

## RESEARCH ARTICLE

# Inpatients with Severe Anorexia Nervosa and Their Siblings: Non-shared Experiences and Family Functioning

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### Abstract

**Objectives:** The aims of this study were the following: to identify perceptions of patients with anorexia nervosa (AN) and their siblings regarding differential experiences within and external to the family including sibling interactions, parental treatment, relationships with peers and events that are unique to each sibling; (2) to compare how patients and their siblings perceive eating disorder symptoms, parental affection/control, social support and stigma; and (3) to test associations with family functioning for patients with AN and their siblings.

**Method:** A total of 26 patients paired with their siblings were recruited from an Eating Disorder Program and administered standardized instruments measuring different experiences within and external to the family, the impact of eating disorder behaviours, stigma, social support and family functioning.

**Results:** Patients rated high on the differential experience of jealousy in contrast to their siblings. Patients scored higher than their siblings on eating symptoms, whereas siblings scored higher on social support. The impact of AN on the family, stigma towards the individual and family, and social support accounted for 37% of the variance in family functioning from the sibling perspective after controlling for age and gender. Of these variables, impact of AN on the family made the largest contribution.

**Discussion:** Family-based and sibling-based interventions that aim to reduce the effects of the illness on the sibling relationship and the family are recommended. Copyright © 2013 John Wiley & Sons, Ltd and Eating Disorders Association.

### Keywords

siblings; eating disorders; family functioning; stigma

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Published online 10 April 2013 in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/erv.2230

## Introduction

Although it has long been recognized that eating disorders (EDs) have a profound impact on parents and on family relationships in general, the specific effects of this illness on siblings have not received much attention, leading some to describe siblings as the 'forgotten group' (Vandereycken & Van Vreckem, 1992). The value of the sibling relationship itself has largely been overlooked by researchers in EDs as well.

We have reviewed comparative studies investigating differences and similarities between patients and their siblings, and the impact of the illness and ED behaviours on families and siblings. When compared with their affected siblings with EDs, unaffected siblings differ in a number of important ways. First, unaffected siblings appear to have a healthy body image, normal eating and lower levels of psychopathology (Amianto et al., 2011; Benninghoven et al., 2008; Halvorsen et al., 2005). Second, they present with different temperaments (Wade et al., 2001; Wade et al., 2008; Wilksch & Wade, 2009). Siblings without an ED appear to be similar to normal controls on personality traits such as stress reactivity, perfectionism and need for approval (Amianto et al.,

2011; Hason-Rozenstein, Latzer, Stein, & Eviatar, 2011; Lilienfeld et al., 2000). Siblings without an ED are less alexithymic than their affected siblings (but more alexithymic than healthy controls) (Hason-Rozenstein, Latzer, Stein, & Eviatar, 2011). Third, they have lower rates of internalizing disorders including anxiety, depression and obsessive-compulsive personality disorder (Adambegan et al., 2012; Halmi et al., 2005; Halvorsen et al., 2005; Hason-Rozenstein et al., 2011; Karwautz et al., 2002; Lilienfeld et al., 2006).

### Shared genetic influences between individuals with eating disorders and their siblings

Although affected and nonaffected siblings differ in temperamental and personality traits, recent studies suggest that siblings share biological vulnerabilities including neurocognitive profiles (Hason-Rozenstein et al., 2011; Hason-Rozenstein et al., 2011). This is consistent with family and twin studies that have shown that EDs have a strong genetic predisposition (ranging from 59% to 82%) with nonshared environmental factors accounting for most of the remaining variance (Campbell et al., 2011;

Culbert et al., 2008; Harden et al., 2012; Hason-Rozenstein et al., 2011; Hason-Rozenstein et al., 2011; Huemer et al., 2012; Karwautz et al., 2003; Karwautz et al., 2011; Klump et al., 2000; Klump et al., 2009; Root et al., 2010). Consistent with shared genetic vulnerability, siblings with EDs exhibit difficulties in set shifting (Roberts et al., 2010) and central coherence (Tenconi et al., 2010) compared with their unaffected siblings.

### Differential environmental influences between siblings and individuals with eating disorders

In addition to shared genetic influences, siblings within the same family may be exposed to different environmental factors that may influence their risk for EDs. For example, siblings with earlier pubertal development (including physical changes and/or early menarche) may experience exposure to dieting and to negative comments about their physical appearance and weight, shape and size thereby increasing their risk of developing an ED (Harden et al., 2012). Most pertinent to the current study, siblings may have differential experiences of their parents, family events and family climate (Daniels, 1986; Daniels & Plomin, 1985). Such family environmental factors may interact with genetic risk factors; for example, a recent study found that siblings with the short(s) allele of the 5-HTTLPR polymorphism in the serotonin transporter gene are at increased risk of developing an ED and that this risk is increased still further in the presence of problematic parenting styles (Karwautz et al., 2011).

