Treating Childhood Obesity: Family Background Variables and the Child's Success in a Weight-Control Intervention

Wilfried Pott, MD[1]
Özgür Albayrak, MD[2]
Johannes Hebebrand, MD[2]
Ursula Pauli-Pott, PhD[3]*

ABSTRACT

Objective: To analyze whether caregiver and family characteristics predict success in a family-based lifestyle intervention program for children and adolescents.

Method: Participants were 111 overweight and obese children (7–15 years) who attended a family-based weight-reduction program. Body mass index (BMI) and BMI standard deviation scores (BMI-SDS) of index child, and BMI of family members, family adversity characteristics, depression, and attachment attitudes of the primary caregiver were assessed.

Results: Risk of nonresponse ($\leq$5% reduction of BMI-SDS or dropout) was elevated in older children, cases with obese sibling(s), maternal depression, and avoidant attachment attitude. In a logistic regression analysis, maternal depression, attachment attitude, and age of index child explained common variance whereas the presence of obese siblings explained unique variance in nonresponding.

Discussion: To meet the specific needs of all participating families and to prevent the discouraging experience of failure in weight-control interventions, our data suggest that special support should be provided to adolescents with obese siblings, and cases of maternal depression, and avoidant attachment attitude. © 2009 by Wiley Periodicals, Inc.

Keywords: maternal depression; attachment style; family adversity; weight reduction program

(Int J Eat Disord 2009; 42:284–289)

Introduction

In the last decades, the prevalence of obesity in children and adolescents has continuously increased.[1,2] Because of the high persistence (more than 50% of obese adolescents stay obese into adulthood[3]) and significance as a major risk factor for the development of coronary heart disease,[4] childhood obesity urgently needs to be effectively treated. Besides behavioral therapy of eating and physical activity behaviors, dietary, and physical exercise courses, which have been regarded as significant components of weight-loss interventions,[5,6] treatment of obesity in childhood should involve the family environment.[7–9]

Even though intervention programs have proven effective in reducing weight and have also shown reasonable long-term success,[10–14] far from all attendees respond to therapy. Percentages of those who do not finish interventions mostly average $\sim$ 20%[10,11,13,15] and of those who complete about 37% fail to reduce overweight more than 5%.[13,14] Particularly in childhood, such negative experiences should be avoided because motivation to control overweight decreases with each failure.[16] Thus, it seems expedient to identify those patients who probably will not succeed early enough to meet their needs more specifically, maybe by offering further or other intervention modules.

Despite a broad consensus on the significance of the family in weight loss interventions for children, the question of whether family characteristics are associated with success to control and lose weight has seldom been analyzed. Child and adolescent psychiatric research has revealed that family adversity (including factors such as incomplete schooling or vocational training of parents, low family income, and high person to room ratio),[17] maternal

Accepted 20 December 2008
*Correspondence to: Dr. Ursula Pauli-Pott, Institute of Medical Psychology, University Medical Centre, Justus-Liebig University of Giessen, Giessen, Germany.
E-mail: ursula.pauli-pott@psycho.med.uni-giessen.de
[1] Department of Psychosomatics and Psychiatry, Red Cross Children's Hospital Siegen, Siegen, Germany
[2] Department of Child and Adolescent Psychiatry, University of Duisburg-Essen, Essen, Germany
[3] Institute of Medical Psychology, University Medical Centre, Justus-Liebig University of Giessen, Giessen, Germany
Published online 2 February 2009 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/eat.20655

depression,[18] and insecure attachment style of the primary caregiver[19] are associated with inadequate parenting and a poor parent-child relationship, which consequently compromise child development.[20–22] These characteristics might also influence the response to weight-reduction programs because success largely depends on implementing learned control strategies and recommended lifestyle changes in everyday family life.

Only a few empirical studies have analyzed predictors of success in weight-reduction programs for children and adolescents.[16,23–25] Most consistently, a high maternal body mass index (BMI) has been associated with less success in the intervention. BMI of other family members, however, were not considered. To our knowledge only one study examined psychological variables of the family. In 8 to 11-year-old children Epstein et al.[26] found psychiatric symptoms of mother and father predicting less reduction of percent overweight of the child. In the current study, we analyze whether caregiver and family characteristics, and in particular family adversity, obesity of family members, and depression and attachment style of the primary caregiver may predict weight loss within the course of one year.

