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Childhood trauma as a predictor of eating psychopathology and its mediating variables in patients with eating disorders

Seongsook Kong and Kunsook Bernstein

Aim. The aims of this study were to determine whether specific forms of childhood trauma predict eating psychopathologies and to investigate the mediating effects of the psychological symptoms of depression and obsessive-compulsion between childhood trauma and eating psychopathologies in patients with eating disorders.

Background. The highest probability of poor treatment outcomes in patients with eating disorders has been observed in those who experienced childhood trauma. Therefore, researchers are now examining whether childhood trauma should be considered a risk factor for eating psychopathology, but childhood traumatic experiences as predictors of eating psychopathology and their mediating variables has not been investigated sufficiently with this clinical population.

Design. Survey.

Methods. The subjects were 73 Korean patients with eating disorders. The Childhood Trauma Questionnaire, Eating Disorder Inventory-2, Beck Depression Inventory and Maudsley Obsessional-Compulsive Inventory were used to assess self-reported childhood trauma in five domains (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect), eating psychopathology, depression and obsessive-compulsion. Stepwise multiple regression analyses were used to explore whether these childhood traumatic experiences predict eating psychopathology and mediation analyses were conducted according to Baron and Kenny's guidelines.

Results. Emotional abuse, physical neglect and sexual abuse were found to be significant predictors of eating psychopathology. We also found that depression fully mediated the association between some forms of childhood trauma and eating psychopathology, while obsessive-compulsion did not mediate this association.

Conclusions. Future interventions for patients with eating disorders should focus on assessing the possibility of childhood trauma, especially in those patients with poor treatment outcomes. In addition, whether or not traumatised individuals exhibit depression is a more important predictor of eating psychopathology than the traumatic experience itself.

Relevance to clinical practice. Early intervention for childhood trauma and depression might contribute to preventing eating disorders in traumatised individuals.

Key words: child abuse, depressive symptomatology, eating problems, nursing psychological factor

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Introduction

Eating disorders are a complex, multifactorial confluence of biological, familial, psychosocial and psychological variables (Kent & Waller 2000). Clinicians and researchers have considered the possibility that childhood abuse and trauma, especially sexual abuse, represent powerful antecedents to eating disorders, including anorexia nervosa (AN), bulimia nervosa (BN) and binge eating (Rorty & Yager 1996).

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Several studies have demonstrated that a significant proportion of individuals with eating disorders report a history of childhood abuse. Rodriguez *et al.* (2005) found that 45% of the patients with eating disorders had a history of sexual abuse or other forms of childhood abuse or trauma, while Carter *et al.* (2006) found that 48% of the inpatients in an eating disorders unit reported a history of childhood sexual abuse. Rayworth *et al.* (2004) note that women who reported both childhood physical and sexual abuse were three times as likely to develop eating disorder symptoms as were women who reported no abuse.

The psychological impact of childhood trauma often persists into adulthood. Rorty *et al.* (1994) reported that childhood trauma has been reliably associated with a range of serious long-term psychiatric sequelae, including depression; alcohol and drug abuse; and anxiety disorder, personality disorder and eating disorders. Research shows that childhood trauma leads to the development of eating psychopathology [defined as the psychological traits or constructs shown to be clinically relevant in individuals with eating disorders (Garner 1991)], anxiety, depression and post-traumatic stress disorder (PTSD; Rorty & Yager 1996, Wonderlich *et al.* 2001a). In addition, the highest probability of poor treatment outcomes in patients with eating disorders has been observed in those who experienced childhood sexual abuse and exposure to other violent acts at an early age (Mahon *et al.* 2001, Rodriguez *et al.* 2005). Rodriguez *et al.* (2005) found that dropout and relapse rates are dramatically higher in patients with eating disorders who reported previous traumatic events compared with those patients without a history of trauma; they theorise that these dropout rates could represent an expression of victimisation or hopelessness that interferes with compliance.

A considerable amount of research has targeted childhood trauma, especially sexual, physical and emotional abuse, as a predisposing risk factor for developing eating disorders in adolescence or adulthood (Rorty *et al.* 1994, Wonderlich *et al.* 1997, Neumark-Sztainer *et al.* 2000). However, previous studies had considerable definitional difficulties and methodological deficiencies of the instruments associated with various forms of trauma. For example, definitions of 'sexual abuse' have varied considerably, ranging from broad definitions that may include one-time incidents of perpetrator exposure to narrow ones that consider only experiences of subject genital contact (Rorty & Yager 1996, Carter *et al.* 2006). The terms 'emotional abuse' and 'psychological abuse' have been used interchangeably, despite O'Hagan (1995) indicating that these terms are not synonymous. In addition, previous studies used abused-or-non-abused dichotomies rather than severity ratings in their methodology (Léonard *et al.* 2003, Carter *et al.* 2006). Some self-reported questionnaires for measuring childhood emotional abuse have focused exclusively on parental behaviours and have failed to ascertain the developmental stage at which the abuse occurred (Nicholas & Bieber 1996, Kent & Waller 1998). Thus, this study adopted the definitions of childhood abuse and neglect reflected in the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink 1998). These definitions were developed based on the childhood trauma literature (Crouch & Milner 1993, Finkelhor 1994) and are consistent with the operational definition [i.e. the CTQ, which was developed based on the 'Childhood Trauma Interview' (Fink *et al.* 1995)]. 'Emotional abuse' refers to verbal assaults on a child's sense of worth or well-being, or any humiliating, demeaning or threatening behaviour directed towards a child by an older person. 'Physical abuse' refers to bodily assaults on a child by an older person that pose a risk of, or result in, injury. 'Sexual abuse' refers to sexual contact or conduct between a child and older person; explicit coercion is a frequent but not essential feature of these experiences. 'Emotional neglect' refers to the failure of caretakers to provide a child's basic psychological and emotional needs, such as love, encouragement, belonging and support. 'Physical neglect' refers to the failure of caregivers to provide a child's basic physical needs, including food, shelter, safety and supervision and health.

