

# Influence of Family Therapy on Bullying Behaviour, Cortisol Secretion, Anger, and Quality of Life in Bullying Male Adolescents: A Randomized, Prospective, Controlled Study

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**Objective:** To determine the influence of brief strategic family therapy (BSFT) on salivary cortisol, anger, and health-related quality of life (QoL) in adolescent boys with bullying behaviour.

**Method:** We selected a sample of 72 boys demonstrating bullying behaviour from the general population and treated 36 with BSFT for 12 weeks. The other 36 boys formed the control group. Primary outcome measures were salivary cortisol concentration 15 to 30 minutes after awakening and changes on the subscales of the State-Trait Anger Expression Inventory (STAXI) and the Health Survey (SF-36).

**Results:** After 12 weeks' treatment, we observed a significant reduction in bullying behaviour in the BSFT group ( $P = 0.017$ ) and in the mean values (according to the intent-to-treat principle) for salivary cortisol concentration ( $P < 0.001$ ). The BSFT group also showed significantly greater change on the STAXI subscales State-Anger ( $P < 0.001$ ), Trait-Anger ( $P < 0.001$ ), Anger-Out ( $P < 0.001$ ), and Anger-Control ( $P < 0.001$ ). Treatment with BSFT also resulted in significant improvement on the SF-36 subscales for Vitality ( $P < 0.001$ ), Social Functioning ( $P < 0.001$ ), Role-Emotional ( $P < 0.001$ ), and Mental Health ( $P < 0.001$ ).

**Conclusions:** BSFT effectively influenced bullying behaviour, salivary cortisol concentration, anger, and health-related QoL in adolescent bullying boys.

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Information on funding and support and author affiliations appears at the end of the article.

## Clinical Implication

- BSFT effectively reduces bullying behaviour, salivary cortisol level, and anger and improves health-related quality of life in bullying male adolescents.

## Limitations

- The sample size was relatively small.
- The sample consisted only of male adolescents.
- Observance of the guidelines for sampling saliva was not checked.

**Key Words:** salivary cortisol, anger, health-related quality of life, brief strategic family therapy, adolescence

Bullying should not be considered a normative aspect of youth development but, rather, a marker for more serious violent behaviours (1,2). Major studies suggest that 20% to 30% of students are frequently involved in bullying as perpetrators and (or) victims (3,4). Bullying behaviours include not only physical aggression but also verbal harassment and public humiliation (5). Studies that rely solely on self-reports suggest that bullies and victims share psychological and social problems (4,6).

Bullying behaviour in perpetrators is associated with psychological burdens (7–9). Acute exposure to stress generally activates the HPA axis, whereas chronic exposure to stressors tends to invoke an adaptational mechanism that reduces the reactivity of this neuroendocrine system to acute stress (10). Moss and others found a diminished salivary cortisol response in children that correlated to the magnitude of behavioural problems (11). Other studies in children have also found reduced basal cortisol concentrations associated with anger, irritability, hostility, and CD severity (12–15); some studies, however, reported the absence of these findings (16). Thus environmental factors are nearly as important as heritable factors in accounting for the variations in plasma cortisol concentrations (11,17). Taken together, these observations suggest that the responsiveness of the HPA axis to a given stressor may result from adaptation to ambient stress levels, behavioural disposition, and the genetic regulation of the HPA axis.

Espelage and others (8), Stockdale and others (18), and Rigby (9) found that greater levels of bullying are associated with higher levels of anger. Further, among male students,

perpetration (not victimization) is strongly associated with poor health-related QoL and lower scores for all domains of life satisfaction (7,19). Treatment of anger and aggression should incorporate environmental or psychotherapeutic measures (20–25), including family therapeutic techniques (20,23,27,28).

Families of disturbed adolescents are characterized by continuous and severe conflict that negatively affects communication patterns and interaction within the family (28). BSFT focuses on assessing the family's conflict resolution style and on developing specific interventions to help families negotiate and resolve their differences more effectively (29). BSFT targets children and youth aged 8 to 17 years who currently display or are at risk for developing behaviour problems (26). BSFT aims to improve adolescent behaviour by improving family relationships, which, presumably, are directly related to adolescent behaviour problems; it also aims to improve relationships between the family and other important systems that influence youth (for example, school and peers) (27).