The perspective of the affected individual regarding their relationships with their siblings and parents has been investigated. After the onset of an ED in a sibling, studies show that the affected sibling experiences more jealousy and antagonism towards their sisters than vice versa (Murphy et al., 2000). Affected individuals report more negative and critical comments from their siblings (Taylor et al., 2006). In fact, negative comments about weight, shape and eating from siblings have been identified as a risk factor for the onset of an ED (Jacobi et al., 2011). Individuals affected with EDs appear to also view their relationships with their parents negatively. By using the Parental Bonding Instrument, studies have found that individuals with an ED perceive both their mother and father as more controlling and less affectionate than healthy controls (Canetti et al., 2008; De Panfilis et al., 2003; Lobera et al., 2011) and those suffering from a chronic ED display the most extreme scores when compared with those who have fully or partially recovered (Bulik et al., 2000).

Researchers have used the Sibling Inventory of Differential Experience (SIDE) to identify differential experiences within and external to the family from the perspective of affected individuals and their siblings. In comparison with their healthy siblings, individuals suffering from bulimia nervosa only perceive high levels of paternal control and low levels of paternal affection (Berg et al., 2000; Lehoux & Howe, 2007; Wonderlich et al., 1994), whereas those with AN only perceive higher levels of maternal control (Murphy et al., 2000) based on the SIDE. In a recent study (Huemer et al., 2012), individuals with anorexia nervosa restrictive subtype perceived lower levels of emotional connectedness, compared with their siblings before developing this illness. Not surprisingly, given the need to actively involve parents in treatment during adolescence (Lock et al., 2001), individuals with EDs perceive themselves as less autonomous within their

family after the onset of the illness (Huemer et al., 2012; Karwautz et al., 2003) compared with their siblings but interestingly perceive themselves as having had the same level of autonomy within their families prior to the onset of the illness. Increased understanding regarding the differential experiences and perceptions of affected individuals compared with their siblings may inform interventions aimed at improving the sibling relationship and strengthening the family as a whole in the presence of an ED.

### The impact of the illness on the family

In comparison with siblings, there is more literature on caregivers, typically parents (Cottee-Lane et al., 2004; Honey & Halse, 2007; Kyriacou et al., 2008; Robinson et al., 2013; Treasure et al., 2001) and partners (Huke & Slade, 2006). Caregivers often experience guilt, shame (Highet et al., 2005; Treasure et al., 2001), helplessness, self-blame, anxiety (Whitney et al., 2005) and an overall lowered quality of life (de la Rie et al., 2005). Predictors of burden and psychological distress in unaffected family members include maladaptive coping strategies, high expressed emotion and unmet caregiver needs (Coomber & King, 2013). The burden of caregiving is also associated with lower levels of social support (Graap et al., 2008; Perkins et al., 2004; Treasure et al., 2008; Winn et al., 2004). Parents report experiencing social isolation because of their perception that they were excluded from extended family members and peers (Hillege et al., 2006).

The perception of others distancing themselves from family members may be influenced by the stigma associated with this illness (Graap et al., 2008; Treasure et al., 2001; Whitney et al., 2007). Although those affected by an ED and their family members view the illness as chronic, very distressing and difficult to cure (Holliday et al., 2005), the general public often stigmatizes EDs as a volitional and mild condition (Crisafulli et al., 2008; Crisp, 2005; Mond et al., 2006; Roehrig & McLean, 2010; Stewart et al., 2006; Stewart et al., 2008). Individuals who perceive themselves as stigmatized often use indirect rather than direct methods of support seeking because of fears of rejection (Williams & Mickelson, 2008). However, indirect methods of support seeking are likely to result in family members, including siblings, not receiving the support that they require to manage the adverse effects of the illness on the family (Williams & Mickelson, 2008). To date, no research has directly explored the perceived stigma of people with AN and their family members from the perspective of siblings even though literature indicates that stigma and lower perceived social support predict poor family functioning (Dimitropoulos et al., 2008).

Although parents and individuals with an ED concur that siblings provide motivation for recovery and are a model for healthy eating (Honey et al., 2006; Honey & Halse, 2007), research demonstrates that ED behaviours have an adverse effect on siblings. In a qualitative study, parents perceived the ED as having an adverse effect on their family and that their non-affected children suffered from their lack of availability to provide emotional and instrumental support (Honey et al., 2006). A study by Halvorsen, Rø, and Heyerdahl (2013) found that siblings felt parents paid less attention to them during their sibling's illness and 24% felt parents had no time for them at all. Siblings of adolescents with EDs also describe difficulties dealing with

increased family conflict and the increased responsibility for supporting and caring for their sibling with the illness (Areemit *et al.*, 2010; Halvorsen *et al.*, 2013), and similar consequences of the illness are described in adults (Dimitropoulos *et al.*, 2009). Overall, siblings both within and outside the home are significantly impacted by the presence of a sibling with an ED and report various negative consequences of the ED on areas of their life such as school work and leisure time (Halvorsen *et al.*, 2013).

