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Emotional tone in young adolescents' close relationships and its association with deliberate self-harm

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Abstract

Previous research has shown that a less positive emotional tone in adolescents' relationships to parents, but not in their relationships to peers, predicts more of behaviour problems and substance use. The purpose of the present study was to replicate these findings, and to extend this research to deliberate self-harm. In a first study with a variable-oriented approach, correlations were analysed between emotional tone in close relationships and a number of behaviour problems. The main results showed that deliberate self-harm among girls, as well as conduct problems, hyperactivity, aggressive behaviour, and the use of alcohol, were more strongly associated with poor emotional relations to their parents than with poor emotional relations to friends. In a second study, a person-oriented approach was used to investigate girls' profiles of emotional tone in close relationships by means of cluster analysis, and to compare the clusters on measures of deliberate self-harm. The analysis led to the identification of five clusters; of these, deliberate self-harm was most frequent in a cluster of girls who reported poor emotional relations to parents in combination with good emotional relations to friends. Self-harm was also frequent in a cluster of girls characterized by poor emotional relations to both parents and friends. The results are discussed in terms of good emotional relations to friends not necessarily serving as a protective factor against emotional and behavioural problems, and the methodological value of a person-oriented approach as a complement to a traditional variable-oriented approach.

Key words: Emotional tone, close relationships, deliberate self-harm, adolescents, behaviour problems, person-oriented approach

Much evidence indicates that the quality of people's close relationships (parents, friends, romantic partners, etc.) is significantly associated with their health and well-being (e.g., Berscheid & Reis, 1998; Ryff, 1995). The nature of an individual's close relationships, however, changes during the life course. Whereas parents are primary sources of intimacy and support in childhood, and remain important also during adolescence, friends become increasingly important in middle

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and late adolescence (Harris, 1995; Hunter & Youniss, 1982). Research indicates, among other things, that having friends is associated with a sense of security, self-worth, well-being, and successful coping during life transitions (e.g., entering school, puberty, marriage, parenthood, retirement, and bereavement; Hartup & Stevens, 1997). Although adolescents tend to spend increasingly more time with friends and considerably less time with their parents (Larson & Richards 1991), however, research also indicates that adolescents' relationships with their parents influence their interactions with peers (e.g. Brown, Mounts, Lamborn, & Steinberg, 1993). For example, adolescents from warm, supportive families are generally more socially competent and report more positive friendships (e.g. Lieberman, Doyle, & Markiewicz, 1999).

An essential aspect of the quality of close interpersonal relations is the valence of the emotions and feelings that people experience in relation to each other. Repinski and Zook (2005) found that a positive emotional tone in adolescents' relationships to parents predicted less of behaviour problems and substance use, and more of academic success. As a possible explanation, they suggested that "the experience of a preponderance of positive emotions in the parent-adolescent relationship may convey to the adolescent acceptance, care, and concern on the part of the parent. This may prove to be self-validating and self-enhancing to the adolescent and thus contribute to the adolescent's development of adaptive self-regulatory abilities" (p. 97). More specifically, it can be assumed that accepting, caring and validating parental attitudes may causally facilitate both the development of positive feelings towards parents and the development of adaptive self-regulation. In contrast, Repinski and Zook (2005) found no association between the emotional tone in adolescents' relationships to friends and the degree of their behaviour problems, substance use or academic success.

The purpose of the present research was to replicate and extend these findings on the emotional tone of adolescents' close relationships. A particular focus was on deliberate self-harm in young adolescents. Deliberate self-harm, especially among girls and young women, is a behaviour problem that has received increasing attention during the past years, and high frequencies of self-harm in adolescents have been reported. For example, Lloyd-Richardson; Perrine, Dierker and Kelley (2007) studied a North American community sample of 633

adolescents (with a mean age of 15,5 years) by means of an anonymous survey, the Functional Assessment of Self-Mutilation (FASM), and found that 46.5% of the adolescents endorsed some form of non-suicidal self-injury during the past year. When Hilt, Cha and Nolen-Hoeksema (2008) used the same questionnaire in a community sample of young adolescent girls (10-14 years old), they found that 56% of the girls reported having engaged in non-suicidal self-injury. Similar figures (40,2% - 65,9%) have also been reported in young Swedish adolescents (Bjärehed & Lundh, 2008; Lundh, Karim, & Quilisch, 2007) with short versions of Gratz' (2001) Deliberate Self Harm Inventory (DSHI).

Previous research indicates that self-harm behavior in adults may be associated with a wide variety of emotionally negative relational experiences in childhood, including childhood sexual and physical abuse (e.g., Gratz, Conrad, & Roemer, 2002; van der Kolk, Perry, & Herman, 1991), emotional and physical neglect (Dubo, Zanarini, Lewis, & Williams, 1997; van der Kolk et al., 1991), and insecure parental attachment (Beeghly & Cicchetti, 1994; Gratz et al., 2002; Wekerle & Wolfe, 1998). Until recently there has been very little similar research on how deliberate self-harm in young adolescents is associated with the emotional quality of their close relationships. Three recent studies, however, have addressed issues of this kind: Yates, Tracey and Luthar (2008) found that parental criticism was associated with non-suicidal injury in adolescents, and that this association was mediated by alienation toward parents. Crowell et al. (2008) similarly found higher levels of negative affect and lower levels of both positive affect and cohesiveness among families of self-injuring adolescents. And in a recent longitudinal study, Hilt, Nock, Lloyd-Richardson and Prinstein (2008) found that adolescents who engaged in non-suicidal self-injury reported lower parental relationship quality than other adolescents. In support of the hypothesis that one function of self-injury may be to acquire social support from parents, however, they also found improved parental relationships from Time 1 to Time 2 among those who engaged in self-injury.