Method

Participants

Participants were 111 overweight and obese children/adolescents and their families. All children were referred to the outpatient weight-reduction program of the Red Cross Children's Hospital, Siegen by local pediatric practices. Mean age of the children was 11.5 years (sd = 1.84, range: 7.5–15.5 years); 63 were girls. Participants had to fulfill the following criteria: BMI above the 97th age and sex related percentile, or BMI above the 95th percentile[27] but with the presence of further risk factors (e.g. hypertension, dyslipidemia, orthopedic problems); intelligence quotient above 80 (CFT20[28]) or at least average school grades. At the beginning of the intervention, mean BMI was 29.1 (sd = 4.7, range: 21.4–44.9) and mean BMI-SDS was 2.43 (sd = 0.44, range: 1.31–3.54).

Of the mothers, one (0.9%) did not finish school, 96 (86.5%) attained basic educational or vocational qualification, and 14 (12.6%) had a high school or college qualification. Forty (36%) mothers were currently not employed, 53 (47.7%) worked part-time, and 14 (12.6%) full-time. Four (3.6%) mothers did not reply. For the fathers, these rates were as follows: 3 (2.7%) did not finish school, 76 (68.4%) had basic educational or vocational qualification, 26 (23.4%) had a high school or college education, 6 (5.4%) did not reply. Seven fathers (6.3%) were not employed, one father worked part-time, and the rest worked full-time (99; 89.2%) or did not reply (4; 3.6%).

Design

The outpatient group intervention program for overweight and obese children and adolescents "Fit Kids" is an adaptation of the program "Obeldicks" by Reinehr et al.[13] Obeldicks has been proven to be effective in reducing weight in a controlled clinical trial, and recently, long-term stability of this weight reduction was demonstrated.[29]

As recommended by Summerbell et al.,[6] "Fit Kids" includes behavioral therapy of eating and physical activity behavior, and physical exercise and dietary courses. The program consists of two phases, a first intervention phase of 3 months' duration and a second repetition and maintenance phase of 9 months' duration. In the first phase, bi-weekly behavioral therapy sessions focusing on self-efficacy, impulse control skills, and stress management are conducted with the child. To support transfer into everyday family life, a parent course led by the same psychologist accompanies these sessions. In the dietary training course (also conducted bi-weekly), children learn to create a more healthy diet (on the basis of the dietary guidelines of the German Nutrition Society). Throughout the whole 12-months' program, a physical exercise course takes place weekly. In the second phase of the program, the weekly physical exercise course and a monthly parent group or individual parent meetings take place.

One hundred eleven children/adolescents started with the program between spring 2005 and spring 2007. Of these, 95 finished the whole 12-month program. These children attended 90% of the 40 sessions of the program [number of not attended sessions: mean (sd) = 4.37(3.02)]. Reasons for dropping out were: not enough time (12 cases), dissatisfaction with therapy (3 cases), and moving to another town (1 case). Of these 16 children who dropped out 5 attended the program up to 3 months, the remainder 6 to 10 months. Eight children/adolescents gained up to 4 kilos, seven showed no change, and only one child lost weight. In the following, these dropouts are included in the analysis as nonresponders. Nonresponders additionally included all index patients who lost 5% of their BMI-SDS after the one year of treatment.

Parents filled in the questionnaires before the start of the program. The study was approved by the ethics committee for clinical research of the University Medical Centre, Giessen. All participants gave their written informed consent.

Variables

Body Weight. Body weight and height of the child were measured at the first meeting at the start of the intervention and subsequently weekly during the whole program. Measurements were carried out by the same staff member using the same calibrated scale (digital column scale SECA 701) and wall mounted stadiometer (SECA 222). Children were weighed in underwear. BMI was calculated and on the basis of German reference data for children,[27] BMI was transformed into a standard deviation score using the least mean square method by Cole,[30] which normalizes the resulting distribution. In the first interview, parents were asked for weight and height of all household members. On basis of the reported BMI, parents (BMI $\geq$30) and siblings (BMI $\geq$95th percentile) were classified as obese and nonobese.

Family Adversity Index. During the first interview, data indicating socioeconomic status of the family (education level and employment of parents) and adversity characteristics were collected. A "Family Adversity Index" was created according to Laucht et al.[17] This index reflects the presence of eight adverse family characteristics: Parent without educational qualification or skilled job training, less than one room per person in the home, parental psychiatric disorder, parental broken home history, marital discord, age of a parent less than 19 years at the child's birth, one-parent family, severe life difficulties. Of the 111 families 36 (32.4%) reported no risk, in 52 (46.8%) families one or two risk factors were present, and 23 (20.7%) reported three or more adverse family characteristics.