Furthermore, most research that has investigated the association between disordered eating and childhood abuse has mostly focused on sexual forms of abuse (Wonderlich *et al.* 2001a,b, Dohm *et al.* 2002, Rodriguez *et al.* 2005, Carter *et al.* 2006). Only recently has childhood emotional abuse, including childhood emotional and physical neglect, been considered as a risk factor for eating psychopathology (Kent *et al.* 1999, Mazzeo & Espelage 2002); in fact, Kent *et al.* (1999) found that emotional abuse is the form of childhood trauma that most clearly influences eating psychopathology. They reported that physical abuse and neglect also appear to predict eating behaviours, but those forms of trauma have their greatest impact when they involve an emotionally abusive component. Additionally, most of these investigations generally study a particular form of trauma, rather than all abuse forms concurrently (Kent & Waller 2000). Bernstein and Fink (1998) ascertained multiple types of abuse and neglect, providing a comprehensive assessment of child maltreatment. Therefore, the present study included all five forms of childhood trauma defined previously for comprehensive investigation.

Finally, the psychological processes that mediate the effects of childhood abuse need to be further examined

(Kent & Waller 2000). Many researchers have suggested the need to elucidate the psychological mechanisms linking childhood trauma to subsequent eating disorders (Kent & Waller 2000, Wonderlich *et al.* 2001a), which may be possible via mediation analysis. Some investigators have reported that depression is a significant mediator between childhood abuse and disordered eating in college students (Mazzeo & Espelage 2002, Mitchell & Mazzeo 2005), while Kent *et al.* (1999) reported that anxiety and dissociation were significant mediators but that depression was not. Obsessive-compulsive features also might be considered to be a mediator. Researchers found that obsessive-compulsive symptoms were more severe in patients with a history of childhood sexual abuse than in patients with no such history (Lockwood *et al.* 2005, Carter *et al.* 2006). The childhood trauma might result in post-traumatic symptoms in the short term, developing into obsessive-compulsive features in the longer term (de Silva & Marks 1999). In addition, obsession was found to be a predictor of bulimic symptomatology (Erol *et al.* 2006). The obsessive fear of gaining weight, extreme preoccupations with food and body image and an irresistible compulsion to binge and vomit have been seen as a manifestation of obsessive-compulsive symptoms. Although obsessive-compulsion is clearly linked with childhood trauma and eating psychopathology, there have been no investigations of obsessive-compulsive features as a mediator between childhood trauma and eating psychopathology. Therefore, further investigation of the mediating effects of depression symptom and obsessive-compulsive features is needed.

The aim of the study

The main purpose of this study was to determine whether specific forms of childhood trauma (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect) predict eating psychopathology in patients with eating disorders. We also investigated the mediating effects of psychological symptoms of depression and obsessive-compulsion between childhood trauma and eating psychopathology.

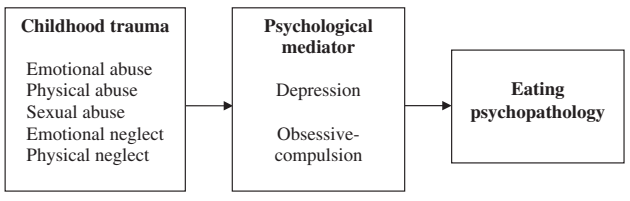

Figure 1 Theoretical framework of the study.

Methods

Study design and participants

A correlative and cross-sectional design was used in this study, which was conducted at an outpatient clinic for patients with eating disorders in Seoul, South Korea. The study population was defined as patients who were 12 years of age or older and who met the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) criteria for an eating disorder (American Psychiatric Association 2000). We included adolescents as participants because eating disorders most frequently begin in adolescence.

Sample size was estimated using power analysis (medium effect size $f^2 = 0{\cdot}15$, $a = 0{\cdot}05$, 80% statistical power, two-tailed; Borenstein *et al.* 1997); based on the results, it was determined that a sample size of at least 76 was required. Therefore, 78 patients with eating disorders were recruited. Five failed to complete all of the instruments; resulting in 73 participants. While we recognise that it would have been better to recruit a greater number of participants to account for participant ineligibility or dropout, it was difficult to find a sufficiently large number of such patients, as eating disorders are not yet commonly recognised as diseases in Korea.

