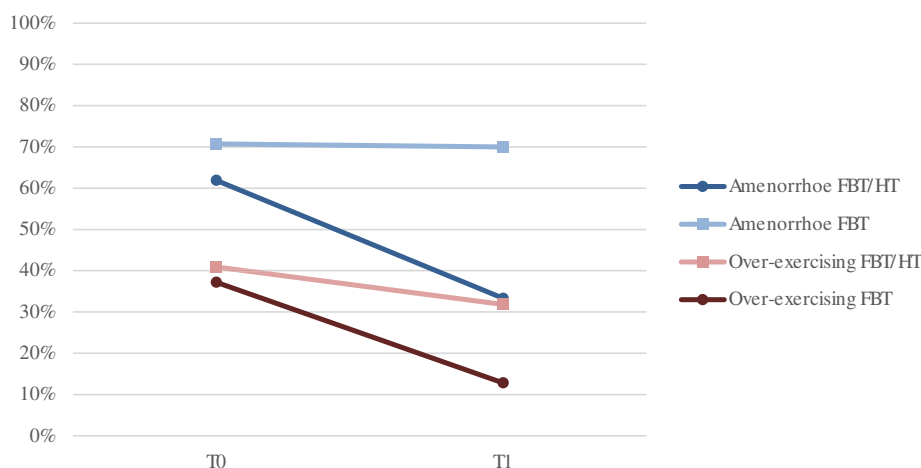

FIGURE 2 Change in amenorrhoea and over-exercising between T0 and T1 [Colour figure can be viewed at wileyonlinelibrary.com]

combined HT/FBT group (Wald $\chi2 = 4.68$, $p = 0.031$) but the interaction between treatment and time was not significant ($p = 0.26$). Furthermore, in the total sample higher EDE total scores (OR = 0.59; $p = 0.006$) and longer disease duration (OR = 0.96, $p = 0.038$) were negatively associated with the remission of over-exercising at follow-up.

The mean total score of the EDE at T1 was 2.1 (SD 1.4), which was a significant improvement for the total sample (Wald $\chi2 = 19.34$, $p < 0.001$). The significant improvement for the total sample ($t(58) = 4.84$; $p < 0.001$) was confirmed by a t-test with an effect size of $d_{corr} = 0.17$. Likewise, the total sample showed a significant improvement of the mean total score of the EDI-2 (232.4, SD 45.5) at T1 (Wald $\chi2 = 11.29$, $p = 0.001$). ANOVA calculation confirmed the significant improvement and showed a medium effect size ($t(20) = 4.04$; $p = 0.001$; $d_{corr} = 0.50$).

No group differences between the HT/FBT group and the FBT-only group regarding change of EDE interview (Wald $\chi2 = 0.41$, $p = 0.521$) or EDI-2 (Wald $\chi2 = 0.05$, $p = 0.831$) total scores between T0 and T1 were found.

4 | DISCUSSION

This study has examined the feasibility, acceptance and effectiveness of HT for adolescents with AN as an add-on to FBT. Regarding the feasibility of HT, it is interesting to note that 67 (89%) of the 75 eligible families agreed to participate in the study and thus to be treated with HT. In addition, there were no dropouts during the treatment period. The high participation rate indicates that HT was feasible for families with a child affected by AN. On average the families received 1.8 sessions of HT per week. We compared the HT/FBT combination group to a waiting list group that received only FBT. Both treatment groups showed moderate to large positive outcomes after 3 months of treatment in terms of weight gain (increase of BMI), eating attitudes and clinical parameters (reduction in amenorrhoea and over-exercising). The combined HT/FBT group compared to the FBT-only group had a significantly greater BMI gain and a higher proportion of patients regaining menstruation. None of the combined HT/FBT group had to be admitted to hospital, while three

(13.6%) of the FBT-only group had to be transferred to an inpatient unit.

Our results of the whole study group confirm the effectiveness of FBT in the treatment of adolescent AN (Agras et al., 2014; Lock et al., 2010). The young age (15.6 years) and the relatively short duration of the AN (1.5 years) prior to the beginning of treatment qualifies the sample to be treated with FBT, a form of therapy that was shown to be effective in adolescents with similar features (Agras et al., 2014; Lock et al., 2010). Our preliminary results of a BMI increase of medium effect size in the total sample (HT/FBT group and FBT group combined) can be considered clinically significant, as BMI is a clinical measure where even small effects can be clinically decisive. We chose the 3 months follow-up time point after baseline because this was right after completion of the HT intervention. We were especially interested in the effects that adding HT to FBT has on early weight gain. Early weight gain within the first 3 months is a positive outcome predictor for adolescents that took part in the FBT programme (Le Grange, Accurso, et al., 2014). Previous studies analysing the effects of FBT had longer follow-up times, mostly 6 months (Lock et al., 2005) or 1 year (Le Grange et al., 2012) after treatment start. Therefore, the comparison of our dataset with these studies, which examine a longer follow-up period than ours, proves difficult.