Depression of the Primary Caregiver. To screen for maternal depression, the German version of the Center for Epidemiologic Studies Depression Scale (CES-D)[31] was used. The German version[32] was evaluated on the basis of a representative sample of 1,298 adults and more than 200 psychiatric patients. Good internal consistency (Cronbach's α = 0.89) and high validity were demonstrated. Of the 105 mothers who filled in the questionnaire, 18 exceeded the recommended cut-off score for depression (>23).

Attachment Attitudes of the Primary Caregiver. Attachment attitudes of the primary caregiver were assessed using the German version[33] of the Adult Attachment Scale (AAS) by Collins and Read.[34] The AAS is a self-report instrument measuring attachment-related attitudes. The questionnaire consists of three subscales: "Depend," "Close," and "Anxiety." Close refers to comfort with intimacy and emotional closeness (capacity to be close). Depend reflects the extent a person trusts and relies on others (capacity to depend on others). Anxiety refers to fears of rejection and abandonment. Internal consistency (Cronbach's α 0.72 to 0.79) and good convergent and discriminant validity of the German version have been shown.

Statistical Analyses

Chi^2 statistics, *t*-tests, and logistic regression analysis were conducted to test the associations between the potential predictor variables (family background characteristics) and the index child's response vs. nonresponse to the weight-loss program. Associations of age, gender and preintervention BMI-SDS of the index child, parental education level, and current employment with response to treatment were analyzed (Chi^2 statistics, *t*-tests). To control for their influence significant variables were also considered in the logistic regression analysis.

Results

Weight Loss within 12 Months

Ninety five children completed the program. Mean reduction of BMI-SDS of these children was 0.3 (sd = 0.36) and mean reduction of BMI was 1.04 (sd = 2.17). Of these 95 children, 79 (83.2%) showed a reduction in BMI-SDS and in 63 (66.3%) this reduction exceeded 5%.

Prediction of Nonresponse

Of the 111 children who had been allocated to treatment, 16 dropped out and 32 failed to reduce BMI-SDS by more than 5%. Family background characteristics were compared between the 63 responders and the 48 nonresponders.

There were no differences between these two groups regarding BMI-SDS of the child at his/her entrance in the program. Children who succeeded in the weight-reduction program were significantly younger than those who failed. Groups did not differ significantly by gender (**Table 1**) of the index child.

Responders did not differ from nonresponders with respect to parental educational level, current employment status, and parental BMI and rates of obesity. However, of the 15 children who had at least one obese sibling, 12 did not respond to the program (**Table 1**).

There was no significant difference between groups in the number of family risk factors (family adversity index). Twelve children of the 18 mothers who exceeded the cut-off score of the depression screening questionnaire did not respond. The difference was significant at the 5% level. Regarding attachment related attitudes of the mothers, there were no differences in the anxiety and depend scores. Mothers of the nonresponding children, however, described higher avoidance of close relationships than mothers of the responding children (**Table 1**).

TABLE 1. Univariate comparisons between children/adolescents who responded and not responded to the weight-reduction program

		Response	No Response	Statistic/Sign.
Social Data				
Age		10.6 (1.9)	11.7 (1.8)	$t = 2.96$*
Gender	Female	35	28	
	Male	28	20	$Chi^2 = 0.77$
Preintervention				
BMI-SDS		2.40 (0.4)	2.48 (0.5)	$t = 0.89$
Mother	Basic education	28	2	
Education Level	Vocational qualification	29	18	
	High school or college	6	8	$Chi^2 = 1.58$
Father	Basic education	27	22	
Education Level	Vocational qualification	18	12	
	High school or college	15	11	$Chi^2 = 0.19$
Mother	not working	27	13	
Current Employment	working part-time	24	29	
	working full-time	9	5	$Chi^2 = 5.01$
Father	not working	2	5	
Current employment	working full-time	58	42	$Chi^2 = 2.30$
Family Background Variables				
Mother: BMI		28.2 (6.3)	29.2 (5.9)	$t = 0.79$
Father: BMI		29.3 (5.4)	30.0 (5.1)	$t = 0.63$
Obese siblings	Yes	3	12	
	No	60	36	$Chi^2 = 9.55$*
Family adversity	0–1	38	22	
Number of Risks	2	14	14	
	3–5	11	12	$Chi^2 = 0.31$
Maternal Depression	Yes	6	12	
	No	53	34	$Chi^2 = 4.61$**
Adult Attachment	Close	12.1 (4.4)	13.9 (4.2)	$t = 2.13$**
Scale	Depend	22.2 (4.7)	21.9 (4.9)	$t = 0.29$
	Anxiety	12.3 (4.6)	12.4 (4.7)	$t = 0.08$

Reported are means (standard deviations) or frequencies.
Significance: *$p < .05$, **$p < .005$.