Data collection

Data were collected between October 2006–July 2007. Participants completed the instruments to provide self-reported information regarding each patient's possible experiences of childhood trauma, eating psychopathology, psychological symptoms of depression and obsessive-compulsion, demographics and clinical characteristics.

Childhood Trauma Questionnaire

The CTQ (28-item version) is a self-reported instrument that assesses five forms of childhood trauma: emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect. Respondents rate each item on a five-point Likert scale ('never true' to 'very often true'). Previous investigations of its factorial validity using confirmatory factor analyses (Bernstein & Fink 1998, Mazzeo & Espelage 2002) supported its five-factor structure. The CTQ was significantly correlated with the Childhood Trauma Interview (Bernstein *et al.* 1994), providing evidence of its convergent validity.

The authors first translated the CTQ from English to Korean and then back into English, with the approval of

Harcourt Assessment, Inc. The back-translated version was then compared with the original version by expert health professionals, including psychiatrists, psychologists and academics in mental health nursing. The authors then conducted a pilot study of the CTQ-Korean version with 20 patients with eating disorders from an outpatient clinic in Korea; the patients were invited to comment on the clarity of the items and on the overall presentation of the scale, which resulted in two items being revised to enhance comprehension.

In the current study, the following Cronbach's alpha coefficients, reflecting internal consistency, were found for the CTQ subscales: 0·81 for emotional abuse, 0·87 for physical abuse, 0·88 for sexual abuse, 0·87 for emotional neglect and 0·68 for physical neglect. The total CTQ scale was 0·91. These alpha coefficients are almost similar to the Cronbach's alpha coefficients reported by Bernstein and Fink (1998).

Eating Disorder Inventory-2 (EDI-2)

The EDI-2 was developed by Garner (1991) to measure eating psychopathology and was translated into Korean by Lyle (1996). The EDI-2 Korean version was used with the permission of Psychological Assessment Resources (Odessa, FL); 11 subscales, derived from 91 items, were presented on a six-point scale: drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interoceptive awareness, interpersonal distrust, maturity fears, asceticism, impulse regulation and social insecurity. The internal consistency as indicated by Cronbach's alpha for this inventory in the current study was 0·72–0·92, which is similar the values reported by Eberenz and Gleaves (1994).

Beck Depression Inventory (BDI)

Symptom of depression was measured by the BDI, developed by Beck *et al.* (1961) and translated into Korean by Hahn *et al.* (1986), a 21-item self-reported rating inventory, presented on a four-point scale, which measures characteristic attitudes and symptoms of depression, categorised into affective, cognitive, motivational and physiological factors. Lee and Song (1991) reported a value of Cronbach's alpha of 0·85 for a Korean population.

Maudsley Obsessional-Compulsive Inventory (MOCI)

MOCI, designed by Hodgson and Rachman (1977), is a 30-item self-reported questionnaire, in true-false format, which measures obsessive-compulsive behaviour. MOCI included four subscales: checking, washing, doubt and slowness. The Korean version was translated and validated by Cho (1985); Cronbach's alpha was found to be 0·80 for all scales and between 0·60–0·69 for subscales.

Ethical considerations

Participation in the study was voluntary and it was made clear to patients that were able to opt out at any point. Potential participants were provided with verbal and written information on the nature, purpose and instruments of the study and their written informed consent was obtained. Permission was also obtained from parents of the adolescents after they had also been provided with information on the study, notably for the participants who were unable to decide themselves (Peterson & Leffert 1995, Long & Fallon 2007). We also explained to the participants that the confidentiality and anonymity of their data were guaranteed. In accordance with the hospital policies for human experimentation, ethical approval was obtained for the study. Permission to conduct the study and access the subjects was also obtained from the director of the hospital.

Data analysis

Data were analysed using SPSSWIN (version 12·0). Bivariate correlates were estimated to test for relationships between childhood trauma and eating psychopathology using Pearson product moment correlation coefficient. The correlations between childhood trauma or eating psychopathology and symptoms of depression and/or obsessive-compulsion also were investigated to examine the assumption of mediation analyses.

Stepwise multiple regression analyses were employed to explore whether any of the five forms of childhood trauma could predict eating psychopathology. Before analysis, normality assumed for multiple regression analysis was verified by drawing histograms. The assumption of homoscedasticity was confirmed to be satisfied through residual plot; Durbin–Watson statistic was in the range of 1·69–2·56, satisfying the assumption of independence. According to the result of examining multicollinearity, both the tolerances and variance inflation factor (VIF) were inspected ($0{\cdot}94 \leq$ tolerances $\leq 1{\cdot}00$, $1{\cdot}00 \leq \text{VIF} \leq 1{\cdot}06$), which showed that there was no problem in multicollinearity. The significance level for all statistical analyses was preset at the $p < 0{\cdot}05$.

