Bonding and Expressed Emotion: Two Interlinked Concepts?

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Key Words
Anorexia nervosa • Bonding • Expressed emotion • Five-Minute Speech Sample • Parental Bonding Instrument • Perceived family relationships

Abstract
Background: Bonding and expressed emotion (EE) are two concepts modeling family relationships. Two studies, with contradictory results, have explored whether these concepts and their corresponding instruments [the Parental Bonding Instrument (PBI) and the Camberwell Family Interview] do indeed measure the same aspects of family relationships. Our first objective was to compare the adolescents' perceptions of family relationships using the PBI, and the parental viewpoint using the Five-Minute Speech Sample (FMSS-EE). Secondly, we compared the PBI scores and EE levels of the parents. Sampling and Methods: Sixty adolescent girls with anorexia nervosa completed the PBI. The FMSS and a modified version of the PBI were administered to parents separately. Results: No significant link was identified between adolescent PBI scores and parental EE levels. However, a link between maternal 'modified' PBI scores and maternal EE was observed: when mothers registered a high Final EE, they were more likely to deny their daughter's psychological autonomy compared to mothers with lower EE.

Conclusions: Our empirical results do not support the hypothesis of an overlap between the two concepts. Indeed bonding and EE measure the same object, i.e. the quality of family relationships, but time scales differ and so do the perspectives (patient vs. parental viewpoint).

Introduction

Anorexia nervosa (AN) is a severe pathology with a reported prevalence ranging from 0.9 to 2.2% among women [1, 2]. The present-day etiopathological approach to this illness is based on a multifactorial determination that associates predisposing, precipitating, and persistence factors, all of which can be familial [3]. In AN, the family environment and its role in therapy have been widely investigated, beginning with work conducted as

Parts of these results were presented in September 2011 at the European Council on Eating Disorder (ECED) and the 8th Congress of the International Society for Adolescent Psychiatry and Psychology (ISAPP).
early as the 19th century. Today, family factors are considered as one of the nonspecific elements governing the genesis and maintenance of this disorder [4, 5] and thus as a therapeutic tool of major importance [6, 7].

Among the numerous conceptualizations and models of family relationships, the concept of bonding between a parent and a child is generally accepted, despite the lack of any clear definition of the concept [8]. Findings from studies on parental contribution have suggested that bonding might be influenced by two main parental attitudes toward their child: care and overprotection [8, 9]. Parker developed the Parental Bonding Instrument (PBI), a subjective rating, to operationalize this theoretical concept [8, 10]. Originally, the PBI included a Care dimension, comprising one pole defined by affection, emotional warmth, and empathy, and another defined by emotional coldness, indifference, and neglect, and a second dimension called Overprotection, with one pole defined by control, overprotection, intrusion, and excessive contact and another pole defined by items that suggest that independence and autonomy are allowed [8, 10].

Conclusions from recent research on the factorial structure of the PBI are in favor of a 3-factor solution: Care, Denial of Psychological Autonomy, and Encouragement of Behavioral Freedom [11–14]. Parental bonding in families with a member suffering from AN has been explored, to our knowledge, in 7 studies since 1984 [15–21].

In line with this, seeking to identify family factors that could explain relapse in schizophrenia, Brown and Rutter [22, 23] conducted interviews with these patients' families. An a-theoretical analysis of the discourse enabled the identification of 5 dimensions: (1) 'critical comments' and (2) 'positive remarks' (about the patient); (3) 'hostility' defined as generalization of criticism about the patient, rejection of the person, or both; (4) 'warmth' reflecting the respondent's sympathy and concern for and interest in the patient, and (5) 'emotional overinvolvement' which includes overprotection by the parent, self-sacrificing behaviors, or extreme emotional responses. This led to the development of the expressed emotion (EE) construct [24]. Hostility and/or critical comments and/or emotional overinvolvement ratings enable a description of the emotional climate in the family in terms of a high or low level of EE. This methodology yielded the Camberwell Family Interview (CFI) [25]. The CFI is the gold standard for evaluating EE, but it is particularly time-consuming. Therefore, shorter instruments were developed, such as the Five-Minute Speech Sample (FMSS) [26–29]. The FMSS enables the 2 principal dimensions of EE to be rated: Criticism (Critical EE) and Emotional Overinvolve-
ment (EOI EE), as expressed by a parent on the subject of their child. Since 1981, the family emotional climate has been widely studied in families with a member suffering from AN [30].