Multivariate Analysis

Age of index patient, obese siblings, maternal depression, and negative attitude toward close relationships significantly discriminated between children who responded to the weight-reduction program and those who did not. In a preliminary analysis intercorrelations of these significant predictors were calculated. There were no statistically significant associations between obese siblings and maternal depression or avoidance of closeness. However, the latter two characteristics were positively correlated ($r = .20$, $p < .05$) indicating that depressive mothers reported a higher tendency to avoid closeness. Age of the index child correlated significantly with maternal depression ($r = .27$, $p < .01$)[1] and marginally significantly with the avoidance of closeness score ($r = .19$, $p < .10$). There was no significant association between age and obese siblings.

To analyze whether these variables explain common or unique variance, a logistic regression analysis was calculated. The regression model proved highly significant, however, only the presence of obese siblings explained significant unique variance (**Table 2**).

TABLE 2. Result of the logistic regression analysis predicting child's responding vs. nonresponding in the weight loss program

Predictors in the Regression	Wald	Odds Ratio	Chi^2 (df)	p	R^2
Age of child/adolescent maternal	3.31*	0.81			
Maternal attachment attitude	0.96	0.95			
Maternal depression	1.40	2.03			
Obese siblings	5.94**	5.59	18.14 (4)	$p < .001$	.21

Significance: *$p < .10$, **$p < .05$, $n = 105$.

Discussion

The main aim of the study was to identify those children and adolescents who are at risk of nonresponse to an outpatient family-based lifestyle intervention program. More specifically, we analyzed whether failure to reduce BMI-SDS by more than 5% could be predicted by family background data. We found three characteristics of the child's family to predict success in the intervention program: Maternal depression, maternal avoidant attachment attitude and obese siblings. Moreover younger children more likely benefited from the

program. While age of child, maternal depression, and maternal attachment attitude contributed shared variance obese siblings independently predicted the child's success.

Maternal depression is often associated with a less reactive, more withdrawn, and emotionally negative behavior toward the child.[18] Thus, depressive mothers might not be able to support the child sufficiently in her/his efforts to adhere to treatment and change eating and physical activity habits. Maternal depression was associated with older age of the index child. A mediation of this association by maternal age was ruled out.[a] Thus it may be that deficits in support are more pronounced or have worse consequences in adolescence. Unfortunately, we did not assess depression in the cases. We can thus not exclude the possibility that maternal depression predicts offspring depression and behavior problems resulting in a poorer response.

Maternal avoidant attachment attitude also has often been found associated with less adequate parenting behavior.[19] In this study, maternal avoidance of closeness significantly overlapped with depression. That might point to less adequate parenting behavior underlying the associations of the two characteristics with failure to succeed in the program. The avoidant attachment attitude by itself possibly entails to a poor patient-provider relationship. In a large sample of diabetes patients, Ciechanowski et al.[35,36] demonstrated that an avoidant attachment style is associated with poor metabolic control and a less satisfying patient-provider relationship. Thus, it may be that the mothers' inclination to avoid close relationships has led to a less satisfying and supporting relationship with the therapist.

We did not find any association between family adversity factors or educational characteristics of parents and the child's response to the weight-loss program. Regarding educational level and single parent status these findings are in line with the results of other studies,[16] which also found no relationship between these variables and the child's weight loss. Apparently, indices of low socioeconomic status and critical life events are not as important for the child's success in a weight-loss program. More proximal characteristics like well-being and emotional resources of the primary caretaker seem more important.

Formal genetic studies have shown a familial loading with obesity and suggest heritability estimates for BMI in the range between 60 and 80%.[37] Because an obese sibling predicted a poor outcome, we hypothesize that, in these cases, genetic factors account for an obesity phenotype less amenable to weight reduction programs. Indeed, in a recent study, we were able to show that children with a specific insulin-induced gene 2 genotype fared less well in such a program.[38] Parental BMI was not associated with the therapeutic outcome in the current study; however, sib-sib BMI correlations have consistently been higher than parent-offspring correlations.[37] Another explanation, however, might be that the presence of an obese sibling not attending the program and thus sticking to his/her eating and sedentary habits may discourage the index child in his/her efforts to change that behavior.