The various possible functions of deliberate self-harm have been discussed in more detail by Nock and Prinstein (2004, 2005) and Chapman, Gratz and Brown (2006). Apart from possible social and communicative functions, there is also a general consensus that deliberate self-harm

may serve as a way of regulating aversive emotions – that is, the physical pain caused by injuring oneself may lead to a reduction of anxiety, depression, or other forms of emotional pain. It may be hypothesized that many adolescents test physical self-harm as a way of communicating their emotional distress, or as a way of regulating aversive feelings, but that they are at risk of developing severe forms of repeated self-harm behavior only in the absence of more functional forms of emotional regulation and communication in a context of sufficiently good interpersonal relations. If so, deliberate self-harm in adolescents should be associated with a low emotional quality of interpersonal relations.

In the present research, therefore, we studied the association between the emotional qualities of young adolescents' relations both to parents and to friends and various kinds of behaviour problems, with a special focus on deliberate self-harm. Methodologically, we combined two different approaches: In a first study, we used a conventional variable-oriented approach to study the correlations between measures of emotional tone and various adjustment problems including self-harm. In a second study, we used a person-oriented approach (Bergman & Magnusson, 1997) to study *patterns* of emotional qualities in close interpersonal relations of young adolescent girls, and their association with deliberate self-harm.

Study 1

The purpose of Study 1 was to investigate the associations between emotional tone in young adolescents' relations to parents and friends and various behavioural problems. In replication of Repinski and Zook's (2005) results, we hypothesized that conduct problems, aggressive behaviour, hyperactivity, smoking, and drinking alcohol would show stronger correlations with emotional tone in parental relations than with emotional tone in relations with friends. We also expected deliberate self-harm to correlate primarily with emotional tone in parental relations, whereas we did not expect equally strong correlations with emotional tone in relations to friends.

Method

Participants

The study made use of a community sample taken from Trelleborg, a municipality in the south of Sweden which on January 1st, 2007 had 40,320 inhabitants and five regular schools with students in Grade 7 (age 14 years, n = 532) and Grade 8 (age 15 years, n = 520). In order to get data from as many students as possible, the ordinary questionnaire sessions at each school were followed by extra sessions for those who were absent at the first session. Altogether, 992 of the 1052 students (94%) filled out the questionnaires during Spring, 2007. Data from Statistics Sweden (2007) indicate that Trelleborg is fairly representative of Sweden in terms of the proportions of children living with both of their parents, as well as having foreign background, but also that it is slighty more rural than Sweden as a whole (80.2% vs. 84.4% urban population), and that its adult population has a slightly lower mean income level and a lower educational level than Sweden as a whole (25% of the population aged 25-64 years having university education vs. 35% for the whole of Sweden).

Instruments

Emotional Tone Index (ETI). This was a modified Swedish version of an instrument originally developed by Berscheid, Snyder and Omoto (1989), and adapted for adolescents by Repinski and Zook (2005). In their original study, Berscheid et al. (1989) asked the participants to estimate the frequency with which they experienced 27 different emotions in their closest relationships. Their Emotional Tone Index (ETI) included 12 positive and 15 negative emotion items, and they computed the difference between each individual's average ratings on the positive and the negative emotions as a measure of the relative frequency with which positive vs. negative emotions were experienced in the relationship. Repinski and Zook (2005) used a modified version of the Emotional Tone Index (ETI) with adolescents, which involved 19 different emotions (6 positive and 13 negative).

In the present version of the ETI, participants were asked to rate the prevalence of different positive and negative emotions in relation to their parents (17 items, 8 positive and 9 negative),

and in relation to their closest friends (12 items, 6 positive and 6 negative). On a 4-point Likert scale (with the response alternatives "never", "seldom", "often", and "very often"), they were asked to rate how often they feel negative emotions like "angry, irritated" or positive emotions like "safe, secure" when they are together with (or think about) their parents/close friends (See the Appendix for the ETI items). Instead of computing the difference between each individual's average ratings on the positive and the negative emotions as a measure of emotional tone of parental and peer relationships, however, we retained separate scales for positive and negative emotions. The rationale for this was that the absolute levels of positive and negative emotions in close relationships also carries important information not given by an index of the difference between positive and negative emotions.

The internal consistency of these ETI scales was good, the alpha values being .83 for both ETI-Parents scales, and .76 and .75 for the positive and negative ETI-Friends subscales, respectively. In a pilot study that was carried out before the present research, the following test-retest coefficients were found in a convenience sample of 202 14-15 year olds from 4 different schools in two other Swedish municipalities: r = .52 for ETI positive feelings to parents, r = .65 for ETI negative feelings to parents, r = .56 for ETI positive feelings to friends, and r = .62 for ETI negative feelings to friends. Because the test-retest intervals in these four schools were longer than is usual in studies of test-retest reliability (varying from 1 ½ to 4 months), these correlation coefficients only give a conservative lower boundary for the true test-retest reliability of the ETI scales.

Deliberate Self-Harm Inventory – 9-item version (DSHI-9). This was a shortened and modified version of the Deliberate Self-Harm Inventory which was originally constructed and validated by Gratz (2001), and translated into Swedish and adapted to adolescents by Lundh et al. (2007) and Bjärehed and Lundh (2008). In the 9-item version of the DSHI respondents are asked if they have deliberately engaged in any of nine different kinds of directly physically self-harming behaviours (e.g., cutting, carving, burning, hitting, etc.) during the past 6 months. Respondents are instructed to rate the number of times they have conducted these behaviours on a scale from 0 to 6, where 0 is "never" and 6 is defined as "more than five times". A total score (from 0 to 54) on the DSHI-9

can thus be calculated by summarizing the number of times a person has engaged in these self-harming behaviours. Respondents were also asked to indicate the number of times that their self-harm behaviour had resulted in hospitalization or the seeking of medical treatment. The internal consistency of the DSHI-9 in the present study was = .90.