Qualitative studies focusing specifically on siblings reveal that they lack knowledge of the illness despite the fact that all aspects of their lives are often significantly affected by the eating disorder symptoms, especially when they are adolescents themselves (Areemit *et al.*, 2010; Halvorsen *et al.*, 2013). In situations where the illness becomes chronic and family resources are depleted, some siblings may participate in caregiving activities (Dimitropoulos *et al.*, 2009). For example, in a recent study of caregivers of family members with an ED, 12.2% were identified as siblings (Padierna *et al.*, 2012). Regardless of whether siblings take on caregiving activities within their family, the emotional distress resulting from the illness may interfere with their ability to provide emotional support to their affected sibling and to seek out support for themselves. Overall, the research that is available on the effects of the illness on the family consistently demonstrates that illness behaviours and the absence of parental support affect siblings in various domains. To the best of our knowledge, very few quantitative studies focus on the impact of ED behaviours on the sibling relationship and family functioning from the perspectives of the siblings.

This study aims to explore the perception of family functioning from siblings and patients. Guided by previous literature, variables have been parsed into descriptive, associated and outcome measures. Descriptive variables elucidate the difference between individuals with AN and their siblings on ED symptoms, peer relationships and family experiences. Associated variables are based on literature that found that siblings are negatively impacted by the sibling's ED (Areemit *et al.*, 2010; Dimitropoulos *et al.*, 2009; Halvorsen *et al.*, 2013), that perceived stigma leads to ineffective support seeking (Williams & Mickelson, 2008) and that a perception of inadequate social support can lead to caregiver burden and poor family functioning (Coomber & King, 2013; Dimitropoulos *et al.*, 2008; Padierna *et al.*, 2012). It is hypothesized that these variables (impact of the ED, perceived stigma and social support) will be associated with the primary outcome of perceived family functioning and therefore have been categorized as such for the purpose of data analysis.

This study aimed to achieve the following: (1) to compare perceptions of patients paired with their siblings regarding differential experiences within and external to the family including sibling interactions, parental treatment, relationships with peers and events that are unique to each sibling; (2) to compare patients with AN and their paired siblings with regard to eating psychopathology, perceptions of social support and stigma towards people with EDs and their families; and (3) to investigate whether eating psychopathology, social support and stigma are associated with perceived family functioning in patients with AN and their siblings.

Hypotheses:

1. Affected individuals will report more jealousy of their siblings than the reverse. Affected individuals will report higher levels

- of maternal control and lower levels of maternal affection compared with their siblings. Affected individuals will also report lower popularity and peer college orientation than their siblings.
2. Individuals with EDs will have greater eating psychopathology, lower perceptions of social support and higher perceptions of stigma towards individuals with AN and their families than their siblings.
3. Impact of EDs on the family, stigma towards the individual and the family and low social support will be associated with family functioning for people with EDs and their siblings.

## Methods

### Participants

The patient participants were consecutively recruited from the Eating Disorder Program, University Health Network from 2009 to 2011. The Eating Disorder Program consists of an inpatient, day treatment and follow-up program. The overarching goals of this intensive program are threefold: (1) to support patients to gain weight and maintain a body mass index (BMI) of 20, (2) to assist with eating rehabilitation and amelioration of purging symptoms and (3) to address core psychopathology and facilitate rehabilitation to the community. All patients are voluntarily admitted to the program. A clinician interview conducted by either a psychiatrist or a psychologist was used to determine a diagnosis of AN based on symptom frequency and severity, and through the use of the Eating Disorder Examination-Questionnaire (EDE-Q). Weight and height were obtained using a digital scale in order to obtain BMI. The clinical interview, weight history and current BMI, and the patients score on the EDE-Q were used to determine a diagnosis of AN and eligibility for the study. During the clinical interviews, patients were asked questions regarding family history of EDs and other mental illnesses in their siblings, parents and other family members.

Inclusion criteria for patients were as follows: (1) current DSM-IV-TR diagnosis of AN, (2) female and male individuals admitted to an intensive inpatient treatment program and (3) identified a sibling with whom they have a close relationship. The inclusion criteria for siblings were as follows: (1) perceive themselves as having a close relationship to the person with the illness, (2) did not have a current ED and (3) able to communicate verbally and in writing in English. All siblings meeting these criteria were eligible for inclusion in the study, regardless of whether they had a past history of an ED.

### Procedures

Participants who met the inclusion criteria were invited to complete a package of questionnaires (see following text) and then participate in a qualitative interview. Participants were also asked to forward information about the study to their siblings. Consenting participants (both patient and sibling) completed the questionnaires within 1 week of their admission to the inpatient component of the Eating Disorder Program. Patients completed questionnaires in hospital, and siblings had the option of completing questionnaires either in hospital or at home. When more than one sibling was available to participate in the study, we used the sibling that was closest in age to the patient.