Mediation analyses were conducted according to Baron and Kenny's (1986) guidelines. Before testing for mediating effects (in this case, of depression and obsessive-compulsion), a relationship between the independent variables (five forms of childhood trauma) and the dependent variable (eating psychopathology) needs to be established. Then,

each independent variable needs to be shown to be related to any of the mediators. Next, each mediator is entered into the regression equation. Finally, the dependent variable is regressed on both mediator and independent variables. If the association between childhood trauma and eating psychopathology is reduced, but remains statistically significant, it is partial mediation. If the association between childhood trauma and eating psychopathology becomes non-significant, it is full mediation. Finally, Sobel's (1982) test was also conducted to examine the significance of this mediating effect.

Results

Demographic characteristics of the subjects

Most participants (97·3%) were female and their average age was 23·9 years (range 14–36 years). Most (90·4%) were not married and 23·3% were employed. Participants were diagnosed with AN (39·7%), BN (53·4%), or eating disorder not otherwise specified (EDNOS; 6·8%). The average duration of illness was 3·6 years. The average frequency of binging per week was 21·46 and the average frequency of purging per week was 28·43. Mean body mass index (BMI) was 19·21 (Table 1).

Table 1 Demographic and clinical characteristics of the subjects (n = 73)

Characteristic	Category	Frequency	% of sample
Gender	Female	71	97·3
	Male	2	2·7
Marital status	Single	66	90·4
	Married	7	9·6
Occupation	Student	45	61·6
	Housekeeper/none	11	15·1
	Clerical	8	11·0
	Professional	2	2·7
	Others	7	9·6
Diagnosis	Anorexia nervosa	29	39·7
	Bulimia nervosa	39	53·4
	EDNOS	5	6·8

Characteristic	Mean (SD)	Range
Age (years)	23·90 (4·82)	14–36
Education (years)	14·07 (2·20)	7–18
Duration of illness (years)	3·63 (3·15)	0·3–15
Binging episodes per week	21·46 (5·66)	0–35
Purging episodes per week	28·43 (11·55)	0–35
Body mass index (BMI)	19·21 (2·82)	13·7–25·7

EDNOS, eating disorder not otherwise specified.

Means of major study variables and proportions of childhood trauma

Means and SD for scores of major variables are shown in Table 2. CTQ total mean score was 52·75 (SD 15·26) and EDI-2 total mean score was 124·19 (SD 44·73). The mean scores for depression and obsessive-compulsion were 24·62 (SD 11·20) and 10·22 (SD 5·48), respectively.

The number and proportion of participants who self-reported experiencing childhood trauma are also shown in Table 2. According to cut points for each CTQ Scale (Bernstein & Fink 1998), 65·8% of the participants self-reported experiencing emotional abuse (≥10 points), 53·4% physical abuse (≥8 points), 30·1% sexual abuse (≥8 points), 46·6% emotional neglect (≥15 points) and 74·0% physical neglect (≥8 points). Exactly 90·4% of all participants self-reported experiencing at least one type of trauma: 17·8%, one; 15·1%, two; 15·1%, three; 35·6%, four; and 6·8%, five.

Table 2 Mean of major study variables and proportion of childhood trauma (n = 73)

Variable	Mean (SD)	Range	n (%)*
EDI-2 total score	124·19 (44·73)	15–199	
Drive for thinness	14·62 (5·99)	0–21	
Bulimia	13·00 (5·78)	0–21	
Body dissatisfaction	14·82 (6·64)	2–27	
Ineffectiveness	14·27 (8·22)	0–28	
Perfectionism	7·79 (4·55)	0–18	
Interoceptive awareness	15·86 (8·25)	0–30	
Interpersonal distrust	6·59 (5·11)	0–20	
Maturity fears	9·73 (5·75)	0–24	
Asceticism	8·74 (4·43)	0–20	
Impulse regulation	9·33 (6·65)	0–30	
Social insecurity	9·44 (5·60)	0–24	
Depression (BDI)	24·62 (11·20)	0–47	
Obsession (MOCI)	10·22 (5·48)	0–24	
Childhood trauma total (CTQ)	52·75 (15·26)	28–91	
Emotional abuse	12·25 (4·62)	5–24	48 (65·8)
Physical abuse	9·07 (4·43)	5–22	39 (53·4)
Sexual abuse	7·29 (3·22)	5–19	22 (30·1)
Emotional neglect	13·88 (4·72)	5–25	34 (46·6)
Physical neglect	10·27 (3·66)	5–22	54 (74·0)

EDI, Eating Disorders Inventory; BDI, Beck Depression Inventory; MOCI, Maudsley Obsessional-Compulsive Inventory; CTQ, Childhood Trauma Questionnaire.

*According to the cut point in Childhood Trauma Questionnaire Scale (Bernstein & Fink 1998).

Correlations between the eating psychopathology and childhood trauma

As shown in Table 3, there were significant correlations between eating psychopathology and all five forms of childhood trauma. However, there were no significant correlations between any forms of childhood trauma and interpersonal distrust, maturity fears, asceticism and social insecurity.