The Strengths and Difficulties Questionnaire – self-report version (SDQ-s; Goodman, 2001). The SDQ contains 25 statements, with three response alternatives: "Not true", "Somewhat true", and "Certainly true". The participants are instructed to respond to each item on the basis of how things have been for them during the last six months. The items are divided into five scales with five items each: Hyperactivity-Inattention, Emotional Symptoms, Conduct Problems, Peer Problems and Prosocial Behaviour. The items are scored 0 for "not true", 1 for "somewhat true" and 2 for "certainly true". Five items on the difficulties scales are worded positively and reversed before scoring. The SDQ was translated into Swedish by Smedje, Broman, Hetta and von Knorring (1999), and the Swedish self-report version was validated by Lundh, Wångby-Lundh and Bjärehed (2008), who found that the Swedish version had similar psychometric properties to the original English version. In the present study, we used the SDQ scales Conduct Problems and Hyperactivity-Inattention.

The Positive and Negative Interpersonal Behaviours Inventory (PANIBI; Lundh, Wångby-Lundh, & Bjärehed, 2009) contains forty statements, asking "How often does it happen that...?", with a five-point response format ranging from 1 ("never") to 5 ("very often"). Part A asks 20 questions on the theme "How are you treated by others?", half of which refer to being the object of others' aggressive behaviours, and half to being the object of prosocial behaviours from others. Part B contains the mirror image of these questions, on the theme "How do you treat others?" In this way, the PANIBI is constructed symmetrically along two dimensions: valence (positive vs. negative) and direction of behaviour (self-to-others vs. others-to-self). Four subscales, each with 10 items, were computed: Treated Well by Others, Treating Others Well, Victim to Aggression and Aggression (Agg). In the present study, we only used the Aggression scale (= .84).

Smoking and *use of alcohol* was assessed by means of single questions, "Do you smoke?"

(with four response alternatives, from "No" to "Daily") and "Do you drink alcohol?" (with six response alternatives, from "No" to "Several times each week").

Procedure

This research was conducted after approval by the Regional Ethics Committee at Lund University. Contact was established with school-managements via head-masters who gave consent to their schools' participation in the study. Information about the form and purpose of the study was sent to the parents, who were asked to contact the school teachers or the researchers if they did not want their child to participate. Respondents were informed that this was a research project on the situation of young people today, in terms of how they feel, and how they perceive themselves, their feelings, relations, and life situation. They were also informed that their participation was voluntary, that their answers were treated confidentially, and that no school personnel would have access to their answers.

The instruments used in the present study were part of an 11-page questionnaire, filled out in school, as part of a separate lecture hour. The questionnaire was administered by research assistants from Lund University, who were either licensed psychologists or advanced level students of psychology. A teacher was present, but did not participate in the data collection. The students were instructed to answer all questions as best they could, but not to think too much about any answer. They were instructed not to write their names anywhere on the questionnaire. After the completion of the questionnaire it was sealed in an envelope by the student.

Statistical analyses

The associations between the variables were analysed by means of Pearson correlations. Differences in the strengths of correlations between independent samples (boys vs. girls) were tested by converting the two correlations to *z*-scores, dividing the difference between the *z*-scores with the standard error of difference between the two correlations, and then testing the significance of the *z* value of the difference score. Differences between the strength of two

dependent correlations from the same sample (within girls or within boys) were tested by means of *t*-test (Chen & Popovich, 2002).

Results

Descriptive data on the ETI

Table 1 shows the means and standard deviations of girls and boys on the ETI scales. Although the genders did not differ significantly on positive emotion in parental relations, the girls reported significantly more negative emotion in parental relations, and significantly more positive and negative emotions in relations to friends. The effects, however, were small ($d < .20$). There were also significant gender differences in variance on three of the scales, with larger variances for girls than for boys: positive emotions in relation to parents (Levene's test of equality of variance: $F = 15.86$, $p < .000$); negative emotions in relation to parents ($F = 23.22$, $p < .000$); and negative emotions in relation to friends ($F = 5.03$, $p < .05$).

Table 1.

Means (and SD) on the Emotional Tone Index for girls and boys.

Subscale	Girls	Boys	*t*	*p*
Positive Emotions in Relation to Parents	3.17 (0.59)	3.22 (0.46)	-1.28	ns
Negative Emotions in Relation to Parents	1.72 (0.54)	1.63 (0.39)	2.89	.004
Positive Emotions in Relation to Friends	3.29 (0.53)	3.18 (0.47)	3.14	.002
Negative Emotions in Relation to Friends	1.54 (0.45)	1.49 (0.40)	2.07	.039

For girls, *n* varied between 494 and 496; for boys, *n* varied between 480 and 483.

Prevalence of deliberate self-harm

A total of 963 of the 992 participants had completed the full DSHI-9. To calculate total scores on the DSHI-9, we required that the individual should have no more than three missing values. In other words, we interpreted these individuals' missing values conservatively as the absence of the behavior asked for (i.e., imputing 0). Nineteen participants had missing values on at

most three items; including them we had results on the full scale for 982 participants.[2] Of these, 408 (41.5%) reported having harmed themselves deliberately on at least one occasion. Significantly more girls than boys (45.2% vs. 38.0%; $^2 = 5.0$, $p < .01$) reported at least one instance of deliberate self-harm. The girls also had a significantly higher mean score than the boys on the DSHI-9, 4.35 (*SD* = 9.33) vs. 2.59 (*SD* = 6.41), $t(981) = 3.44$, $p < .001$, and a significantly larger variance ($F = 33.09$, $p < .000$). The most common form of self-harm among the girls was cutting oneself in the arms, thereby causing bleeding, which was reported to have occurred at least once by 22.1% of the girls. The most common form of self-harm among the boys was punching oneself or banging one's head, thereby causing a bruise, which was reported to have occurred at least once by 18.8% of the boys. 5,1% of the girls and 3.7% of the boys reported that their self-harm behaviours had caused them to seek medical treatment at least once.