Our purpose in this investigation was fourfold. First, we designed the study to examine salivary cortisol secretion 30 minutes after awakening in adolescent boys demonstrating bullying behaviour. Second, we tested the hypothesis that these subjects have relatively high anger levels. Third, we explored the theory that bullying is associated with a relatively poor health-related QoL. Our fourth goal was to find out whether the application of BSFT based on a biopsychosocial framework as a monotherapy could be effective in changing cortisol reactivity, reducing anger, and improving QoL in the study participants.

#### Abbreviations used in this article

BOPA	bodily pain
BSFT	brief strategic family therapy
CD	conduct disorder
CI	confidence interval
GEPE	general health perceptions
HPA	hypothalamic–pituitary–adrenal
PHFU	physical functioning
PSYC	mental health
QoL	quality of life
ROEM	role limitations due to emotional problems
ROPH	role limitations due to physical health
SD	standard deviation
SF-36	SF-36 Health Survey
SOFU	social functioning
STAXI	State-Trait Anger Expression Inventory
VITA	vitality

#### Methods

##### Subjects

We restricted the study to adolescent boys aged 14 and 15 years (see also 8) who engaged in bullying, according to self-reports (see also 1). The boys were recruited through advertisements. Trained staff initially questioned them by telephone about their bullying behaviour.

Exclusion criteria were current liability to prosecution, psychotic illness, current dependency on drugs or alcohol, and current psychotherapy and (or) use of psychotropic medication.

The necessary sample size was calculated for a Type I error of 5% ( $z_1 = 1.96$ ) and a power analysis of 80% ( $z_2 = 0.842$ ) according to the mean value (mean<sub>1</sub> 18.6, SD 5.1; and mean<sub>2</sub> 15.1, SD 4.5) for the Anger-Out score (for STAXI assessment, see below) obtained from a small pilot study. The formula is as follows:

$$n \text{ (per group)} = [(z_1 + z_2)^2 \times (SD_1^2 + SD_2^2)] / (\text{mean}_1 - \text{mean}_2)^2 \quad (30)$$

Additionally, we also calculated about 20% for possible drop-outs. This resulted in a group size of  $2 \times 36$  patients.

After the telephone interview, we determined that 83 adolescent boys potentially met the inclusion criteria for the study (Figure 1); these were invited with their families to participate in a face-to-face interview, clinically tested for CD according to DSM-IV criteria, and tested with the STAXI and the SF-36 (see below).

### **Salivary Cortisol Measurement and Psychiatric Assessment**

*Salivary Cortisol.* Salivary cortisol was analyzed with a time-resolved fluorescence immunoassay (described in detail by Dressendoerfer and others, 31). Salivary cortisol determinations are a useful, nontraumatic method to assess changes in cortisol responsiveness; they are particularly useful for children (32).

*State-Trait Anger Expression Inventory.* The STAXI is a procedure for assessing anger and its expression in individuals aged 14 years or older (for male test subjects, Cronbach's  $\alpha = 0.76$  to  $0.89$ ). It comprises 44 items forming 5 subscales:

1. State-Anger, the subjective state of anger at the time of measurement.
2. Trait-Anger, the readiness to react with anger (mean normal value 18.1, SD 5.34).
3. Anger-In, the tendency to suppress anger (mean normal value 16.0, SD 4.04).
4. Anger-Out, the tendency to direct anger outwards (mean normal value 13.0, SD 4.02).
5. Anger-Control, the tendency to keep anger under control (mean normal value 22.4, SD 5.29).

The values for State-Anger and Trait-Anger range from 10 to 40, and the other values range from 8 to 32 (33).

*Health Survey.* The SF-36 (34) was designed to obtain individual reports from patients aged 14 years and over regarding their health-related QoL, independent of their current state of health and age. It consists of a questionnaire with 36 items categorized according to several subject areas. The items record 8 dimensions of subjective health (abbreviations as follows): PHFU, ROPH, BOPA, GEPE, VITA, SOFU, ROEM, and PSYC. The items and subscales of the SF-36 are calculated so that a higher score corresponds to a better state of health. A higher score in functionality, for instance, indicates better functionality in the subject, and a higher score on the pain subscale means freedom from pain. The subscales' raw values are converted into transformed scale values ( $T$  values). Reliability testing shows an internal consistency ranging from 0.77 to 0.93 (35).