In the 1980s, Leff and Vaughn [31] and Parker et al. [32] hypothesized that the concepts of bonding and EE could be closely related and suggested that 'it would be informative to compare EE ratings and PBI scores for the same relatives' [p. 438 in 32]. They postulated that the Care score might be inversely related to Critical EE comments, while the Overprotection score could be related to the EE EOI ratings [31, 32]. To our knowledge, this hypothetical link has only been investigated in 2 studies, with apparently contrasting results. Parker et al. [32] tested this link using the PBI and the CFI measures on 57 patients suffering from schizophrenia (58% males, mean age 26 years). This study found that the number of critical comments on the CFI was 'weakly' correlated to maternal and paternal Care scores (respectively, r = 0.27 and r = 0.24) and maternal Overprotection scores (r = 0.26). The Emotional Overinvolvement dimension was correlated with Overprotection, but 'more markedly' for the mother than for the father (r = 0.43 vs. 0.20) [p. 440 in 31]. Hedlund et al. [33] tested this same hypothesis in a smaller sample of 30 bulimic patients (6.6% males, mean age 24.3 years) using the CFI and PBI measures. Care and Overprotection were not found to be linked with family levels of EE, while the links with each of the dimensions critical comments and EOI were not studied.

The present study aimed first to compare bonding on the PBI and the EE on the FMSS. More precisely, we compared the bonding dimension Care with the Critical EE level, and the bonding dimensions Care with the Critical EE level, and the bonding dimensions Denial of Psychological Autonomy and Encouragement of Behavioral Freedom with the EOI EE level. The second objective was to compare family relationships from the same perspective: parental bonding to their child with a modified parent version of the PBI and the parental perceptions of EE using the FMSS. The idea was to determine whether links between parental scores on the modified PBI and their EOI profiles on the FMSS would be more significant than links between adolescent PBI and parental FMSS.

**Material and Methods**

**Recruitment**

This study complies with the terms of the Helsinki Declaration and received approval from the Ile-de-France III Ethics Committee. Prior to inclusion in the study, all participants were hospitalized in our care unit for a life-threatening physical and/
or mental state (for one or more of the following criteria: BMI below 14 and or rapid weight loss and/or compromised vital functions, severe depression, high suicide risk, chronic under-nutrition with low weight, and failure of outpatient care) according to international guidelines [7, 34–36]. Once the patient was admitted, the objectives of hospitalization were defined by means of a weight contract establishing a discharge target weight [36–38]. For each patient hospitalized between January 1999 and July 2002, a screening file sheet was completed by a psychiatrist not involved in the patient's treatment (N.G.) in collaboration with the patient's clinicians. Although each patient and her parents were informed of the study at admission, the inclusion occurred when possible in the second half of their hospital stay (i.e. half way towards their target weight).

The inclusion criteria were female subjects 13–21 years old, with a DSM-IV diagnosis of AN at admission, hospitalized in our inpatient unit for AN, with age at onset under 19 years and AN duration ≤ 3 years at admission to the hospital, living in the Paris metropolitan area, and never having received family therapy. The patient could be receiving appropriate medication. The exclusion criteria were inability to speak or read French and/or understand the interview questions, any metabolic pathology interfering with eating or digestion (e.g. diabetes), or a psychotic disorder. These criteria also concerned the patients' parents.

Out of the 116 patients for whom eligibility was assessed during the recruitment period, 40 did not meet our selection criteria (10 males 14 for whom illness onset occurred at age 19 or older or illness duration was > 3 years, 3 had a parent with schizophrenia, 5 were living outside Paris area, an 8 had had family therapy previously). Out of the 76 eligible participants, 16 refused to participate (21%). The patients and parents who refused to participate did not differ from those included with regard to sociodemographic variables or clinical status on entry or at discharge (data available on request) [34]. The evaluations were conducted during the second part of the hospitalization, when refeeding was partially achieved and the patient was in regular contact with the family.