Correlational analysis

Correlations were analysed separately for girls (see Table 2) and boys (see Table 3). Because of the large number of correlations computed, the alpha value was set at $p < .001$. As seen in Table 2, the data pattern for girls is clearly consistent with the hypothesis that behaviour problems show stronger correlations with emotional tone in parental relations than with emotional tone in relations with friends. First, all measures of behaviour problems showed significant negative correlations with positive emotions to parents, and significant positive correlations with negative emotions to parents. Second, although behaviour problems showed a similar pattern of correlations also with positive and negative emotions to friends, this pattern was consistently weaker, and not all correlations were significant at the chosen alpha level.

[2] Of the 19 individuals with missing values, almost all (16) reported having harmed themselves at least once, and 11 of them scored at least 5 on the DSHI-9 (four of them had total DSHI scores of 20 and higher). This means that adolescents with self-harm were clearly overrepresented among those with missing values, and that excluding them would have biased the sample. Imputing 0 for their missing values led to the inclusion of adolescents with self-harm without exaggerating the extent of their self-reported self-harm.

Table 2. *Correlations between emotional tone and behaviour problems in girls.*

	ETI Parents		ETI Friends	
	Positive	Negative	Positive	Negative
SDQ Conduct problems	-.56[a]	.48[a]	-.29	.33
SDQ Hyperactivity-Inattention	-.33[a]	.38	-.19	.26
Drinking alcohol	-.31[a]	.24	-.10	.17
Smoking	-.25	.21	-.13	.13
Deliberate Self-Harm (DSHI-9)	-.55[a]	.52[a]	-.32	.37
Aggressive Behaviour (PANIBI-Agg)	-.37[a]	.41	-.22	.39

All $r > .16$ are significant at $p < .001$.

[a] This correlation was significantly stronger than the corresponding correlation with emotions to friends ($p < .001$).

Table 3. *Correlations between emotional tone and behaviour problems in boys.*

	ETI Parents		ETI Friends	
	Positive	Negative	Positive	Negative
SDQ Conduct problems	-.36	.44[a]	-.23	.27
SDQ Hyperactivity-Inattention	-.28	.40	-.15	.28
Drinking alcohol	-.18	.18	-.05	.06
Smoking	-.18	.10	-.12	.06
Deliberate Self-Harm	-.23	.27	-.19	.17
Aggressive Behaviour (PANIBI-Agg)	-.28	.43	-.16	.37

All $r > .16$ are significant at $p < .001$.

[a] This correlation was significantly stronger than the corresponding correlation with emotions to friends ($p < .001$).

As a direct test of the hypothesis that problem behaviours would show stronger correlations with emotional tone in parental relations than with emotional tone in relations with friends, these correlations were compared by *t*-test. As seen in Table 2, almost all of the negative correlations with positive emotions to parents (the only exception was smoking) were significantly stronger than the corresponding correlations with positive emotions to friends. Of special interest, the correlation between self-harm and positive emotions to parents was significantly stronger than the correlation between self-harm and positive emotions to friends ($r = -.55$ vs $r = -.32$, $t = -6.23$, $p < .001$). In addition, both conduct problems and deliberate self-harm showed

significantly stronger correlations with negative emotions to parents than with negative emotions to friends.

As shown in Table 3, the measures of behaviour problems showed a similar pattern of correlations also among boys, although both the correlations and the parents-friends differences in correlations were generally weaker than among the girls. Testing the significance of the differences in correlations by *t*-test showed only one significant effect: conduct problems was more strongly associated with negative emotions to parents than with negative emotions to friends ($p < .001$).

The numerically largest difference between girls and boys with regard to correlations with emotions to parents was found for deliberate self-harm. The girls showed significantly stronger correlations than the boys between deliberate self-harm and positive emotions to parents ($r = -.55$ in girls vs. $r = -.23$ in boys, $z = -5.40$, $p < .001$) and also between deliberate self-harm and negative emotions to parents ($r = .52$ in girls vs. $r = .27$ in boys, $z = 4.29$, $p < .001$).

Discussion

The present results are consistent with most previous research in showing that deliberate self-harm is more common among girls than among boys. In addition, there are at least two other interesting results of the present study. First, the results indicate that deliberate self-harm among girls, like most other behaviour problems, is more strongly associated with the emotional tone of their relations to parents than with the emotional tone of their relations to friends. Second, the results also show that the association between deliberate self-harm and emotional tone in parental relations is stronger in girls than in boys.

Because the present results rely on a purely variable-oriented approach, however, they do not tell us if the emotional quality of friendships may serve a protective function in the absence of sufficiently good parental relationships. In other words, it is possible that poor emotional tone in relations to parents might not have the same meaning – that is, suggest the same risk for self-harming behavior – in the context of good as opposed to poor emotional relations to friends. If there is a protective effect in adolescence of good emotional relations to friends, such relations

might compensate for poor emotional relations to parents. This hypothesis may be tested by means of a person-oriented approach.

Study 2

Study 1 used a *variable*-oriented approach by focusing on correlations between two sets of variables: variables measuring emotional tone in adolescents' close relationships, and variables used to measure emotional and behavioural problems. The purpose of Study 2 was to use a *person*-oriented approach in accordance with an advanced procedure developed by Bergman (1998) to identify different subgroups of adolescents with different profiles of values on measures of emotional tone in relations to parents and friends, to see if these subgroups would differ on deliberate self-harm.