### **Procedure**

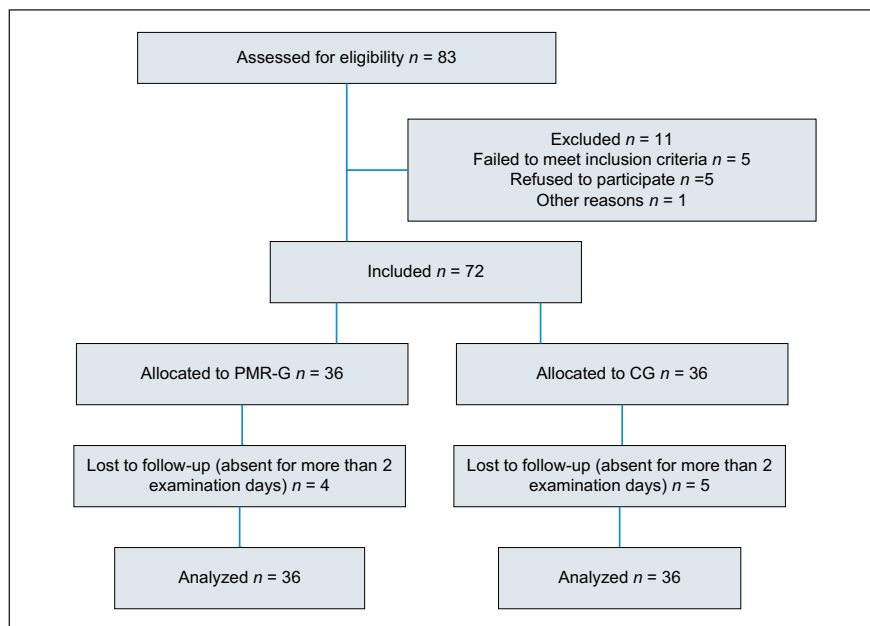
We carried out our study for 12 weeks between January 2003 and September 2004. We required 72 subjects. All the selected families appeared for the first therapy date. The clinic administration carried out randomization confidentially with Excel table random numbers (Figure 1); this was arranged so that 36 subjects would be treated with BSFT and 36 would form the control group. The BSFT group comprised 48 parents, 36 adolescents, and 21 younger siblings; the control group comprised 45 parents, 36 adolescents, and 23 younger siblings. If the parents were separated and did not live too far from the clinic, we attempted to invite both. Parents were reminded about the appointment 3 to 5 times by telephone. The subjects were all reminded of their appointments 3 to 4 times by telephone. Both groups were comparable with respect to their mean age, family conditions (living together with both parents: BSFT group  $n = 15$  [41.7%], control group  $n = 14$  [38.9%]), having a girlfriend (BSFT group  $n = 5$  [13.9%], control group  $n = 4$  [11.1%]), and smoking (BSFT group  $n = 26$  [72.2%], control group  $n = 24$  [66.7%]). The subjects met the DSM-IV criteria for CD (BSFT group  $n = 15$  [41.7%], control group  $n = 16$  [44.4%]), oppositional defiant disorder (BSFT group  $n = 12$  [33.3%], control group  $n = 13$  [36.1%]), attention-deficit hyperactivity disorder (BSFT group  $n = 2$  [5.5%], control group  $n = 1$  [2.8%]), and other disorders (BSFT group  $n = 5$  [13.9%], control group  $n = 6$  [16.7%]). Most youths (BSFT group  $n = 27$  [75.0%], control group  $n = 25$  [69.4%]) met criteria for more than one disorder. A few subjects smoked regularly (BSFT group  $n = 7$  [19.4%], control group  $n = 6$  [16.7%]). All were physically healthy.

We asked subjects to take samples of their saliva (Salivette, Sarstedt, Numbrecht, Germany) for cortisol assessment on all 5 school days each week during the 8-week period and instructed them exactly how to do this. Saliva had to be sampled 15 to 30 minutes after awakening. The youths were not to do normal morning activities, such as brushing teeth, eating breakfast, or exercising, until they finished taking samples. They agreed to follow the schedule strictly. However, the time of saliva collection could not be controlled. Also, we could not validate the accuracy of saliva collection; we relied on the subjects' compliance. The blinded boxes with saliva assays were released twice weekly (they were saved at  $-80^{\circ}\text{C}$ ).