**Measures**

The PBI. This is a self-report measure in which patients are asked to retrospectively score their parents' attitudes and behaviors as they perceived them in the first 16 years of life. Three dimensions are rated for each parent: Care, Denial of Psychological Autonomy, and Encouragement of Behavioral Freedom on 25 items [8, 13]. A modified version was administered to the parents in order to investigate their remembrances of their own attitudes towards their daughter on the subject of the same elements. This parent version uses the same set of statements as the original, altering the wording so that the statements are not those of the child talking about a parent but rather of the parent talking about his or her own attitudes towards the child, e.g. 'She/he helped me whenever I needed it' becomes 'I helped her whenever she needed it'.

The FMSS. This is a recorded 5-min sample of free speech provided by the respondent about the patient, and the measure has been validated in French and in AN [26, 28, 29]. The interviewer reads a single instruction asking the parent to talk about what kind of person his/her child is, and his/her relationship with him/her. Two dimensions are rated for both the content and the tone of the brief sample: Criticism (Critical EE) and Emotional Overinvolvement (EOI EE). Critical EE is rated on the basis of the respondent's initial statement concerning the patient, the relationship, critical comments, and dissatisfaction. EOI EE is based on emotional displays (tears), statements of attitudes (scored as present when the respondent expresses very strong feelings of love for the relative or willingness to do anything for the relative in the future), self-sacrifice/overprotective behavior or lack of objectivity, excessive detail about the past, and positive remarks. A high Critical EE profile is rated if the parent expresses an initial negative statement and/or a negative relationship and/or one or more critical comments; in other cases, Critical EE is rated as low. A high EOI EE is given based on self-sacrificing or overprotective attitudes and/or emotional displays during the interview and if any 2 of the following apply: excessive details, statements of attitudes, and at least 5 positive remarks; in other cases the EOI EE is rated as low. Critical EE and EOI EE are used to establish a final high or low EE rating.

**Statistical Analyses**

Means, standard deviations, minima, and maxima were calculated for the quantitative variables. For qualitative variables, frequencies and proportions were calculated. Student's t test was used to compare means and Student's matched test was as appropriate. To assess the links between qualitative variables, Fisher's exact test was used, since conditions enabling the use of the χ² test were not met. Finally, links between quantitative variables were explored using either Pearson's correlation test or Spearman's nonparametric test, as appropriate.

**Results**

**Participant Characteristics**

Descriptive statistics of the 60 adolescents girls, each diagnosed with AN, and their parents are detailed in Table 1. Regarding their educational level, 20.8% were in lower secondary school, 75.5% were in upper secondary school, and 11.7% were attending higher education.

The professional status of each parent was recorded according to the classification of the French National Institute for Statistics and Economic Studies. Among the 58

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**Table 1. Participants' characteristics**

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Age at inclusion, years</td>
<td>16.6 ± 1.6</td>
<td></td>
</tr>
<tr>
<td>Age at onset of disorder, years</td>
<td>14.8 ± 1.6</td>
<td></td>
</tr>
<tr>
<td>Restrictive type AN, n (%)</td>
<td>55 (91.6)</td>
<td></td>
</tr>
<tr>
<td>AN duration, months</td>
<td>16.6 ± 6.8</td>
<td></td>
</tr>
<tr>
<td>Minimum lifetime BMI</td>
<td>13 ± 1.1</td>
<td></td>
</tr>
<tr>
<td>BMI at admission</td>
<td>13.6 ± 1.1</td>
<td></td>
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<tr>
<td>BMI at inclusion</td>
<td>16.9 ± 1.1</td>
<td></td>
</tr>
<tr>
<td>BMI at discharge</td>
<td>17.5 ± 1.1</td>
<td></td>
</tr>
<tr>
<td>Age of mother at inclusion, years</td>
<td>47.4 ± 4.7</td>
<td></td>
</tr>
<tr>
<td>Age of father at inclusion, years</td>
<td>49.3 ± 4.9</td>
<td></td>
</tr>
</tbody>
</table>

Data are expressed as means ± SD unless otherwise stated.
Table 2. Family relationship PBI and FMSS: PBI scores for patients towards their fathers and mothers (PBI\textsubscript{AN}), modified PBI scores for fathers and mothers towards their daughters (PBI\textsubscript{P}) and fathers' and mothers' high EE-FMSS levels (Critical EE, EOI EE, and Final EE)