We received ethics approval from the Research Ethics Board of the University Health Network. Written consent was obtained from patient and sibling participants prior to completion of the questionnaires.

## Measures

Descriptive measures (not included in regression analyses):

*Eating Disorder Examination-Questionnaire* (Fairburn & Beglin, 1994) (patients and siblings): The EDE-Q is a 28-item self-report version of the widely used clinician-administered Eating Disorder Examination (EDE) (Fairburn & Cooper, 1993). This measure of ED symptoms and behaviours has been shown to have high levels of agreement with the EDE and good psychometric properties.

*Sibling Inventory of Differential Experience* (Daniels & Plomin, 1985) (patients and siblings): The SIDE is a self-report measure designed to assess differential nonshared environmental influences on experiences in affected and nonaffected siblings within the same family. Participants were asked to answer 73 statements by comparing their experiences with those of their sibling on various dimensions. For the purpose of this study, we focused our analyses on seven dimensions that have been studied in the ED literature (Berg et al., 2000; Karwautz et al., 2001; Klump et al., 2002; Lehoux & Howe, 2007; Murphy et al., 2000; Wonderlich et al., 1994). These dimensions included maternal affection, paternal affection, maternal control, paternal control, jealousy, peer college orientation and peer popularity. Intercorrelations among the SIDE scales are low to moderate; test-retest reliability ranges from .77 to .93 (Daniels, 1986).

Predictor/associated variables:

*Devaluation of Consumers and Consumer Families Scales* (DCCFS) (Struening et al., 2001) (patients and siblings): The DCCFS is employed to measure stigma. The scale is divided into the 'A' (devaluation of consumers) subscale consisting of the first eight items and the 'B' (devaluation of consumer families) subscale consisting of the last seven items. The total (15 items) and subscale scores will be included as predictor variables.

*Social Provisions Scale* (SPS) (Cutrona & Russell, 1987) (patients and siblings): The SPS is a 24-item self-report measure employed to measure six dimensions of social support (four items each): reliable alliance, attachment, guidance, opportunity for nurturance, social integration and reassurance of worth. The total score provides an indication of global support, with a Cronbach's alpha of 0.93 (Cutrona & Russell, 1987).

*Eating Disorders Symptom Impact Scale* (EDSIS) (Sepulveda et al., 2008) (siblings only): The EDSIS assesses the impact of caring for a loved one with an ED. This 24-item scale has good psychometric properties. Items on the EDSIS capture four dimensions (nutrition, guilt, dysregulated behaviour and social isolation).

Outcome variables:

*McMaster Family Assessment Device – General Functioning Scale* (FAD-GFS) (Epstein et al., 1983) (Patients and siblings): The FAD-GFS, based on the McMaster Model of Family Functioning, provides a total score representing the overall health or pathology of the family. Internal consistency for the FAD-GFS is considerably

higher than the other FAD subscales, with a Cronbach's alpha of 0.92 (Epstein et al., 1983).

## Data analysis

Data were analyzed using the Statistical Package for the Social Sciences for Windows. Descriptive statistics were calculated for demographic variables, including means, standard deviations and frequencies. Paired *t*-tests were performed to identify differences between patients and siblings for predictor and outcome variables. For Aim 1, we used paired *t*-tests to compare affected individuals and their siblings within the same family in order to identify differences in the following areas (measured using the SIDE): parental treatment, sibling interactions and peer relationships. Using Bonferroni adjustment for multiple comparisons, we applied an individual alpha of  $p = 0.007$  (seven independent tests were conducted), which resulted in a family-wise error rate of 0.049. For Aim 2, we conducted analysis of covariance analyses to determine differences between patients and siblings in eating psychopathology, perceptions of social support and stigma towards people with EDs and their families after covarying for potential confounding factors including age and gender. For Aim 3, two sets of bivariate correlations were calculated between predictor and outcome variables, one for patients and one for siblings. The predictor variables that were significantly correlated with the outcome variable were entered in a regression analysis, in which we first entered age and gender as control variables and then added other predictor variables to determine their combined effect on perceived family functioning.

## Results

A total of 26 patients with AN paired with 26 siblings participated in the study. Demographic and clinical characteristics of participants are summarized in Table 1. Some information was only available on patients, rather than sibling participants who were not interviewed directly. With regard to family psychiatric history, 6 of 24 patients who provided this information stated that they had a sibling with a history of an ED, 3 of 24 reported a parent with an ED and 13 of 24 reported having someone in their family with any mental illness. It is not known if the siblings who participated in the study are the same siblings discussed by the patients as having a history of an ED. With regard to birth order, more patients ( $n = 10$ , 38, 5%) than siblings ( $n = 7$ , 26, 9%) were first born; however, this difference was not statistically significant (Chi-square = .80,  $p = 0.37$ ,  $df = 1$ ).