All the subjects were tested weekly with the STAXI and with the SF-36. Face-to-face interviews were conducted by blinded professional staff (that is, 5 individuals who were randomly assigned to the subjects), always independently of the therapy sessions.

Therapists and cotherapists were randomly assigned to the families. We treated the members of the BSFT group with a short-term, problem-focused intervention that included twelve 100-minute sessions in the therapists' offices, spaced

**Figure 1** Flow diagram of patients' progress through the phases of the trial



**Table 1** Initial and final evaluation of STAXI and salivary cortisol

STAXI subscale	Initial evaluation Mean (SD)		Final evaluation Mean (SD)		Difference in change between the 2 groups	95%CI	Probability (U test)	Effect size
	BSFT group <sup>a</sup>	Control group <sup>a</sup>	BSFT group <sup>a</sup>	Control group <sup>a</sup>				
State-Anger	22.8 (2.8)	21.4 (2.3)	19.8 (2.4)	20.9 (2.1)	-2.4	-3.0 to -1.9	< 0.01	2.1
Trait-Anger	21.9 (2.3)	21.5 (2.3)	19.4 (1.9)	20.7 (2.3)	-1.8	-2.5 to -1.1	< 0.01	1.3
Anger-In	15.5 (1.7)	15.4 (1.4)	14.7 (1.7)	14.8 (1.3)	-0.1	-0.3 to 0.41	= 0.796	0.06
Anger-Out	17.4 (1.9)	16.8 (2.4)	15.5 (1.5)	16.1 (2.4)	-1.4	-1.9 to -0.8	< 0.01	1.2
Anger-Control	23.2 (1.8)	22.8 (1.9)	24.0 (1.3)	22.2 (1.8)	1.4	0.9 to 2.0	< 0.01	1.3
Salivary cortisol <sup>b</sup>	7.3 (2.9)	7.2 (3.0)	9.9 (2.0)	7.3 (2.9)	2.4	1.1 to 3.2	< 0.01	2.0

<sup>a</sup>n = 36  
<sup>b</sup>nmol/L

over a period of 12 weeks. Interventions were implemented at the family level and took into account the complex relationships within the family system, targeting repetitive patterns of interactions (that is the habitual ways in which family members interact with one another) directly related to the youths' behaviour problems.

The control group was treated simultaneously and just as frequently as the BSFT group, but with an alternative intervention: a structured session with detailed questions about how they felt and about their daily activities and events. We paid rigorous attention to their not receiving any of the previously described family therapeutic interventions.

Nine subjects who failed to appear more than 4 times for the sessions (4 from the BSFT group and 5 from the control group) dropped out of the study (Figure 1). We did not analyze the intermediate results during the course of the trial. The study concluded according to plan.

**Data Analysis**

We used the statistical program SPSS, Version 11 (SPSS Inc Chicago, IL). Since data were not normally distributed, we performed the Mann–Whitney U Test for comparison of continuous variables. We used difference in change between the 2 groups, its 95%CI, and probability for reporting the treatment results according to the intent-to-treat principle. To describe

**Table 2 Changes on SF-36 subscales (T values)**

SF-36 subscale	Initial evaluation Mean (SD)		Final evaluation Mean (SD)		Difference in change between the 2 groups	95%CI	Probability (U test)	Effect size
	BSFT group <sup>a</sup>	Control group <sup>a</sup>	BSFT group <sup>a</sup>	Control group <sup>a</sup>				
PHFU	94.0 (4.3)	94.2 (4.5)	94.6 (4.2)	94.9 (4.9)	0.1	-0.6 to 0.4	= 0.271	0.07
ROPH	96.4 (4.6)	96.7 (4.0)	96.9 (4.9)	97.1 (3.9)	0.0	-0.5 to 0.6	= 0.852	0.05
BOPA	91.6 (4.7)	89.4 (4.6)	92.4 (4.8)	90.2 (3.4)	0.0	-0.5 to 0.5	= 0.889	0.04
GEPE	80.5 (3.9)	84.1 (4.4)	81.1 (4.0)	85.1 (4.5)	0.4	-0.8 to 0.1	= 0.098	0.4
VITA	57.7 (4.7)	55.3 (4.2)	60.3 (5.0)	55.3 (4.1)	2.6	2.1 to 3.1	< 0.01	2.7
SOFU	73.7 (4.3)	72.9 (3.8)	75.9 (4.1)	72.9 (4.0)	2.2	1.7 to 2.7	< 0.01	2.2
ROEM	72.2 (2.5)	71.9 (3.0)	74.5 (2.4)	71.7 (3.4)	2.7	2.0 to 3.2	< 0.01	2.2
PSYC	62.0 (2.5)	61.5 (2.5)	65.8 (2.6)	61.5 (2.3)	3.8	3.1 to 4.6	< 0.01	2.7

<sup>a</sup>n = 36

the magnitude of change between the groups, we calculated the effect size. As a measure for the association, we calculated the rank-order correlation coefficients according to Spearman (30).