<table>
<thead>
<tr>
<th>Daughters towards their fathers (PBI\textsubscript{AN})</th>
<th>n</th>
<th>Care mean (SD)</th>
<th>Pearson's r and p value</th>
<th>Denial of Psychological Autonomy mean (SD)</th>
<th>Pearson's r and p value</th>
<th>Encouragement of Behavioral Freedom mean (SD)</th>
<th>Pearson's r and p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60</td>
<td>22.4 (8.0)</td>
<td>r = 0.412 p &lt; 0.001</td>
<td>4.4 (3.6)</td>
<td>r = 0.296 p &lt; 0.05</td>
<td>12.8 (3.6)</td>
<td>r = 0.219 NS</td>
</tr>
<tr>
<td>Fathers towards their daughters (PBI\textsubscript{P})</td>
<td>51</td>
<td>27.0 (5.2)</td>
<td>P &lt; 0.001</td>
<td>5.2 (3.5)</td>
<td>P &lt; 0.05</td>
<td>12 (2.6)</td>
<td>NS</td>
</tr>
<tr>
<td>Daughters towards their mothers (PBI\textsubscript{AN})</td>
<td>60</td>
<td>27.6 (6.6)</td>
<td>r = 0.454 p &lt; 0.001</td>
<td>6.4 (4.4)</td>
<td>r = 0.425 p &lt; 0.001</td>
<td>12.3 (3.0)</td>
<td>r = 0.273</td>
</tr>
<tr>
<td>Mothers towards their daughters (PBI\textsubscript{P})</td>
<td>56</td>
<td>30.6 (3.7)</td>
<td>P &lt; 0.001</td>
<td>5.5 (3.3)</td>
<td>P &lt; 0.001</td>
<td>12.4 (2.4)</td>
<td>P &lt; 0.05</td>
</tr>
</tbody>
</table>

Table 3. Care scores on the PBI\textsubscript{AN}/modified PBI\textsubscript{P} in relation to maternal and paternal Critical EE and Final EE levels

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Care (PBI\textsubscript{AN})</th>
<th>t test p value</th>
<th>Care (modified PBI\textsubscript{P})</th>
<th>t test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean (SD)</td>
<td></td>
<td>mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical EE</td>
<td>15</td>
<td>21.9 (8.0)</td>
<td>NS</td>
<td>13</td>
<td>26.5 (4.3)</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>22.4 (8.1)</td>
<td></td>
<td>34</td>
<td>27.1 (5.0)</td>
</tr>
<tr>
<td>Final EE</td>
<td>27</td>
<td>20.8 (7.9)</td>
<td>NS</td>
<td>22</td>
<td>26.0 (4.3)</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>23.6 (8.0)</td>
<td></td>
<td>25</td>
<td>27.7 (5.1)</td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical EE</td>
<td>14</td>
<td>28.3 (7.1)</td>
<td>NS</td>
<td>13</td>
<td>29.1 (5.6)</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>27.8 (5.9)</td>
<td></td>
<td>42</td>
<td>31.1 (2.9)</td>
</tr>
<tr>
<td>Final EE</td>
<td>30</td>
<td>28.5 (6.4)</td>
<td>NS</td>
<td>28</td>
<td>30.1 (4.3)</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>27.3 (5.9)</td>
<td></td>
<td>27</td>
<td>31.1 (3.2)</td>
</tr>
</tbody>
</table>

fathers, 59.6% were high-level white-collar workers or intellectual professionals, 17.6% were in 'intermediate professions' (e.g. teachers, intermediate workers in health and social sectors, intermediate administrative and business workers), 12.3% were civil servants, 7.1% were self-employed or small business owners, and 3.4% were retired or unemployed. Among the mothers (n = 60), 38.3% were white-collar workers, 45.0% were in 'intermediate professions', 15% had 'no activity', and 1.7% were self-employed or small business owners.