### Analysis of the SIDE

With respect to the SIDE (Table 2), there were no statistically significant differences between the siblings on parental control and affection and events unique to each individual (college orientation, popularity). Patients scored significantly higher on the SIDE jealousy subscale than siblings, demonstrating that patients experience more jealousy towards their sibling than siblings perceive towards the patient. Using analysis of covariance, we compared patients and siblings on a number of variables after controlling for age and gender (Table 3). As expected, patients scored significantly higher ( $M = 4.11$ ,  $SD = 1.27$ ) on the EDE-Q than siblings ( $M = 1.79$ ,  $SD = 1.49$ ) ( $F = 20.8$ ,  $p < .001$ ). The

**Table 1** Demographic and clinical characteristics

	Patient			Sibling		
	N	Range	M (SD)	N	Range	M (SD)
Total	26			26		
Gender						
Male	1			10		
Female	25			16		
Age	26	17–43	26.77 (6.98)	14–42	24.92 (7.74)	
BMI	26	11.7–18.7	15.12 (1.91)			
Duration of illness	25	1–25 years	8.24 (5.93)			
Onset of illness	25	12–32 years	18.88 (5.25)			
AN subtype						
Restricting	15					
Binge/purge	11					
Marital status						
Single	20					
Married	2					
Separated	1					
Divorced	1					
Living circumstance						
Alone	2					
Parents and siblings	16					
Parents	3					
Partner	2					
Occupation						
Part-time work	4					
Disability	9					
Student	11					
Ethnicity						
Caucasian	19					
Hispanic	1					

**Table 2** Comparison of individuals and their siblings on the Sibling Inventory of Differential Experience (SIDE)

SIDE	Patient [M (SD)]	Sibling [M (SD)]	T	df	p
Maternal affection	2.74 (0.78)	2.84 (0.51)	-0.49	25	0.626
Paternal affection	2.89 (0.67)	2.99 (0.65)	-0.49	25	0.626
Maternal control	3.33 (0.45)	3.20 (0.66)	0.86	25	0.398
Paternal control	3.37 (0.56)	3.18 (0.54)	1.20	25	0.241
Jealousy	3.76 (0.66)	3.16 (0.74)	3.50	25	<b>0.002</b> <sup>1</sup>
College orientation	2.93 (0.65)	3.43 (0.53)	-2.53	24	0.018
Popularity	2.64 (0.71)	3.21 (0.83)	-2.19	25	0.038

<sup>1</sup>Significant after correction for seven comparisons ( $p < 0.007$ ).

**Table 3** Analysis of covariance for eating psychopathology, social support and stigma covarying for age and gender

	Patient [M (SD)]	Sibling [M (SD)]	F	df	p
EDE-Q	4.11 (1.27)	1.79 (1.49)	20.8	1	<b>0.000</b> <sup>1</sup>
SPS	65.94 (10.73)	79.78 (9.90)	17.1	1	<b>0.000</b> <sup>1</sup>
DCCFS – Individual	20.01 (3.09)	17.69 (4.39)	2.47	1	0.122
DCCFS – Family	16.71 (3.41)	16.36 (4.10)	0.20	1	0.654

EDE-Q, Eating Disorders Examination-Questionnaire; SPS, Social Provisions Scale; DCCFS, Devaluation of Consumers and Consumer Families Scales.

<sup>1</sup>Significant after correction for seven comparisons ( $p < 0.007$ ).

proportion of patients and siblings scoring above the clinical range (4.0) are as follows: 65% of patients and 12% of siblings. Siblings scored significantly higher ( $M = 79.78$ ,  $SD = 9.90$ ) on the SPS than patients ( $M = 65.94$ ,  $SD = 10.73$ ), consistent with greater perceived social support ( $F = 17.1$ ,  $p < .001$ ). There were no significant differences between patients and siblings on stigma towards individuals or families.

**Bivariate correlations**

For patients, the FAD-GFS was significantly correlated with DCCFS – Individual ( $r = 0.58$ ,  $p < .01$ ), demonstrating higher family dysfunction is correlated with greater perceptions of negative attitudes of others towards AN. The remaining predictor variables were not statistically correlated with FAD-GFS (Table 4).

For siblings (Table 5), FAD-GFS was significantly correlated with EDSIS, SPS, DCCFS – Family and DCCFS – Individual. The positive correlation with the EDSIS demonstrates higher family dysfunction is correlated with higher negative impact of the illness on the family from the perspective of siblings. The negative correlation with SPS demonstrates higher family dysfunction is correlated with lower social support from family and friends outside of the nuclear family. The positive correlations with DCCFS – Family and DCCFS – Individual demonstrate higher family dysfunction is correlated with greater sibling perceptions of negative attitudes of others toward individuals with AN and greater perceptions of others devaluing families of individuals with AN.