#### Source of Funding and Ethical Considerations

The study was planned and conducted in accordance with the Declaration of Helsinki (see [www.wma.net/e/policy/b3.htm](http://www.wma.net/e/policy/b3.htm)) and with ethical laws pertaining to the medical professions. Its design was approved by the clinic's *Ethikkommission* (the German equivalent of the Committee on Human Subjects). The study was conducted independently of any institutional influence and was not funded. After the study was described in detail to the youths and their parents, we obtained written informed consent.

#### Results

Table 1 shows the STAXI test results. We found no essential differences between the BSFT group and the control group on initial testing. At the beginning of the study, both groups had distinctly increased STAXI scores, indicating the presence of anger-related symptoms.

Twelve weeks later, there was a reduction in reports of bullying (in the BSFT group, from  $n = 36$  to  $n = 11$ ; in the control group, from  $n = 36$  to  $n = 29$ ;  $P = 0.017$ , Fisher's exact test). Tables 1 and 2 also summarize BSFT group and control group differences in change over the course of the study. Compared with the control group, the BSFT group experienced a significantly greater difference in reduction in salivary cortisol secretion and on all the STAXI subscales except the Anger-In subscale (Table 1). There were significant increases on the VITA, SOFU, ROEM, and PSYC subscales of the SF-36, but

not on the PHFU, ROPH, BOPA, and GEPE subscales (Table 2).

In the BSFT group, there was a significant negative correlation between the difference in change in salivary cortisol and difference in change on the State-Anger ( $r = 0.655$ ,  $P < 0.01$ ), Trait-Anger ( $r = 0.509$ ,  $P < 0.01$ ), Anger-Out ( $r = 0.504$ ,  $P < 0.01$ ), and Anger-Control ( $r = 0.496$ ,  $P < 0.01$ ) STAXI subscales. Similarly, we found significant positive correlations between the difference in change in salivary cortisol and difference in change on the VITA ( $r = 0.647$ ,  $P < 0.01$ ), SOFU ( $r = 0.694$ ,  $P < 0.01$ ), ROEM ( $r = 0.688$ ,  $P < 0.01$ ), and PSYC ( $r = 0.695$ ,  $P < 0.01$ ) SF-36 subscales.

Figures 2 and 3 illustrate the change over time in salivary cortisol and on the Anger-Out subscale for the both groups. In most categories, BSFT was associated with initial gradual change (in the first to about the third or fourth week of treatment) but later relatively rapid change (from about the fourth or fifth week). The changes on the STAXI Anger-In subscale (another type of anger processing) and on the SF-36 PHFU, ROPH, BOPA, and GEPE subscales remained continuously moderate.

#### Discussion

After treatment, bullying behaviour was significantly reduced. The baseline measurement of salivary cortisol resulted in relatively low values (see also 36). Compared with the control group, the BSFT group experienced a significant increase in morning salivary cortisol level. Compared with the test norms (33), both groups showed increased STAXI scores on initial testing (see also 8,18). The BSFT group experienced a significantly greater change than the control group on 4 STAXI subscales: State-Anger, Trait-Anger, Anger-Out and