Family Relationships
The patients' scores on the PBI (PBI\textsubscript{AN}) and the parents' scores (PBI\textsubscript{P}) are presented in Table 2. For the Care dimension, the adolescents described their parents as being significantly less affectionate than the degree of affection recalled by the parents (for daughters and fathers, t = 3.9, p < 0.001; for daughters and mothers, t = 3.4, p < 0.001). For the dimensions Denial of Psychological Autonomy and Encouragement of Behavioral Freedom, the adolescents' scores did not differ signifi-

Bonding and EE

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Table 4. Denial of Psychological Autonomy scores on the PBI\textsubscript{AN}/modified PBI\textsubscript{P} in relation to maternal and paternal EOI EE and Final EE levels

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Denial of Psychological Autonomy (PBI\textsubscript{AN})</th>
<th>n</th>
<th>Denial of Psychological Autonomy (modified PBI\textsubscript{P})</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mean (SD)</td>
<td></td>
<td>t test p value</td>
</tr>
<tr>
<td><strong>Father</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EOI EE</td>
<td>19</td>
<td>4.9 (3.3)</td>
<td>15</td>
<td>4.9 (2.5)</td>
</tr>
<tr>
<td>Low</td>
<td>36</td>
<td>4.1 (3.8)</td>
<td>32</td>
<td>5.1 (3.5)</td>
</tr>
<tr>
<td>Final EE</td>
<td>27</td>
<td>4.5 (3.3)</td>
<td>22</td>
<td>4.9 (2.9)</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>4.2 (4.0)</td>
<td>25</td>
<td>5.1 (3.5)</td>
</tr>
<tr>
<td>Low</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mother</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EOI EE</td>
<td>21</td>
<td>7.4 (4.4)</td>
<td>19</td>
<td>6.8 (2.1)</td>
</tr>
<tr>
<td>Low</td>
<td>37</td>
<td>5.9 (4.5)</td>
<td>36</td>
<td>5.1 (3.7)</td>
</tr>
<tr>
<td>Final EE</td>
<td>30</td>
<td>6.6 (4.5)</td>
<td>28</td>
<td>6.8 (3.2)</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>6.2 (4.5)</td>
<td>27</td>
<td>4.4 (3.1)</td>
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<tr>
<td>Low</td>
<td>28</td>
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</tbody>
</table>

Table 5. Encouragement of Behavioral Freedom scores on the PBI\textsubscript{AN}/modified PBI\textsubscript{P} in relation to maternal and paternal EOI EE and Final EE levels

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Encouragement of Behavioral Freedom (PBI\textsubscript{AN})</th>
<th>n</th>
<th>Encouragement of Behavioral Freedom (modified PBI\textsubscript{P})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mean (SD)</td>
<td></td>
<td>t test p value</td>
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<tr>
<td><strong>Father</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EOI EE</td>
<td>19</td>
<td>12.5 (3.9)</td>
<td>15</td>
<td>11.7 (2.5)</td>
</tr>
<tr>
<td>Low</td>
<td>36</td>
<td>12.9 (3.5)</td>
<td>32</td>
<td>12.0 (2.7)</td>
</tr>
<tr>
<td>Final EE</td>
<td>27</td>
<td>12.6 (3.9)</td>
<td>22</td>
<td>12.0 (2.4)</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>12.8 (3.4)</td>
<td>25</td>
<td>11.8 (2.9)</td>
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<tr>
<td>Low</td>
<td>28</td>
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<tr>
<td><strong>Mother</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>EOI EE</td>
<td>21</td>
<td>12.4 (3.4)</td>
<td>19</td>
<td>12.5 (1.8)</td>
</tr>
<tr>
<td>Low</td>
<td>37</td>
<td>12.3 (2.9)</td>
<td>36</td>
<td>12.4 (2.7)</td>
</tr>
<tr>
<td>Final EE</td>
<td>30</td>
<td>12.4 (3.1)</td>
<td>28</td>
<td>12.5 (2.2)</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>12.3 (3.1)</td>
<td>27</td>
<td>12.3 (2.7)</td>
</tr>
<tr>
<td>Low</td>
<td>28</td>
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<td></td>
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</tr>
</tbody>
</table>

Significantly to those of either of their parents (Denial of Psychological Autonomy: patients and fathers, t = 1.2, p = 0.22; patients and mothers, t = 1.4, p = 0.17; Encouragement of Behavioral Freedom: patients and fathers, t = 1.6, p = 0.11; patients and mothers, t = 0.20, p = 0.84). There was a positive significant correlation between adolescents’ scores and their mothers’ scores for the 3 dimensions of the PBI. Correlations between the daughter’s scores and their fathers’ were positively significant for only 2 dimensions (Care and Denial of Psychological Autonomy) (table 2).