**Table 4** Bivariate correlations among predictor and outcome variables for patients

	1	2	3	4
1. SPS				
2. DCCFS – Individual	-0.32			
3. DCCFS – Family	-0.35	0.40*		
4. FAD-GFS	-0.38	0.58**	0.38	

SPS, Social Provisions Scale; DCCFS, Devaluation of Consumers and Consumer Families Scales; FAD-GFS, Family Assessment Device – General Functioning Scale.

\*Correlation statistically significant ( $p < .05$ ).

\*\*Correlation statistically significant ( $p < .01$ ).

**Table 5** Bivariate correlations among predictor and outcome variables for siblings

	1	2	3	4	5
1. EDSIS					
2. SPS	-0.05				
3. DCCFS – Individual	0.18	-0.28*			
4. DCCFS – Family	0.11	-0.19	0.85*		
5. FAD-GFS	0.41*	-0.28*	0.48**	0.45**	

EDSIS, Eating Disorders Symptom Impact Scale; SPS, Social Provisions Scale; DCCFS, Devaluation of Consumers and Consumer Families Scales; FAD-GFS, Family Assessment Device – General Functioning Scale.

\*Correlation statistically significant ( $p < .05$ ).

\*\*Correlation statistically significant ( $p < .01$ ).

## Regression analysis

A regression analysis was conducted to examine the overall magnitude of the associations with family functioning for siblings but not for patients, as only one predictor variable significantly predicted the outcome variable for patients. We first entered age and gender in the regression model. Impact of AN on the family, stigma towards the individual and family, and social support were entered as a second step. Age and gender together accounted for 21% of the variance in family functioning. The other four variables accounted for an additional 37% of the variance over and above age and gender (Incremental  $F(4, 19) = 4.1, p = 0.01$ ).

## Discussion

This study sought to examine differential factors between affected individuals and their siblings. We hypothesized that affected individuals with AN would be more jealous of their siblings than the reverse (jealousy reported by siblings of individuals with AN). The finding of this study is consistent with previous research on adolescents and adults showing siblings with AN report more antagonism and more jealousy towards their well siblings than their siblings towards them (Karwautz et al., 2001; Murphy et al., 2000). It is possible that jealousy is a natural emotional response for individuals with AN whose friendships, quality of life and health have been adversely impacted by the illness. The sources of jealousy for the affected individuals cannot be gleaned through the use of a quantitative measure such as the SIDE. Future qualitative research is required to identify sources of jealousy and whether they include weight-based and appearance-related comparisons or other factors. Such research may further identify how jealousy manifests itself in the sibling relationship.

Individuals with AN and their siblings did not report any significant differences in maternal and paternal affection and control. Perceptions of affected individuals and their siblings regarding their family environment have yielded contradictory results. One study found that individuals with AN perceived greater maternal control than their affected siblings (Murphy et al., 2000), whereas another study found both affected individuals and their siblings perceived high levels of maternal control and low levels of maternal care (Amianto et al., 2011). Murphy et al. (2000) studied patients with anorexia and their siblings in a similar age range to the current study; however, the aforementioned study focused on outpatients rather than inpatients. It is possible that maternal and paternal control and affection do not differ between siblings and patients because the patients are hospitalized and therefore receiving intensive care from a specialized ED team.

There were no differences between affected individuals and their siblings regarding peer relationships and peer college orientation subscales of the SIDE. These findings are congruent with another study using the SIDE, which found no differences in popularity and peer college orientation, dimensions that reflect differential peer experiences (Murphy et al., 2000). However, Murphy et al. (2000) did find that siblings are more likely to date than their affected siblings. Another study revealed that individuals with EDs perceive their siblings as more popular, with a greater number of close relationships (Karwautz et al., 2001). Similarly, Amianto et al. (2011) found that individuals with AN

have a much greater need for approval from others and a greater preoccupation with relationships than their siblings.

This study sought to identify differences between individuals with AN and their siblings on a number of salient variables including eating psychopathology, social support and perceptions of stigma towards those afflicted with this disorder and families. Research shows that individuals with anorexia have greater body image difficulties, a stronger drive for thinness and differing perceptions of binge eating than their siblings (Amianto et al., 2011; Benninghoven et al., 2008). Generally consistent with these earlier studies (Benninghoven et al., 2008; Hason-Rozenstein et al., 2011; Karwautz et al., 2002), we found that siblings had significantly lower scores on a quantitative scale of ED symptoms (EDE) compared with AN-affected individuals. However, we did identify a subgroup of 12% of siblings who scored high on the EDE, although we could not confirm a diagnosis of an ED because a clinician-rated interview was not conducted. This finding is not surprising given the high heritability of EDs (Klump et al., 2009), but it is inconsistent with previous literature where siblings were similar to healthy controls on the EDE (Hason-Rozenstein et al., 2011; Karwautz et al., 2001; Karwautz et al., 2002) and the Eating Attitudes Test (Areemit et al., 2010). These previous studies (Areemit et al., 2010; erv2230-bib-0033Hason-Rozenstein et al., 2011; Karwautz et al., 2001; Karwautz et al., 2002) excluded siblings with any history of ED, which may explain the discrepancy between them and the current study.