Figure 2 Course over time: morning salivary cortisol

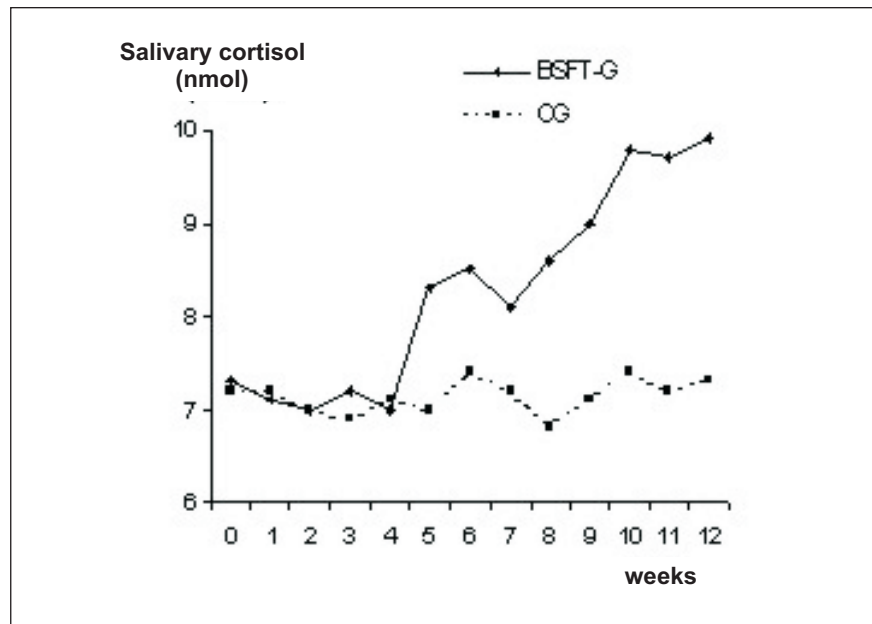
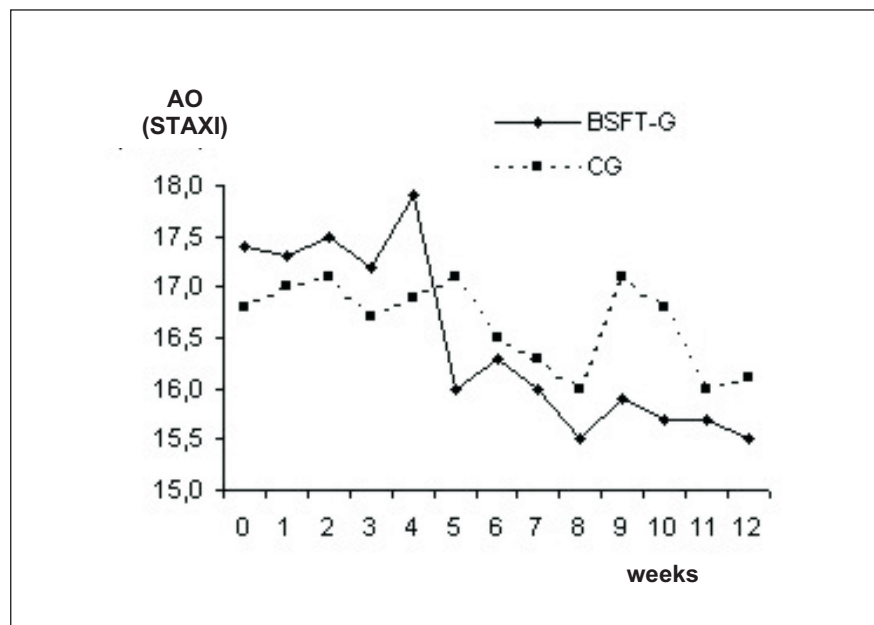


Figure 3 Course over time: Anger-Out of STAXI



Anger-Control. Individuals with high State-Anger scores experience relatively intense feelings of anger, and those with high Trait-Anger scores experience anger relatively frequently. Whether they suppress their anger or direct it inwards can be assessed through the Anger-In, Anger-Out, and Anger-Control subscales. Because Anger-In and Anger-Out are independent of each other, subjects can have high scores on both subscales (33). Persons with high Anger-Control scores expend a lot of energy on directing and controlling their emotions in situations that provoke anger (33). Among

our adolescents, BSFT appeared to influence significantly the intensity of their subjective state of anger as well as their readiness to react with anger. Further, the tendency to control anger was significantly strengthened.

At the beginning of the study, both groups had relatively low mental health SF-36 scores (indicated by the VITA, SOFU, ROEM, and PSYC subscales), which indicated subjective reductions in these areas of health-related QoL (7,19). Treatment with BSFT resulted in significant improvement in the

following categories: VITA, SOFU, ROEM, and even PSYC. No significant changes were observed in PHFU, ROPH, BOPA, and GEPE. This is related to the fact that the youth had already achieved high scores in the baseline tests for the subscales measuring the QoL related to physical health (see also 35).