The classifications of EE levels for the 2 parents are detailed in table 2. The Critical EE and EOI EE levels of mothers and fathers are low for the most part.

Comparisons of Perceptions of Family Bonding by the Adolescents (PBI\textsubscript{AN}) and the Family Emotional Climate Described by the Parents (FMSS)

No significant differences were found between the score for the Care dimension as reported by the adolescents with AN according to the levels of Critical EE as expressed by fathers or mothers (table 3). The scores of Denial of Psychological Autonomy (table 4) and Encouragement of Behavioral Freedom (table 5) as seen by the adolescents were not significantly different in relation to the levels of EOI EE as expressed by fathers or mothers about their adolescent daughters.

Likewise, no significant link was found between the scores of the adolescents on the PBI and the number of
critical comments or positive remarks by either of the parents (data available on request).

Comparisons of Perceptions of Family Bonding by the Parents on the Modified Version of the PBI (PBIp) and Their Perception of the Family Emotional Climate (FMSS)

The dimensions Care (table 3), Denial of Psychological Autonomy (table 4), and Encouragement of Behavioral Freedom (table 5) as reported by the parents were not significantly different according to the levels of Critical EE nor EOI EE as expressed by fathers or mothers with respect to their adolescent daughters.

When mothers registered a high Final EE, they were more likely to report denying their daughter’s psychological autonomy compared to mothers with a lower Final EE. In contrast, the PBI dimensions as perceived by the fathers with respect to their daughter were not significantly different according to their EE levels.

In addition, no significant link was found between the scores of the adolescents on the PBI and the number of critical comments or positive remarks by either of the parents (data available on request).

Discussion

The aim of the present work was to explore links that might exist between the concepts of bonding and EE among subjects with AN, using the PBI and the FMSS. To do this, the population chosen was one in which affection and overprotection are thought to be important factors to consider [39–42] and in which the assessment of family relationships has shown its usefulness and its validity [43–45].

The original aspect of this study is consideration of both adolescent and parental points of view with regard to bonding, using a modified version of the PBI for the parents (PBIp).

The main finding of our study is that the bonding dimensions investigated among adolescents and parents were not significantly different according to parental EE levels (high and low Critical EE and EOI EE). One of the significant results that we found in the comparisons was that when mothers registered a high Final EE, they were more likely to deny their daughter’s psychological autonomy (PBIp). It is possible to discuss our results from either methodological or theoretical viewpoints. Indeed, it could be argued that our results arise from certain methodological discrepancies. We do, however, maintain the theoretical interpretations that support the absence of any link between the concepts of bonding and EE.

In the two studies that previously explored links between bonding and EE (Parker et al. [32] and Hedlund et al. [33]), the two bonding dimensions (Care and Overprotection) were linked respectively to the number of critical comments expressed by parents and to EOI (evaluated by the CFI). In the FMSS, unlike the CFI, Critical EE and EOI are qualitative variables. This is why we compared the PBI scores on the 3 dimensions according to Critical and EOI EE levels.

Parker et al. [32], in families of schizophrenic patients, showed a link between the EOI dimension measured by the CFI and the Overprotection dimension assessed by the patient version of the PBI, but we failed to replicate this link. Some differences between Parker et al. [32] and our study could have contributed to low EE levels. Consequently, these low EE levels could have led to a lack of statistical power. The different measures and populations could explain our different results. Firstly, Parker et al. [32] used the CFI rather than the FMSS which is less sensitive [26]. Indeed, investigation using the FMSS lasts only 5 min, while the CFI is a 1-hour interview [25]. With regard to the PBI, Parker et al. [32] used a version implementing only 2 factors (as did Hedlund et al. [33]), whereas the French validated version used 3 [11–14].

Secondly, the difference in the pathology involved in our study could also provide an explanation. Parker et al. [32] recruited families of schizophrenic patients, whereas we considered patients suffering from AN. AN families have an EE level that is classically considered to be lower on average than that obtained in other clinical groups [25, 30, 46]. In addition, the evaluations in our sample were conducted at the end of hospitalization, so that both a decrease in symptoms and a possible reduction in parental EE were likely. Indeed, it is known that the presence of active eating disorder symptoms is associated with a more negative perception of the family functioning [47]. Finally, in most of the families included, the fathers occupied professions in the ‘upper intellectual’ or ‘intermediate’ categories. Although this bias is frequently encountered in care units specialized in ED [48], Critical EE tends to be lower in these socioeconomic categories [30, 49].