Correlations between childhood trauma or eating psychopathology and depression and/or obsessive-compulsion also were investigated to examine the assumption of mediation analysis that each independent variable needs to be related to the mediators. Depression was significantly correlated with four forms of the CTQ (emotional abuse, physical abuse, emotional neglect and physical neglect) and with all subscales of the EDI-2. Obsessive-compulsion was significantly related with two forms of the CTQ (sexual abuse and physical neglect) and with eight subscales of EDI-2 (drive for thinness, body dissatisfaction, ineffectiveness, perfectionism, interoceptive awareness, asceticism, impulse regulation and social insecurity).

Childhood trauma as a predictor of eating psychopathology

A series of stepwise multiple regression procedures was performed to determine whether specific forms of childhood trauma predict eating psychopathologies that had $p \leq 0{\cdot}05$ on the bivariate analysis with childhood trauma (i.e. drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interoceptive awareness and impulse regulation). Based on the results of the correlation analysis illustrated in Table 3, interpersonal distrust, maturity fears, asceticism and social insecurity were excluded as dependent variables.

Table 4 shows that CTQ total score was a significant predictor for EDI-2 total score (adjusted $R^2 = 0{\cdot}10$). Emotional abuse was the significant predictor for ineffectiveness (adjusted $R^2 = 0{\cdot}09$), as well as for interoceptive awareness (adjusted $R^2 = 0{\cdot}13$). Physical neglect was found to be the significant predictor for the drive for thinness (adjusted $R^2 = 0{\cdot}04$), bulimia (adjusted $R^2 = 0{\cdot}05$) and body dissatisfaction (adjusted $R^2 = 0{\cdot}04$). With regard to the model on impulse regulation, emotional and sexual abuses were significant predictors, with adjusted $R^2 = 0{\cdot}17$. For perfectionism, sexual abuse was the significant predictor, with adjusted $R^2 = 0{\cdot}05$. Therefore, emotional abuse, physical neglect and sexual abuse were found to be the three significant predictors for eating psychopathology.

Mediating effects of depression and obsessive-compulsion

We investigated whether the association between childhood trauma and eating psychopathology was mediated by depression and/or obsessive-compulsion, using the method outlined by Baron and Kenny (1986). For the drive for thinness, physical neglect was the only form of trauma that predicted eating psychopathology. Stepwise multiple regression analy-

Table 3 Correlations between eating psychopathology and childhood trauma

	Childhood trauma (CTQ)							
Variable	EA	PA	SA	EN	PN	Total	BDI	MOCI
EDI-2 total score	0·309**	0·185	0·204	0·259*	0·282*	0·338**	0·711**	0·482**
Drive for thinness	0·116	0·078	0·158	0·218	0·239*	0·216	0·378**	0·366**
Bulimia	0·152	0·161	0·025	0·202	0·252*	0·221	0·288*	0·171
Body dissatisfaction	0·122	0·013	0·217	0·175	0·239*	0·198	0·397**	0·321**
Ineffectiveness	0·327**	0·181	−0·011	0·284*	0·225	0·291*	0·630**	0·296*
Perfectionism	0·208	0·109	0·251*	0·094	0·230	0·232*	0·251*	0·488**
Interoceptive awareness	0·380**	0·158	0·240*	0·276*	0·272*	0·362**	0·678**	0·420**
Interpersonal distrust	0·134	0·051	0·097	0·134	0·055	0·130	0·452**	0·212
Maturity fears	−0·001	0·047	0·118	0·020	0·058	0·058	0·296*	0·211
Asceticism	0·085	0·035	0·041	0·044	0·130	0·089	0·482**	0·429**
Impulse regulation	0·364**	0·311**	0·323**	0·132	0·163	0·349**	0·557**	0·384**
Social insecurity	0·214	0·137	0·014	0·188	0·130	0·197	0·617**	0·246*
Depression (BDI)	0·403**	0·258*	0·121	0·378**	0·304**	0·412**		0·461**
Obsessive-compulsion (MOCI)	0·117	0·100	0·241*	0·137	0·278*	0·224		

*$p < 0{\cdot}05$; **$p < 0{\cdot}01$.

CTQ, Childhood Trauma Questionnaire; EA, emotional abuse; PA, physical abuse; SA, sexual abuse; EN, emotional neglect; PN, physical neglect; BDI, Beck Depression Inventory; MOCI, Maudsley Obsessional-Compulsive Inventory; EDI, Eating Disorders Inventory.