Because the results in Study 1 indicate (a) that girls engage more in deliberate self-harm than boys, and (b) that self-harm has stronger interpersonal correlates in girls than in boys, it may be of interest to use this methodological approach especially with girls, to see if it can contribute further knowledge about the relation between the emotional quality of girls' close relationships and deliberate self-harm. In the analysis of profiles, the individual's ratings of positive and negative emotions in relation to parents and to friends are considered simultaneously. This presents an opportunity to investigate whether the specific *constellation* of ratings on these measures is associated with the girl's inclination for engaging in self-harm behaviour, beyond the associations found for the separate ratings. For example, it is possible that poor emotional relations to parents may mean different things in the context of good as opposed to poor emotional relations to friends. One hypothesis is that good emotional relations to friends might compensate for poor emotional relations to parents. If this is true, girls with a combination of poor parental relations and good peer relations will show less deliberate self-harm than girls who have poor emotional relations both to parents and peers.

Method

Participants

This study used a subsample of the community sample that was described in Study 1, consisting of all girls (n = 491) in Grades 7-8 in Trelleborg during Spring, 2007, who had data both on the ETI and the DSHI-9.

Instruments and procedure

This study used the Emotional Tone Index (ETI) and the Deliberate Self-Harm Inventory (DSHI-9) questionnaires that were described in Study 1. See also Study 1 for a description of the procedure.

Statistical analyses

Cluster analysis was used to group the girls on the basis of their different profiles of scores on the four ETI scales, according to the LICUR procedure (Bergman, 1998). This was done in four steps. First, multivariate outliers were identified by means of the residue procedure in the statistical package for pattern-oriented analyses SLEIPNER 2.1 (Bergman & El-Khouri, 2002). Second, Ward's hierarchical clustering method was applied. Four criteria presented by Bergman (1998) were used to decide on the optimal cluster solution: (a) theoretical meaningfulness of the cluster solution; (b) if a distinct drop in the explained error sum of squares (EESS) occurs when a cluster solution is extracted this may imply that two not so similar clusters were merged to a non-optimal cluster solution; (c) the number of clusters should not be more than 15 and should not be expected to be less than five; (d) the size of the EESS for the chosen cluster solution should preferably not be less than 67%, and at the very least exceed 50%. Third, a data simulation was undertaken to verify that the explained ESS was higher than could be expected on a random data set with the same general properties as the data set used in the real analysis. Fourth, a non-hierarchical relocation procedure (Wishart, 1987) was carried out in order to improve the homogeneity of the clusters and to increase the variance explained by the cluster solution.

These clusters were then compared by one-way ANOVA on measures of self-harm. As an additional analysis, the clusters were cross-tabulated with a categorization of students defined by

the number of their self-reported episodes of self-harm; the observed frequency in each cell was compared with the frequency that should be expected by chance alone, and tested for significance with exact single cell tests according to the fixed-margins model using EXACON (Bergman & El-Khouri, 1987); the significance level was adjusted with a Bonferroni correction.

Results

Cluster analysis

All girls (n = 491) with data on both the ETI and the DSHI-9 were included in the analysis. First, 9 multivariate outliers were identified and excluded by the residue procedure, thus leaving 482 individuals for the cluster analysis. Second, the application of Ward's hierarchical clustering method, together with Bergman's (1998) criteria, resulted in the choice of a five-cluster solution, which explained 60.5% of the total error sum of squares (ESS). Third, a data simulation showed that the explained ESS of the cluster solution was significantly higher than expected by chance ($p < .0001$). Fourth, a non-hierarchical relocation procedure to improve the homogeneity of the clusters resulted in a five-cluster solution that was found to explain 64.0% of the variance.

Table 4 shows the profiles of the ETI scale means for the clusters, together with the means for the whole girl sample, and Figure 1 shows the profiles of z-scores for each cluster (defined as the difference between the cluster mean and the mean for the whole girls sample, divided by the SD of the whole girls sample). The analysis identified two large clusters, which together contained 67% of all participants: one with very good emotional relations both to parents and friends (Cluster 1; n = 164) and another equally large cluster with average emotional relations both to parents and friends (Cluster 2; n = 165). (It should be noted that "average" here means experiencing positive emotions more than "often" on average, and negative emotions less than "seldom" in relation to both parents and friends.) The third largest cluster (Cluster 3; n = 84) showed marginally good emotional relations to both parents and friends; although they scored close to average on negative emotions in relation to parents and friends, they indicated clearly less of positive emotion in both kinds of relations. Finally, there were two clusters characterized by poor emotional relations to parents; of these, the largest (Cluster 4; n = 44) also showed poor

emotional relations to friends, whereas the smaller one (Cluster 5; *n* = 25) indicated rather good emotional relations to friends.