Maternal depression and avoidance of closeness, older age, and one or more obese siblings of the index child turned out to be risks for nonresponding. In our logistic regression analysis only obese siblings significantly predicted nonresponse, however, the R^2 was only 0.21. Certainly, these results must be cross validated. Furthermore, because our sample size did not allow for valid analyses of interaction effects this should be done in future research. It might be that the amount of explained variance in nonrespondse increases when the interactions are considered. If the results in future studies hold true, it is necessary to focus on the mechanism via which the mother's emotional well-being, age of index child and an obese sibling(s) affect outcomes.

Clinical Implications

It seems noteworthy to mention, that the environmental contribution to the variance of BMI largely depends on nonshared environment, rather than on shared environment.[39] Therefore, therapeutic strategies should focus on the nonshared environment. Accordingly, the results of the present study suggest a careful assessment of maternal well-being and her difficulties in the relationship with the index child at the entrance in a weight reduction program. This diagnostic information can help to provide additional and more specific support that meets the needs of the individual family. These further interventions may consist, for example, in parenting training sessions focusing concrete problems with an adolescent or meetings that enrol the whole family when obese siblings are present and cause difficulties.

[a]To control for the possibility that the association is mediated by maternal age the correlation between maternal age and depression has been calculated. The association was not significant (r = .02).

continue to check back and look for the section on Eating Disorders. Additional information about the program is available at www.aedweb.org