Table 4 Stepwise multiple regression analysis for eating psychopathology

Dependent variables	Predictors	A-R^2	F	p	β	t	p
EDI-2 total	CTQ total score	0·102	9·18	0·003	0·338	3·03	0·003
Drive for thinness	Physical neglect	0·044	4·29	0·042	0·239	2·07	0·042
Bulimia	Physical neglect	0·050	4·82	0·031	0·252	2·20	0·031
Body dissatisfaction	Physical neglect	0·044	4·29	0·042	0·239	2·07	0·042
Ineffectiveness	Emotional abuse	0·094	8·48	0·005	0·327	2·91	0·005
Perfectionism	Sexual abuse	0·050	4·78	0·032	0·251	2·19	0·032
Interoceptive awareness	Emotional abuse	0·133	12·01	0·001	0·380	3·47	0·001
Impulse regulation	Emotional abuse	0·167	8·23	0·001	0·364	3·29	0·002
	Sexual abuse				0·249	2·24	0·028

A-R^2, adjusted R^2; CTQ, Childhood Trauma Questionnaire; EDI, Eating Disorders Inventory.

ses revealed that both depression (β = 0·378, t = 3·44, $p < 0·01$) and obsessive-compulsion (β = 0·366, t = 3·32, $p < 0·01$) reliably predicted the drive for thinness. However, when physical neglect was re-entered into the regression equation, the previous significant relationship between physical neglect and the drive for thinness disappeared, whereas the relationships between physical neglect and depression (β = 0·337, t = 2·93, $p < 0·01$) and between physical neglect and obsessive-compulsion (β = 0·325, t = 2·84, $p < 0·01$) each remained significant. Finally, Sobel's test indicated that the mediating effect of depression was significant between physical neglect and the drive for thinness (Sobel's test = 2·12, $p < 0·05$), while the effect of obsessive-compulsion was not (Sobel's test = 1·96, p = 0·05). However, if the basic assumption for mediation analysis was not satisfied, depression or obsessive-compulsion was excluded as a mediator in mediation analysis. For example, obsessive-compulsion was excluded as a mediator because the relationship between CTQ total and obsessive-compulsion was not significant (see Tables 3 and 5).

Further mediation analyses demonstrated that depression also fully mediated the relationships between physical neglect and body dissatisfaction (β = 0·358, t = 3·14, $p < 0·01$; Sobel's test = 2·16, $p < 0·05$), emotional abuse and ineffectiveness (β = 0·595, t = 5·90, $p < 0·001$; Sobel's test = 3·25, $p < 0·001$), emotional abuse and interoceptive awareness (β = 0·475, t = 4·08, $p < 0·001$; Sobel's test = 2·80, $p < 0·01$), emotional abuse and impulse regulation (β = 0·491,

Table 5 Mediating effects of depression and obsessive-compulsion between childhood trauma and eating psychopathology

			Multiple regression[a]						Sobel's test	
Dependent variables	Predictors	Mediating variables	β	t	p	A-R^2	F	p	Sobel's	p
EDI-2 total[b]	CTQ total score	Depression	0·688	7·48	0·000	0·493	36·07	0·000	3·50	0·000
Drive for thinness	Physical neglect	Depression	0·337	2·93	0·005	0·136	6·66	0·002	2·12	0·034
		Obsessive-compulsion	0·325	0·284	0·006	0·130	6·40	0·003	1·96	0·050
Bulimia[c]	Physical neglect	Depression	0·233	1·97	0·053	0·087	4·45	0·015	1·84	0·066
Body dissatisfaction	Physical neglect	Depression	0·358	3·14	0·003	0·149	7·33	0·001	2·16	0·031
		Obsessive-compulsion	0·276	2·38	0·020	0·103	5·11	0·008	1·85	0·063
Ineffectiveness[d]	Emotional abuse	Depression	0·595	5·90	0·000	0·387	23·68	0·000	3·25	0·001
Perfectionism[e]	Sexual abuse	Obsessive-compulsion	0·454	4·27	0·000	0·236	12·10	0·000	1·91	0·056
Interoceptive awareness[d]	Emotional abuse	Depression	0·475	4·08	0·000	0·184	9·12	0·000	2·80	0·005
Impulse regulation[f]	Emotional abuse	Depression	0·491	4·60	0·000	0·315	17·54	0·000	3·09	0·002
	Sexual abuse	Obsessive-compulsion	0·325	2·95	0·004	0·181	8·94	0·000	1·80	0·072

CTQ, Childhood Trauma Questionnaire; EDI, Eating Disorders Inventory; A-R^2: adjusted R^2.

[a]The mediator is entered together with the influencing factors into the regression equation.

[b]Obsessive-compulsion as a mediator was excluded because the relationship between CTQ total and obsessive-compulsion was not significant.

[c]Obsessive-compulsion as a mediator was excluded because the relationship between bulimia and obsessive-compulsion was not significant.

[d]Obsessive-compulsion as a mediator was excluded because the relationship between emotional abuse and obsessive-compulsion was not significant.

[e]Depression as a mediator was excluded because the relationship between sexual abuse and depression was not significant.

[f]Obsessive-compulsion as a mediator between emotional abuse and impulse regulation was excluded because the relationship between emotional abuse and obsessive-compulsion was not significant. Depression as a mediator between sexual abuse and impulse regulation was excluded because the relationship between sexual abuse and depression was not significant.