The descriptive baseline data showed no differences between the combined HT/FBT group and the FBT-only group in terms of age, education, BMI, menstrual status, level of over-exercising and age of onset of AN as well as in EDI-2 total score. However, the FBT-only group showed a significantly higher EDE total score which could point to a higher severity of the illness. However, controlling for EDE total score did not change any of our significant results. We therefore interpret the medium effect size of the greater weight gain in the HT/FBT group as clinically significant for treatment success.

To foster early weight gain and to minimise parental criticism we trained the HT nurses in our trial to directly support useful parental approaches and family interactions that help to re-establish family meals and to reduce parental criticism. Parental criticism is an important factor that has been shown to negatively affect treatment outcomes for adolescents with AN (Allan et al., 2018; Eisler et al., 2000). A recent study describes HT as a promising new tool to improve outcome in adolescent AN (Herpertz-Dahlmann et al., 2020). This study has similar aims to our study, focussing on parental management of food intake and other ED symptoms to facilitate weight gain in the first 2 months. The majority of patients treated with HT reached their target weight after 4–8 weeks of inpatient treatment and successfully

maintained it after 1 year (Hepertz-Dahlmann et al., 2020).

Moreover, menstrual status showed a significantly greater improvement from T0 to T1 in the combined HT/FBT group compared to the FBT-only group. During our follow-up period, none of the patients of the combined HT/FBT group needed inpatient treatment, while 13.6% of the FBT-only group had to be referred to an inpatient unit. The addition of HT to FBT thus seems to help the adolescents and their family to transfer the instructions of FBT into the home environment and to support the re-establishing of family meals. The early weight gain may lead to earlier improvement in other clinical parameters and better overall treatment success. There was no significant difference between the treatment groups in psychopathological improvement as measured with the EDE or EDI-2 total scores. As expected, the additional HT focussed on family guidance seems to primarily influence the clinical parameters of the eating disorder by improving food intake at family meals.

To investigate whether certain patient groups benefit more from the combination of HT with FBT, different clinical parameters were tested for their influence on the outcome (in terms of increase in BMI) in the combined HT/FBT group. Neither pre-treatment BMI nor pre-treatment disease duration or age at onset correlated significantly with treatment outcome. Additionally, we found no significant correlations between age at T0 and increase of BMI. Thus, the add-on of HT seems a feasible and suitable possibility to augment the effects of FBT for a broad range of adolescents with AN.

4.1 | Limitations

Our study used a waiting list control design. Allocation to the treatment group was not randomized, but was based on the availability of HT, resulting in different group sizes in the two treatment arms and complicating statistical analysis. In addition, allocation to treatment groups according to HT availability at the time of referral cannot completely exclude allocation bias. The outcome results of the FBT-only group include the results of those patients who had to be additionally treated as inpatients, whereby the effects of the treatments cannot be differentiated. The raters were not part of the treatment, but were also not blind to the treatment conditions, which increases the risk of measurement bias. Our outcome variables did not include all factors that were influenced by the HT intervention such as communication strategies, parental criticism and family social resources. In addition, the total sample size is small. The resources provided for the HT/FBT group in terms of number of

essions were substantially larger than for those who received FBT only. The larger weight gain and lower inpatient rate could justify the resources spent, particularly if the long-term outcome also would be better. However, cost–benefit studies are needed to examine whether this kind of treatment should be administered to all adolescents with AN or only to a subgroup that does not show early weight gain when treated with FBT.

Although none of the patients dropped out of FBT treatment, the proportion of patients completing all T1 assessments was significantly smaller in the FBT-only group compared to the HT/FBT group. This resulted in a lower N for the EDE and EDI-2 examinations for the FBT-only group at time of follow-up which makes it difficult to find significant phenomenological differences between the groups. The current study design did not allow further investigation of the reason for this difference in motivation to complete the T1 follow up. Finally, our study is only a short-term follow-up after a treatment period of 3 months, and a long-term follow-up study should be conducted to investigate the effects of HT on the further course of the disease. The data should therefore be interpreted with caution and should be considered preliminary.

5 | CONCLUSION

HT as an add-on to FBT seems to be a feasible, well-accepted and effective treatment option in adolescent AN. Adding HT to regular FBT seems to be a promising approach to improve the effectiveness of FBT in terms of early weight gain and clinical improvement. Additionally, our results point in the direction that adding HT to FBT might reduce the rate of referrals to inpatient services in adolescents with AN. In future, these results should be further investigated using randomized controlled trial designs with larger sample sizes.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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