References

1. Kalies H, Lenz J, von Kries R. Prevalence of overweight and obesity and trends in body mass index in German pre-school children, 1982–1997. Int J Obes 2002;26:1211–1217.
2. Wang Y, Beydoun MA. The obesity epidemic in the United States—Gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. Epidemiol Rev 2007;29:6–28.
3. Viner RM, Cole TJ. Who changes body mass between adolescence and adulthood? Factors predicting change in BMI between 16 year and 30 years in the 1970 British birth cohort. Int J Obes 2006;30:1368–1374.
4. Baker JL, Olsen LW, Sorensen TIA. Childhood body-mass index and the risk of coronary heart disease in adulthood. N Eng J Med 2007;357:2329–2337.
5. Shaw K, O'Rourke P, Del Mar C, Kenardy J. Psychological interventions for overweight or obesity. Cochrane Database Syst Rev 2007;2007:CD003818.pub2.
6. Summerbell CD, Ashton V, Campbell KJ, Edmunds L, Kelly S, Waters E. Interventions for treating obesity in children. Cochrane Database Syst Rev 2003;2003:CD001872.
7. Jonides L, Buschbacher V, Barlow SE. Management of child and adolescent obesity: psychological, emotional, and behavioral assessment. Pediatrics 2002;110:215–221.
8. McLean N, Griffin S, Toney K, Hardeman W. Family involvement in weight control, weight aintenance and weight-loss interventions: A systematic review of randomised trials. Int J Obes 2003;27:987–1005.
9. Story MT, Neumark-Stzainer DR, Sherwood NE, Holt K, Sofka D, Trowbridge FL, et al. Management of child and adolescent obesity: Attitudes, barriers, skills, and training needs among health care professionals. Pediatrics 2002;110:210–214.
10. Nemet D, Barkan S, Epstein Y, Friedland O, Kowen, G, Eliakim A. Short- and long-term beneficial effects of a combined dietary-behavioral-physical activity intervention for the treatment of childhood obesity. Pediatrics 2005;115:e443–e449.
11. Jelalian E, Mehlenbeck R, Lloyd-Richardson EE, Birmaher V, Wing RR. "Adventure therapy" combined with cognitive-behavioral treatment for overweight adolescents. Int J Obes 2006;30:31–39.
12. Reinehr T, de Sousa G, Toschke AM, Andler W. Long-term follow-up of cardiovascular disease risk factors in children after an obesity intervention. Am J Clin Nutr 2006;84:490–496.
13. Reinehr T, Kersting M, Alexy U, Andler W. Long-term follow-up of overweight children: After training, after a single consultation session, and without treatment. J Pediatr Gastroenterol Nutr 2003;37:72–74.
14. Kalavainen MP, Kroppi MO, Nuutinen OM. Clinical efficacy of group-based treatment for childhood obesity compared with routinely given individual counseling. Int J Obes 2007;31:1500–1508.
15. Stein RI, Epstein LH, Raynor HA, Kilanowski CK, Paluch RA. The influence of parenting change on pediatric weight control. Obes Res 2005;13:1749–1755.
16. Reinehr T, Brylak K, Alexy U, Kersting, M, Andler W. Predictors to success in outpatient training in obese children and adolescents. Int J Obes 2003;27:1087–1092.
17. Laucht M, Esser G, Baving L, Gerhold M, Hoesch I, Ihle W, Steigleider P, Stock B, Stoehr RM, Weindich D, Schmidt MH. Behavioral sequelae of perinatal insults and early family adversity at 8 years of age. J Am Acad Child Adolesc Psychiatry 2000; 39(10):1229–1237.
18. Lovejoy MC, Graczyk PA, O'Hare ENeuman G. Maternal depression and parenting behavior: A meta-analytic review. Clin Psychol Rev 2000;20:561–592.
19. Van Ijzendoorn MH. Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the adult attachment interview. Psychol Bull 1995;117:387–403.
20. Ashman SB, Dawson G, Panagiotides H, Yamada, E, Wilkinson CW. Stress hormone levels of children of depressed mothers. Dev Psychopathol 2002;14:333–349.
21. Cummings EM, Davies PT. Maternal depression and child development. J Child Psychol Psychiatry 1994;35:73–112.
22. Network NECCR. Chronicity of maternal depressive symptoms, maternal sensitivity, and child functioning at 36 months. Dev Psychol 1999;35:1297–1310.
23. Jelalian E, Hart CN, Mehlenbeck RS, Lloyd-Richardson EE, Kaplan JD, Flynn-O'Brien KT, et al. Predictors of attrition and weight loss in an adolescent weight control program. Obesity 2008;16:1318–1323.
24. Eliakim A, Friedland O, Kowan G, Wolach B, Nemet D. Parental obesity and higher pre-intervention BMI reduce the likelihood of a multidisciplinary childhood obesity program to suceed—A clinical observation. J Pediatr Endocrinol Metab 2004;17:1055–1061.
25. Nuutinen O, Knip M. Predictors of weight reduction in obese children. Eur J Clin Nutr 1992;46:785–794.
26. Epstein LH, Wisniewski L, Weng R. Child and parent psychological problems influence child weight control. Obes Res 1994;2: 509–515.
27. Kromeyer-Hauschild K, Wabitsch M, Kunze D, Geller D, Geiss HC, Hesse V, et al. Percentiles of body mass indx in children and adolescents evaluated from different regional German studies. Monatsschr Kinderheilkd 2001;149:807–818.
28. Weiss RH. Grundinteligenztest Skala 2 (CFT20). Göttingen: Hogrefe, 1998.
29. Reinehr T, Temmesfeld M, Kersting M, de Sousa G, Toschke AM. Four-year follow-up of children and adolescents participating in an obesity intervention program. Int J Obes 2007;31:1074–1077.
30. Cole TJ. The LMS method for onstructing normalized growth standards. Eur J Clin Nutr 1990;44:45–60.
31. Radloff L. The CES-D sale: A self-report depression scale for research in the general population. Appl Psychol Meas 1977;1: 385–401.
32. Hautzinger M, Bailer M. Allgemeine Depressionsskala. Weinheim: Beltz Test, 1993.
33. Schmidt S, Strauß B, Höger D, Brähler E. Die adult attachment scale (AAS)—Teststatistische Prüfung und normierung der deutschen version. Psychother Psychosom Med Psychol 2004;54:375–382.
34. Collins NL, Read SJ. Adult attachment, working models, and relationship quality in dating couples. J Pers Soc Psychol 1990; 58:644–663.
35. Ciechanowski PS, Katon WJ, Russo JE, Walker EA. The patient-provider relationship: Attachment theory and adherence to tratment in diabetes. Am J Psychiatry 2001;158:29–35.
36. Ciechanowski P, Russo J, Katon W, von Korff M, Ludman E, Lin E, et al. Influence of patient attachment style on self-care and outcomes in diabetes. Psychosom Med 2004;66:720–728.
37. Hebebrand J, Sommerlad C, Geller F, Görg T, Hinney A. The genetics of obesity: Practical implications. Int J Obes 2001; 25(Suppl 1):S10–S18.
38. Reinehr T, Hinney A, Nguyen TT, Hebebrand J. Evidence of an influence of a polymorphism near the INSIG2 on weight loss during a lifestyle intervention in obese children and adolescents. Diabetes 2008;57:623–626.
39. Stunkard AJ, Harris JR, Pedersen NL, McClearn GE. The body mass index of twins who have been reared apart. N Eng J Med 1990;222:1483–1487.