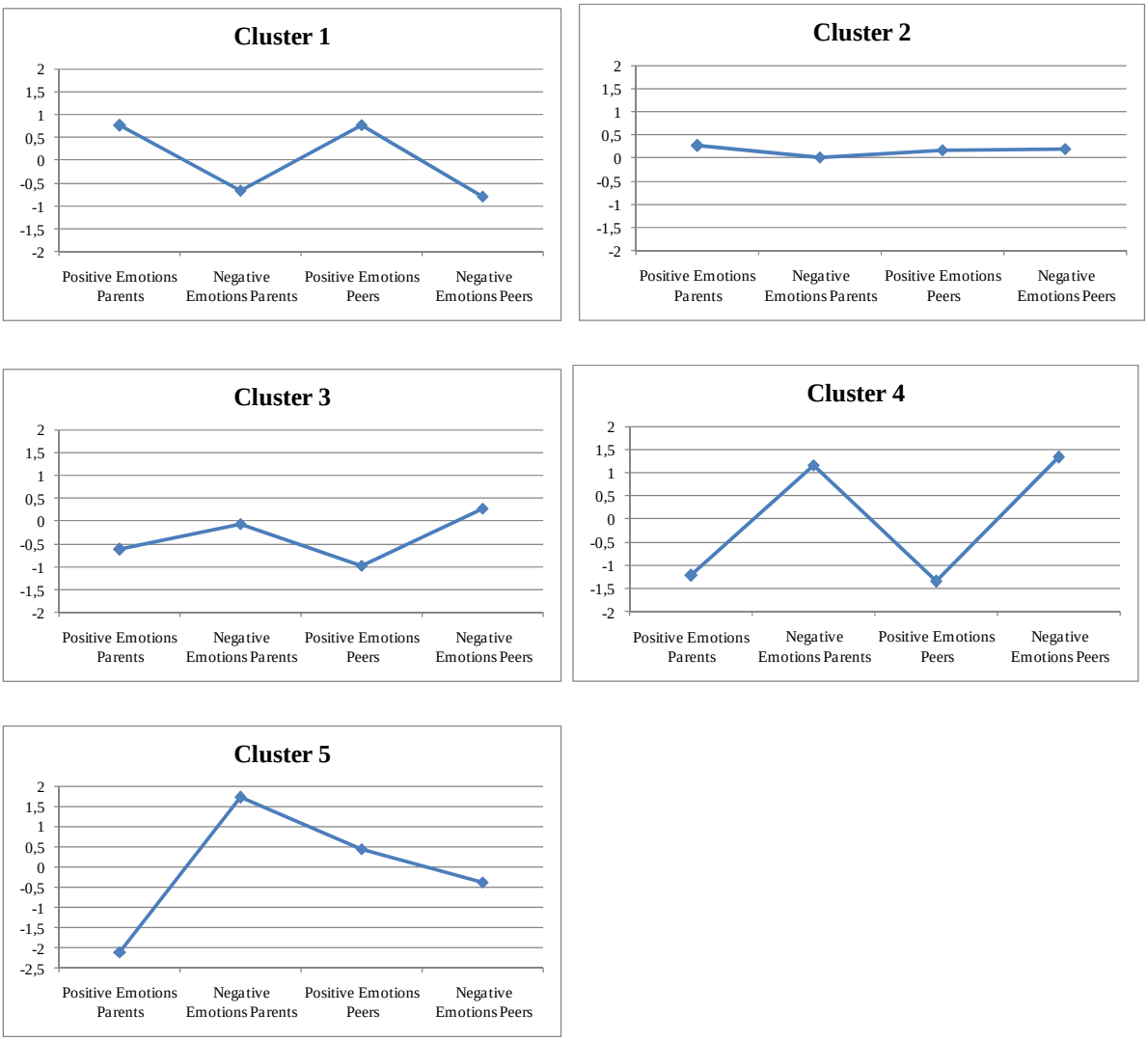


Figure 1. Profiles of the 5 ETI clusters, in terms of z-scores (where z = 0 corresponds to the whole girls sample's mean on each ETI scale).

Table 4.

Profiles of ETI clusters: 5-cluster solution.

	Parents		Friends	
Cluster	Positive	Negative	Positive	Negative
1. Generally good emotional relations (n=164)	3,62	1,31	3,69	1,18
2. Normally good emotional relations (n=165)	3,33	1,73	3,38	1,63
3. Marginally good emotional relations (n=84)	2,82	1,68	2,78	1,66
4. Generally poor emotional relations (n=44)	2,47	2,43	2,59	2,14
5. Poor emotional relations to parents, but good emotional relations to friends (n=25)	1,96	2,77	3,52	1,37
M (and *SD*) for all (n = 491, including the 9 outliers in the residuum)	3,18 (0,58)	1,72 (0,61)	3,29 (0,52)	1,54 (0,45)

Four one-way ANOVAs with the five-cluster categorization as the independent variable and the ETI variables as dependent variables showed that the clusters differed significantly on all four ETI scales. Tukey post hoc tests showed that Cluster 5 reported significant less positive emotions, and significantly more negative emotions, to parents than all of the other clusters, but also that this cluster reported significantly more positive emotions to friends than clusters 3 and 4, and significantly less negative emotions to friends than cluster 2, 3 and 4. The only cluster that reported more positive emotions to friends, and less negative emotions to friends than cluster 5, was Cluster 1.

Comparison between the clusters on deliberate self-harm

Table 5 shows a comparison between the five clusters' mean DSHI-9 scores. One-way ANOVA with the five cluster-categorization as the independent variable showed that the clusters differed significantly on the DSHI-9, $F(4) = 44.16$, $p < .0001$. Tukey post hoc tests showed that clusters 4 and 5 reported significantly more self-harm than clusters 1, 2, and 3, which did not differ significantly from each other. In addition, cluster 5 reported significantly higher deliberate self-harm than cluster 4.

Table 5.

Means (and SD) on the DSHI-9 for the five clusters.

Cluster	*N*	DSHI-9
1. Generally good emotional relations	164	1,23 (3.29)
2. Normally good emotional relations	165	2,28 (4.61)
3. Marginally good emotional relations	84	3,67 (7.10)
4. Generally poor emotional relations	44	12,11 (13.65)
5. Poor emotional relations to parents, but good emotional relations to friends	25	17,36 (17.24)
All	491	3.84 (8.37)

In an additional analysis, the five clusters were cross-tabulated with three categories of students that were formed on the basis of the number of their self-reported episodes of self-harm: those reporting no self-harm, those reporting 1-5 episodes of self-harm, and those reporting more than 5 episodes of self-harm. As shown in Table 6, significant findings were obtained in five cells. Cluster 1 had significantly more individuals who did not report any self-harm, and significantly less individuals who reported more than five episodes of self-harm than expected by chance. Cluster 4 had significantly fewer individuals than expected who had never injured themselves, and more individuals than expected who had injured themselves more than five times. Finally, in Cluster 5 there were more individuals than expected who had injured themselves more than five times. Clusters 2 and 3 contained no cells where the observed number of individuals differed significantly from that expected.