Our study found no differences between individuals with AN and siblings with regard to stigma towards affected individuals with this illness and their families. This was contrary to our prediction. Although there is no literature comparing perception of stigma between patients and siblings, one possible interpretation of our findings is that both patients and siblings perceive AN as an equally stigmatizing illness. This is consistent with literature on mental illness in general that shows family members are simultaneously concerned about the stigma a family member may be suffering (Corrigan & Miller, 2004) and the stigma they may themselves receive from others (Larson & Corrigan, 2008). For siblings specifically, they often perceive blame for not assuring their sibling successfully adheres to treatments, and these effects appear to be more pronounced for siblings that live with the sibling suffering from mental illness (Corrigan & Miller, 2004). Future research with larger numbers of siblings, perhaps including different methods such as qualitative interviews, is warranted to further explore differential perceptions of stigma within families.

This study also showed that in contrast to their siblings, patients perceive themselves as having lower levels of social support. This finding is supported by emerging literature that demonstrates that individuals with EDs have significant interpersonal difficulties (Carter et al., 2012). Significant interpersonal difficulties in EDs are thought to be related to impaired social cognition, which can be understood in EDs by a three-phase model that posits predisposing factors for impairment exacerbated by decreased functioning during the acute phase of the illness, which can in turn affect relationships (Treasure et al., 2012). When acquiring, recognizing, interpreting and responding to social stimuli, individuals with an ED have a bias towards threatening emotional stimuli, impaired recognition of emotions of themselves and others, impaired reflective functioning in social

situations and decreased ability to understand situational contexts during the acute phase of their illness (Oldershaw *et al.*, 2011). Because of these impairments, it is possible that individuals with an ED perceive less social support through the inability to accurately process social stimuli. It is also possible that caregivers and siblings attempt to provide support, which is misinterpreted or rejected by the individual with an ED because of their impaired social cognition, and in turn, the quality and quantity of social support may diminish over time.

Another goal of the study was to describe the features associated with family functioning from the perspective of individuals with AN and their siblings. For individuals with AN, higher family dysfunction was associated with stigma towards individuals. For siblings, a combination of factors including the ED symptoms, stigma and social support (after controlling for age and gender) appear to be associated with family functioning. The association was sizable. The impact of the eating symptoms on the family (EDSIS) made the largest single contribution towards family functioning. Generally consistent with the current study, Dimitropoulos *et al.* (2008) found increased impact of the ED symptoms on the family and family stigma, and lower social support were predictors of problems in family functioning as perceived by caregivers (most of whom were parents). The adverse impact of the illness on the family from the perspective of the sibling has been found in other studies (Honey *et al.*, 2006).

## Strengths, limitations and research recommendations

This study adds to the limited research focusing on both individuals with AN and their siblings. It is one of the few studies that examines differences between patients with AN and their siblings regarding perceptions of social support, stigma and the effects of the illness on the family. This study also has some limitations. First, this study relied exclusively on the use of self-report measures with the siblings, administering a clinician interview rather than self-report measures to gather information about eating psychopathology and other comorbid diagnoses in the siblings. Without this information, we cannot rule out that the presence of EDs and other mental health issues was influencing the responses on the self-report measures. This is a significant limitation of our study. In the absence of a direct interview with the siblings, we also cannot confirm whether the siblings had an ED. A clinician-rated instrument coupled with the EDE-Q would have allowed us to assess whether the siblings were under-reporting (or over-reporting) current disordered eating.

Because the study is cross sectional, we cannot make causal statements about the observed associations. It is possible that perceptions of family functioning may be influencing perceptions of stigma and social support from the perspective of the siblings. The cross-sectional nature of the study further prevents us from teasing apart the influence of eating psychopathology and emaciation on the perception of the affected sibling of their relationships with their siblings. Given that we administered self-report measures to patients at the start of their treatment, their responses to the measures may have been influenced by the severity of their illness, emaciation and stress associated with the goals of weight restoration and eating rehabilitation. Similarly, responses on the

questionnaires by siblings (completed either at the hospital or at a place of their choosing) may have been shaped by their own and their sibling's emotional state related to entering intensive treatment for severe AN.