Although the results of the present study could at first glance appear to be in line with those obtained by Hedlund et al. [33], a closer look at their methodology reveals certain biases that could weaken the relevance of comparison with our results. Hedlund et al. [33], in a population of patients with bulimia, showed that Care and Overprotection (PBI) were not linked to Final EE scores mea-
sured by the CFI. First, they studied a small sample, which could explain false-negative results from lack of statistical power. Second, they studied the links between Care and Overprotection with the Final EE, whereas we also studied the links with the 2 dimensions Critical EE and EOI EE. Third, it is also possible that the results obtained by Hedlund et al. [33] could be linked to their combined scoring of the family emotional climate (mothers + fathers), rather than to scores for individual parents. Indeed, if one of the parents rates high on the Final EE it is sufficient for the family emotional atmosphere level to be high. In the present study, this effect was deliberately avoided, since it was nonsense to compare individual entities (parents responded separately on the PBI) with family entities (where the EE scores are not differentiated). Furthermore, it has been shown that parental gender is linked to EE levels; it seems preferable to separately analyze the EE levels of the two parents [30, 50].

We found a significant difference between a high maternal Final EE score and reluctance to give their daughters autonomy (in maternally reported). This result, which is in line with the hypothesis set out respectively by Leff and Vaughn [31] and Parker et al. [32], could be explained as an adaptive behavior of parents to the illness. Indeed, the Final EE is a combination of EOI-EE and Critical EE. EOI may be a response by the parent trying to cope with the particular clinical states of the patient [51], and it may be considered as a typical familial reaction [52]. Likewise, criticism could be a result of parental difficulties in coping with the pathology, exacerbating the symptoms [50-53]. EE has also been hypothesized as a reflection of parental psychological distress (depression and anxiety) [50], which could lead parents to be reluctant to give their children any autonomy.

Thus, our study failed to find clear evidence for a close link between bonding and EE. First, the concept of bonding has a sound theoretical basis, while EE is claimed to be a-theoretical. Second, these two concepts concern two different time spans in the family dynamic. The concept of bonding provides a longitudinal understanding of the relationships within the family perceived subjectively, while EE is cross-sectional, exploring the current family emotional climate as narrated to a third party. Nevertheless, both of these concepts are relevant in clinical practice in AN since the perception of the quality of parental relationships (by children on the PBI) and the ongoing emotional atmosphere (on the FMSS) are two clinical aspects with different potential implications in the development and maintenance of AN. Indeed parent-child interactions and bonds play a crucial part in a child’s psycho-affective development [21, 54]. Disturbances in family interactions in early childhood are a risk factor for the development of many mental disorders in adulthood [55]. A contrario, EE is an evaluation of the current family emotional climate that is influenced by patient and parental characteristics and by the pathology [30]. EE is viewed more as a consequence of AN than as a factor that favors it [56, 57]. Thus, both bonding and EE appear as concepts important to consider in the evaluation of family dynamics, and it seems valuable to use both despite the time span being different. This was indeed the conclusion reached by Dare et al. [58] after failing to find any similarity between the concept of the psychosomatic family of Minuchin et al. [59] and EE in families with an AN sufferer.

Our work has some limitations, such as its statistical power. Likewise, the modified version of the PBI used (exploring parental remembrances about their behaviors towards their child) has not been validated. However, the adolescents’ PBI scores and those of their parents using the modified version of the PBI were positively and significantly correlated, suggesting the validity of these measures. Despite this limitation, several perspectives emerge. This work needs to be confirmed on a larger sample, in a different pathology, so as to overcome the limitations. In addition, comparisons between the concept of EE and other family relationship models could be quite challenging. Although some researchers have studied the link between attachment and EE in schizophrenia [60] and the link between attachment and bonding in obsessive-compulsive disorder [61], none, to our knowledge, have explored the link between bonding, EE, and attachment in families with a member suffering from AN.

In conclusion, bonding and EE are two different concepts that are derived from the same object, i.e. the quality of family relationships. Their time scales do, however, differ, as do their perspectives (patient vs. parental point of view).

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None.

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