$t = 4{\cdot}60$, $p < 0{\cdot}01$; Sobel's test = 3·09, $p < 0{\cdot}01$) and EDI-2 and CTQ total scores ($\beta = 0{\cdot}688$, $t = 7{\cdot}48$, $p < 0{\cdot}001$; Sobel's test = 3·50, $p < 0{\cdot}001$). Entering depression into the regression equation with CTQ total score increased the explanatory power on EDI-2 total score by 49·3%. In addition, entering depression into the regression equation with emotional abuse increased the explanatory powers on ineffectiveness by 38·7% and on impulse regulation by 31·5%. Obsessive-compulsion also showed mediation effects in regression analyses in the relationships between physical neglect and drive for thinness; between physical neglect and body dissatisfaction; sexual abuse and perfectionism; and sexual abuse and impulse regulation. However, these mediation effects were not significant in Sobel's test (see Table 5).

Discussion

The aim of this study was to determine whether specific forms of childhood trauma predict eating psychopathologies and to investigate the mediating effects of the psychological symptoms of depression and obsessive-compulsion between childhood trauma and eating psychopathology. The study's reported rate of traumatic experiences (90·4%) were comparable with the highest rates obtained by Grilo and Masheb (2001) and by Rodriguez *et al.* (2005), who reported a 45–83% rate of experiences of childhood trauma in patients with eating disorders. This finding suggests that there is a significant relationship between childhood trauma experiences and the development of eating disorders.

Childhood trauma as a predictor of eating psychopathology

The findings indicate that some forms of childhood trauma are significant predictors of eating psychopathology, although the explanatory power of childhood trauma was low (4·4–16·7%). Kent *et al.* (1999) also reported that childhood trauma had a significant overall predictive effect for 4·3% of the EDI variance of the drive for thinness, bulimia and body dissatisfaction. There was a significant relationship between EDI-2 and CTQ total scores ($r = 0{\cdot}34$, $p < 0{\cdot}01$) and CTQ total score was a significant predictor for EDI-2 total score (adjusted $R^2 = 0{\cdot}10$, $p < 0{\cdot}01$). Although these low explanatory powers were statistically significant, they might not be clinically significant. Therefore, the importance of mediation analysis needs to be emphasised to enhance the explanatory power of the model in this study.

Emotional abuse was shown to be a predictor of ineffectiveness, interoceptive awareness and impulse regulation in the EDI-2. Kent *et al.* (1999) found that emotional abuse was the only form of childhood trauma that clearly predicted eating psychopathology in female college students. Gerke *et al.* (2006) reported that childhood emotional abuse was a predictor of bulimic symptoms. Recent reviews suggest that childhood emotional abuse plays an important role in the development of psychological difficulties, including eating disorders and may be more traumatic than physical abuse (Kent & Waller 2000, Hund & Espelage 2006). Kent and Waller (2000) explained that childhood emotional abuse was a risk factor in the development of eating psychopathology, given the evidence of links between childhood emotional abuse and self-esteem (Gross & Keller 1992).

The present study also indicates that childhood emotional abuse is a predictor of interoceptive awareness. van der Kolk (1994) reported that traumatised persons were deficient in 'interoceptive awareness' for internal physiologic and psychological states; they often failed to develop the capacity to differentiate between complex internal states. Therefore, they often expressed their emotions behaviourally rather than verbally, as they had difficulty expressing their feelings in words. In addition, the finding that emotional abuse is a predictor of impulse regulation was consistent with the notion that the survivors of childhood abuse might turn to self-destructive and self-harming behaviours, such as purging and vomiting, compulsive sexual behaviour, compulsive risk-taking and the use of psychoactive drugs, for relief from tension and distress and to regulate their internal emotional states, in the absence of the internal capacity for self-soothing (van der Kolk *et al.* 1991).

Second, childhood physical neglect was the only predictor for the drive for thinness, bulimia and body dissatisfaction in this study. Researchers reported that bulimic symptoms, including weight problems, were related to physical abuse and physical neglect (Johnson *et al.* 2002, Mitchell & Mazzeo 2005). Grilo and Masheb (2001) also reported that, out of the five trauma types in the CTQ, only physical neglect was associated with dietary restraint in binge-eating disorder patients. However, the explanatory power of physical neglect was very low in this study. Therefore, it is important for future research to investigate this association more extensively.

Third, sexual abuse was found to be a predictor for impulse regulation and perfectionism. A study of 10–15-year-old girls found that sexual abuse status significantly predicts impulsivity and that impulsivity provides the strongest mediation between a history of childhood sexual abuse and purging and/or restricting diet behaviour (Wonderlich *et al.* 2001b). Although Wonderlich *et al.* (2001b) and Zlotnick *et al.* (1996) also found that childhood sexual abuse significantly predicted perfectionism, Elal *et al.* (2004) found

otherwise. Hesdon and Salmon (2003) found that sexually abused anorexic subjects had higher perfectionism than did non-abused subjects and thus were more concerned with avoiding failure, especially in exercise. The discrepancies among these findings suggest the need of replication.