Comparison by one-way ANOVA also showed that the clusters differed significantly on the number of times that their self-harming behaviour had resulted in hospitalization or the seeking of medical treatment, $F(4) = 6.52$, $p < .0001$. Tukey post hoc tests showed that clusters 4 and 5 reported significantly more medical treatment after self-harm than clusters 1 and 2, which did not differ significantly from each other, nor from cluster 3. In addition, cluster 5 reported significantly more medical treatment than cluster 3.

Table 6.

Cross-tabulation of the five ETI clusters with a categorization of the students in terms of number of self-reported self-harm behaviours on the DSHI-9. Comparisons between observed and expected frequencies in each cell (expected frequencies in parentheses).

Cluster	None	1-5	>5	Total
1. Generally good emotional relations	114 (91)*	40 (43)	10 (30)*	164
2. Normally good emotional relations	96 (92)	47 (44)	22 (30)	165
3. Marginally good emotional relations	40 (47)	27 (22)	17 (15)	84
4. Generally poor emotional relations	11 (25)*	10 (12)	23 (8)*	44
5. Poor emotional relations to parents, but good emotional relations to friends	7 (14)	3 (7)	15 (5)*	25
Total	268	127	87	482

* $p < 0.05/15 = 0.003$, two-tailed

The residuum. The cluster analysis identified nine multivariate outliers who were placed in the residuum, as their ETI profiles differed markedly from all other individuals. It may be noted that the residuum had a very high mean score, 25.11, - in fact, higher than any of the identified clusters – on the DSHI-9.

Discussion

The cluster analysis of girls' ETI profiles led to the identification of five clusters, of which two were associated with more of deliberate self-harm than the others. One of these clusters (Cluster 4) was characterized by poor emotional tone in relation to both parents and friends, whereas the other (Cluster 5) was characterized by poor emotional tone only in relation to parents. In fact, the latter cluster of girls reported better relations to friends (more positive emotions and less negative emotions) than the average for the entire sample of girls, and almost as good relations to friends as the cluster with the best interpersonal relations (Cluster 1). In this context, it is interesting to note that Cluster 5 was the cluster with the highest self-harm scores, and that it showed significantly more of deliberate self-harm than Cluster 4. Of the girls in Cluster 5, 60% (15 of 25) reported more than five episodes of self-injury, whereas 52% of the girls in Cluster 4 (23 of 44) did this.

It is also of theoretical interest that although the cluster analysis identified one cluster with poor relations to both parents and friends, and one with poor relations to parents but good relations to friends, the analysis did *not* identify any cluster of girls characterized by a combination of good parental relations and poor peer relations. This is an example of what Bergman and Magnusson (1997) refer to as a "white spot", which may have important theoretical implications; "what does not occur is also instructive. There must be an explanation for why certain configurations occur less often than expected by chance" (p. 309). One possible explanation is that good emotional relations to parents lay a relatively solid foundation for the development of good friendship relations, so that the risk of developing poor friendship relations becomes more or less negligible.

General discussion

There are two important aspects of the present results. First, the results indicate that deliberate self-harm among girls, like other behaviour problems, is more strongly associated with the emotional quality of their relationships to parents than with the emotional quality of their relationships to friends – and that positive emotional qualities of their relations to friends do not seem to protect against the negative effect of poor emotional qualities in relations to parents. Second, the results exemplify how a person-oriented approach which focuses on the participants' profiles of values on a family of variables may represent an important complement to traditional variable-oriented methodological approach.

The results showed that deliberate self-harm in girls (as well as conduct problems, hyperactivity, aggressive behaviour, and the use of alcohol) was more strongly associated with the emotional tone of their relations to parents than with the emotional tone of their relations with friends. This is of interest against the background of previous findings which show that although parents are primary sources of intimacy and support in childhood, friends become increasingly important in middle and late adolescence (e.g., Harris, 1995). The present results suggest that good emotional relations with parents are more basic than good emotional relations to friends in terms of protecting 14-15 year old girls from developing deliberate self-harm and other behaviour problems. Moreover, to judge from the results of Study 2, good emotional relations with friends

do *not* seem to protect girls with poor emotional relations to parents from the risk of engaging in deliberate self-harm. In fact, the girls who reported *a pattern* of *good emotional relations to friends in a context of poor emotional relations to parents* were the ones who reported the highest frequency of deliberate self-harm – even higher than the girls who reported poor emotional relations to *both* parents and friends.

This is consistent with the assumption that positive emotion in relations to friends need not always serve health and adjustment, but may have different consequences depending on the nature of these friendships, as well as on the values and attitudes among the friends. For example, if girls with poor relations to parents and behaviour problems tend to seek each others' company, it might be the case that they reinforce each others' problem behaviours, including deliberate self-harm. One of the most robust predictors of adolescents' engagement in a specific behavior is the extent to which they perceive that their peers engage in similar behaviors, and there is reason to assume that this may apply also to self-injurious behavior. For example, Heilbron and Prinstein (2008) describe an unpublished longitudinal study of a community-based sample, where it was found that increases in adolescents' non-suicidal injury over a two year period were predicted by the degree of self injury reported by their best friends (as defined by their own nomination). According to Heilbron and Prinstein (2008), if an adolescent who struggles with negative emotions is exposed to peers who engage in self-injury as a strategy for emotion regulation, and if these peers afford close friendship, high status, and a group to identify with, this adolescent may well choose self-injury as a strategy both for coping with negative emotions and for achieving a desired self-image.