In the BSFT group, the difference in change in salivary cortisol level had a significant negative correlation with the difference in change on most of the STAXI subscales, which could support the view that an inverse relation exists between cortisol secretion after awakening and aggressive behaviour (see also 12–15). Thus the difference in change in morning salivary cortisol level correlated significantly and positively with the differences in change on all the SF-36 subscales measuring psychological health, which would generally support the view that there is a close relation between cortisol secretion and mental health in adolescents (11–15).

This study demonstrated that aggressive adolescent boys were able to take part successfully in BSFT (see also 37). The clear time frame and clear interventions were shown to promote compliance (see also 20,26–28).

In our study, BSFT proved to effectively reduce bullying behaviour and anger, to affect morning salivary cortisol secretion (12–15,32), and to improve health-related QoL (7,19,38) in adolescent boys demonstrating bullying behaviour.

Bullying has been recognized as a health problem for children because of its association with adjustment problems, including poor mental health and violent behaviour (5). Psychotropic medication is often necessary for young people who cannot cope with their anger or stress levels (23). There are, however, other approaches that can be initiated earlier. After BSFT, the youths in this study showed significantly reduced bullying behaviour and anger and improved health-related QoL, with simultaneous change in their morning salivary cortisol secretion. It may be possible to integrate BSFT, even prophylactically, into coordinated school mental health and aggression-management programs.

Our study contributes new data to the discussion on salivary cortisol secretion, aggression, and health-related QoL in adolescents. It is possible that low HPA axis activity actually correlates to severe and persistent aggression in male adolescents.

Additional research is needed to see whether these results can be replicated and how long-lasting the benefits are.

### Limitations

This study had several methodological limitations. First, despite a valid power analysis, the sample size was relatively small. Second, the sample consisted only of adolescent boys. Whether these results could also be replicated with adolescent

girls is unknown. Third, the sample comprised only subjects who were currently not abusing substances or taking concurrent medications. Fourth, the length of this trial was 3 months, which possibly reduced the dropout rate. Fifth, we could not check observance of the guidelines for sampling saliva; we relied on the subjects' compliance. Sixth, the definition of bullying was not validated. Seventh, we made clinical diagnoses based only on DSM-IV criteria (without assessment tools).

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The study was conducted independently of any institutional influence and was not funded.

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## Résumé : L'influence de la thérapie familiale sur le comportement intimidateur, la sécrétion de cortisol, la colère et la qualité de vie chez les adolescents masculins intimidateurs : une étude prospective randomisée contrôlée

**Objectif :** Déterminer l'influence d'une brève thérapie familiale stratégique (BTFS) sur le cortisol salivaire, la colère et la qualité de vie liée à la santé chez des adolescents masculins ayant un comportement intimidateur.

**Méthode :** Nous avons prélevé un échantillon de 72 garçons démontrant un comportement intimidateur dans la population générale et en avons traité 36 au moyen de la BTFS pendant 12 semaines; les autres 36 garçons ont formé le groupe témoin. Les principales mesures du résultat étaient la concentration de cortisol salivaire de 15 à 30 minutes après le réveil, et les changements aux sous-échelles de l'inventaire d'expression de la colère état-trait (STAXI) et à l'Enquête sur la santé (SF-36).

**Résultats :** Après le traitement de 12 semaines, nous avons observé une réduction significative du comportement intimidateur dans le groupe de la BTFS ( $P = 0,017$ ) et dans les valeurs moyennes (selon le principe des sujets retenus au début de l'essai clinique) des concentrations de cortisol salivaire ( $P < 0,001$ ). Le groupe de la BTFS a aussi démontré un changement significativement plus grand aux sous-échelles de STAXI état-colère ( $P < 0,001$ ), trait-colère ( $P < 0,001$ ), colère-expression ( $P < 0,001$ ), et colère-maîtrise ( $P < 0,001$ ). Le traitement de la BTFS a également produit une amélioration significative aux sous-échelles de la SF-36 de la vitalité ( $P < 0,001$ ), du fonctionnement social ( $P < 0,001$ ), du rôle émotionnel ( $P < 0,001$ ), et de la santé mentale ( $P < 0,001$ ).

**Conclusions :** La BTFS a influencé efficacement le comportement intimidateur, la concentration de cortisol salivaire, la colère, et la qualité de vie liée à la santé chez des adolescents masculins ayant un comportement intimidateur.