Mediators between childhood trauma and eating psychopathology

Mediation analysis was used to examine mediating variables between childhood trauma and eating psychopathology because the explanatory power of childhood traumatic variables on eating psychopathology was found to be small. In the present study, the relationships between childhood trauma and eating psychopathology were mediated entirely through depression, while obsessive-compulsion did not significantly mediate the relationship between any forms of childhood trauma and eating psychopathology. In addition, entering depression as a mediator into the regression equation with childhood abuse variables increased the explanatory power on eating psychopathology by 49·3%.

Depression was a significant mediator between physical neglect and the EDI variables (drive for thinness and body dissatisfaction), as well as between emotional abuse and EDI variables (ineffectiveness, interoceptive awareness and impulse regulation). Researchers reported that depression mediated the relationship between childhood trauma experiences and disordered eating in their female college sample, although childhood physical and emotional abuses were not directly associated with disordered eating (Mazzeo & Espelage 2002, Mitchell & Mazzeo 2005, Gerke *et al.* 2006). However, Kent *et al.* (1999) reported that anxiety and dissociation were mediated in the association between childhood emotional abuse and eating disorders among college females, but that depression was not a significant mediator.

Our finding that depression is a significant mediator for eating disorders indicates that the psychological affecting-modulating functions of disturbed eating may be especially salient for individuals with a history of childhood trauma (Rorty & Yager 1996). This result also suggests that, whether or not traumatised individuals exhibit depression, is a more important predictor of eating psychopathology than the traumatic experience itself. Therefore, individuals at risk for developing eating disorders, as well as those who experienced childhood trauma, would benefit from interventions that address adaptive ways to cope with distress and negative affect (Mazzeo & Espelage 2002, Hund & Espelage 2006).

On the other hand, obsessive-compulsion was not found to be a significant mediator between any form of childhood trauma and eating psychopathology. Although obsessive-compulsion showed mediation effects in the relationships between physical neglect or sexual abuse and certain EDI variables (body dissatisfaction, perfectionism and impulse regulation), these effects were not significant in Sobel's test. Generally, the four statistical procedures other than Sobel's test applied in this study for mediation analysis (see the section entitled 'data analysis') can be used informally to judge whether or not mediation occurs (Preacher & Hayes 2004). However, MacKinnon *et al.* (1995) included Sobel's test to determine the significance of the indirect effect of the independent variable on the dependent variable via the mediator. Our findings that obsessive-compulsion was neither a significant mediator nor strongly correlated with childhood trauma indicates that the appropriateness of selecting obsessive-compulsion as a mediator between childhood trauma and eating psychopathologies should be reconsidered, despite the theoretical framework of the study being established from previous studies and literature on how obsessive-compulsion is related to eating disorders and childhood trauma.

Limitations of the study

This study has some limitations. The findings may not be generalisable beyond the population studied and the sample size was not large enough for multiple regression analysis. As mentioned earlier, eating disorders are not yet commonly recognised as diseases in Korea, making it difficult to find a sufficiently large number of such patients. Although we determined that 76 participants were required to ensure sufficient statistical power, the inclusion of only 73 participants would not have significantly affected the results of multiple regression analysis. Another limitation is that various psychological symptoms, such as anxiety, dissociation and alexithymia, were not included. Therefore, future research should involve larger samples and include additional psychological factors as mediators.

Conclusions

Despite these limitations, this study indicates that certain forms of childhood trauma may be risk factors for certain types of eating psychopathologies; it also indicates that depression is a mediator in this association. In addition, by using reliable measurement of childhood trauma (i.e. the CTQ), it was possible to find out the different forms of abusive experiences. Furthermore, participants in this study were from a clinical population in an out-patient setting, while other studies have investigated a community sample, especially college students (Kent & Waller 2000, Mitchell & Mazzeo 2005). Thus, this study found that childhood trauma

experiences were significant predictors of eating psychopathology in the clinical population. However, because childhood traumatic variables were found to explain only a small part of eating psychopathology, mediation analysis was used to investigate mediating variables between childhood trauma and eating psychopathology. Depression significantly mediated the relationship between some forms of childhood trauma and eating psychopathology, which suggests that, whether or not traumatised individuals exhibit depression, is a more important predictor of eating psychopathology than the traumatic experience itself.

Relevance to clinical practice

Results of this study suggest some clinical applications. First, clinical nurses should consider the potential role of childhood emotional abuse, physical neglect and sexual abuse in eating psychopathology. In fact, it could be clinically useful to consider all abusive experiences in assessing eating disorder patients. Second, treatment options will be better understood and applied when the role of various forms of childhood trauma in eating disorders has been more firmly established. In our clinical experience, the higher probability of failure at treatment engagement was observed in eating disorder patients who had experienced childhood abuse. Therefore, a primary goal of therapy with eating disorder patients who were traumatised as children should be to help them make links between their eating psychopathology and their childhood abusive experiences. Finally, the results that certain forms of childhood trauma are predictors of eating psychopathology and that depression is a significant mediator suggest that early intervention for childhood trauma and the resulting depression symptoms may help in preventing the development of eating disorders in traumatised individuals.

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Study design: SK; data collection and analysis: SK and manuscript preparation: SK & KB.

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