The process involved might be similar to the so-called "peer deviancy training" that appears to occur at high frequencies in relationships among antisocial peers, and that includes discourse about, as well as rehearsal and positive social evaluation of deviant acts. Peer deviancy training has been associated with the onset (Keenan, Loeber, Zhang, Stouthamer-Loeber, & Van Kammen, 1995) and escalation (Patterson, Dishion, & Yoerger, 2000) of a range of problem behaviors during adolescence, including stealing, violence, substance use, and risky sexual

behavior. More research is required on the role of peer influence in the development of deliberate self-harm among adolescents.

The second important aspect of the present results is that they illustrate how a traditional variable-oriented methodological approach (Study 1) may be fruitfully complemented by a person-oriented approach (Study 2). The results of the variable-oriented approach in Study 1 showed that the frequency of deliberate self-harm was significantly associated not only with poor emotional relations to parents but also with poor emotional relations to friends. That such a pattern of linear correlations can hide other theoretically interesting non-linear associations, however, was clearly shown by the finding in Study 2 that the cluster of girls who reported the highest frequency of deliberate self-harm actually showed a pattern of poor parental relations and *good* relations to friends. Another theoretically interesting result of Study 2 is that the cluster analysis did *not* identify any cluster of girls characterized by a pattern of good emotional relations to parents in combination with poor emotional relations to friends. This is also a kind of result that is difficult to get with a pure variable-oriented approach, and that may possibly reflect a basic fact about good emotional relations to parents forming a relatively firm basis for the development of good relations to friends. Bergman and Magnusson (1997) have elaborated on the theoretical importance of identifying "white spots" of this kind.

A high proportion (41.5%) of adolescents in the present study reported having self-harmed at least once. Although this high rate of self-harm is clearly consistent with the results from other studies that have used self-assessment instruments (DSHI and FASM) that ask for a large number of different self-harming behaviours (e.g., Bjärehed & Lundh, 2008; Hilt et al., 2008a; Lloyd-Richardson et al., 2007; Lundh et al., 2007; Yates et al., 2008), substantially lower figures (a life-time prevalence of 12-13%, and a 12-month prevalence of 6-7%) have been reported in survey studies (e.g., De Leo & Heller, 2004; Hawton, Rodham, Evans, & Weatherall, 2002; Hilt et al., 2008b) that have relied on one single survey question about self-harm. As argued previously by Lundh et al. (2007), this divergence may be due to the use of the different kinds of instruments: multi-item questionnaires that ask for a large variety of self-harm behaviours vs. large-scale surveys that rely on one single question about self-harm. Although participants in the latter

studies who responded affirmatively to this one survey question received follow-up questions about their self-harm, a non-affirmative response to this question precluded any follow-up. This means that the validity of this method relies very much on the sensitivity of one single item. It may therefore be the case that the latter kind of method lacks in sensitivity. On the other hand, it is also possible that the high rates of self-harm that are found with multi-item self-assessment measures may be the result of exaggeration or misunderstandings, and we do not know to what extent they represent serious forms of self-harm or relatively benign behaviours.

A major strength of the present study is that it relied on a community sample covering around 94% of all adolescents in a Swedish municipality. However, the present study also has some limitations. First, Study 2 focused only on the girls. This choice of focus may seem rational in the context of a study of deliberate self-harm, as this seems to be more of a problem among girls than boys. It would still be interesting, however, to carry out a similar cluster analytic study also of adolescent boys' emotional tone in close relationships; such a study might, however, focus primarily on problem behaviours that are typical of boys. Second, like most other work on self-harm the present study is cross-sectional; one of the most important tasks for future research would be to use longitudinal designs to extend the understanding of the developmental relationships between deliberate self-harm and emotional relations to parents and friends. A third limitation is that all variables in the present research were measured only by self-assessment; it would be valuable to include also parent-report and peer-report measures of behaviour problems and emotional tone of close relationships in future research. Finally, a fourth limitation is that we have no data that would make it possible to draw conclusions about the behavioural and emotional profiles of the adolescents' friends; such data would have made it possible to test the hypothesis that girls who engage in self-harm tend to associate with each other and to reinforce each others' self-destructive behaviour.

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Appendix. English translation of the ETI items

Think about the relation to your *parents*! How often do you feel like this when you are together with your parents (or when you think about them)?

	Never	Seldom	Often	Very often
1. Angry, irritated.....	·	·	·	·
2. Glad, happy, excited.....	·	·	·	·
3. Sad, disappointed, depressed.....	·	·	·	·
4. Safe, secure..... ·	·	·	·	
5. Worried, restless.....	·	·	·	·
6. Calm, relaxed.....·	·	·	·	
7. Embarrassed, ashamed.....	·	·	·	·
8. Proud of myself.....·	·	·	·	
9. Scared, anxious, insecure.....	·	·	·	·
10. Eager, full of energy.....	·	·	·	·
11. Bored..... ·	·	·	·	
12. Loved, liked, cared for.....	·	·	·	·
13. Rejected, ignored, mistreated.....	·	·	·	·
14. A feeling of belongingness.....	·	·	·	·
15. Feeling lonely, excluded.....	·	·	·	·
16. Feeling understood.....	·	·	·	·
17. Feeling misunderstood.....	·	·	·	·

Think about the relation to your ***closest friends!*** How often do you feel like this when you are together with your parents (or when you think about them)?

	Never	Seldom	Often	Very often
18. Glad, happy, excited	·	·	·	·
19. Angry, irritated	·	·	·	·
20. Calm, relaxed..... ·	·	·	·	
21. Sad, disappointed, depressed	·	·	·	·
22. Eager, full of energy	·	·	·	·
23. Worried, restless.....	·	·	·	·
24. Proud, self-assured.....	·	·	·	·
25. Scared, anxious, insecure, embarrassed ...	·	·	·	·
26. A feeling of belongingness.....	·	·	·	·
27. Feeling lonely, excluded.....	·	·	·	·
28. Feeling understood	·	·	·	·
29. Feeling misunderstood.....	·	·	·	·