Another limitation of this study is that our sample is small and heterogeneous. The sample was variable in age, the onset of illness (9–30 years) and duration of illness (1–29 years). Siblings of patients with a shorter duration of illness may experience strong emotional reactions to the appearance of emaciation and persistent restrictive eating. Siblings of patients with an adolescent onset may also be affected more directly by changes in family functioning because of the acuity of the illness and the intense involvement of the parents in the treatment process. It was reported in a recent qualitative study on siblings of adolescents with EDs (Areemit *et al.*, 2010) that meal times were the most stressful and contributed to significant family conflict. In this study, siblings reported a 'loss of family, a normal childhood, positive sibling relationships, physical closeness with their siblings, and a sense of identity as they once knew it' (Areemit *et al.*, 2010, p. 572). Conversely, the perspective of siblings of individuals who develop the illness in adulthood may differ from the perspective of siblings of adolescents with EDs residing at home with their parents. As has been shown in a qualitative study on adult siblings of adult individuals with AN, siblings have greater concerns about future intentions of caregiving when their parents are no longer able and available to provide such care (Dimitropoulos *et al.*, 2009). Future research is needed to identify the effects of EDs on sibling relationships at different stages of the illness and developmental phases of both the patient and the sibling and the family life cycle. Studies are recommended that follow patients and their siblings over time to note changes in the quality of the sibling relationship and family functioning.

At the same time, our sample of patients is also homogeneous in some important ways limiting its generalizability to other samples of individuals with EDs. Participants had moderate to severe AN and had agreed to accept inpatient treatment focused on recovery from the ED. Our sample consisted primarily of individuals of Caucasian background, residing with their parents and dependent on the government for financial support. We caution against generalizing our findings to individuals and their siblings from varying backgrounds and who are less impaired and able to support themselves financially. Future research is needed to conduct research on individuals and their siblings from different ethnic, socio-economic backgrounds and living arrangements.

Another salient limitation in this study is that we do not have a response rate for the study. Prospective participants provided us with the following reasons for declining to invite their siblings to participate in the study: (1) siblings had no knowledge of the illness or that the patient was in treatment, (2) a strained relationship with the sibling and (3) minimal contact with their siblings. Because of policies governing confidentiality, information about the study could only be disseminated by the patient rather than research personnel. Consequently, patients and siblings recruited for this study may be different from patients who declined to ask their siblings to participate in the study. The study would have been strengthened by the inclusion of a healthy nonclinical control group to whom we could have compared both the patients and their siblings. Information from parents regarding their

affected child and other children's exposure to shared and nonshared familial factors may be needed. Future research is also recommended to obtain a larger sample size of patients with EDs and their siblings from tertiary and community-based settings using a nonclinical healthy control group.

## Clinical implications

This study has a number of clinical implications for the affected individual, siblings and families. Therapeutic interventions are required to assist affected individuals in developing the necessary skills to form emotional connections with their siblings, family members and others outside the family in order to reduce their social isolation. Cognitive interventions may be required to also address core beliefs and unhelpful thinking patterns that are contributing to jealousy towards siblings (Fairburn, 2005; Fairburn et al., 1999). With respect to family interventions, the focus is typically on how the parents (and other carers) can respond in ways that may facilitate behavioural changes in the affected individual (Lock et al., 2001; Treasure et al., 2007). However, few interventions specifically identify how to intervene to assist siblings with their unique struggles with the illness. Family-based interventions are recommended that encourage greater discussion among the affected person and their siblings about the illness. As has been demonstrated by this research, family therapists must similarly provide opportunities for siblings to describe the impact of the illness on them and specify how their parents can support them while identifying ways to strengthen the sibling relationship. Interventions that are designed exclusively for siblings are recommended and might include a combination of psychoeducational information challenging stigmatizing attitudes about EDs while also providing support in reducing their social isolation.

Therapeutic approaches that enhance opportunities to strengthen the relationship between the affected individual and their siblings are further recommended, especially because a recent meta-analysis revealed that this relationship can be protective and moderate the effects of psychopathology in siblings (Buist et al., 2013). This meta-analysis specifically found large effect sizes for the contribution of sibling conflicts to internalizing and externalizing behaviours. Sibling warmth also contributed to internalizing and externalizing problems, but the effect sizes were smaller. Given these findings, we would recommend that clinicians utilize interventions to reduce conflict in this relationship that may be intensified by jealousy in the patient and the adverse effect of the illness on family functioning.

This study demonstrates that a number of important factors influence family functioning from the perspective of siblings including eating symptoms, lack of social support outside of the family and stigma towards those with EDs and their families. This study further reveals that patients experience greater jealousy towards their siblings while also perceiving themselves as having minimal social support outside of their family. A qualitative study may further assist with contextualizing these findings by identifying the sources of the jealousy for patients and whether they are based on appearance and weight and shape.

## Acknowledgements

We wish to thank the patients and their siblings for their participation in this study. We also extend our appreciation to Allied Health Research at the University Health Network for the grant that supported this study.

We would like to extend our appreciation to the editors and reviewers for their excellent questions and comments regarding the manuscript.

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