Eur Child Adolesc Psychiatry
DOI 10.1007/s00787-014-0532-0

ORIGINAL CONTRIBUTION

A descriptive study of symptom change as a function of attachment and emotion regulation in a naturalistic adolescent inpatient setting

Amanda Venta · Carla Sharp · Elizabeth Newlin

Received: 19 August 2013 / Accepted: 23 February 2014

Abstract This is the first study to describe the relation between attachment security, emotion regulation, and symptom change in a sample of adolescents completing inpatient treatment in a naturalistic setting. We examined whether attachment security predicted symptom change, and whether emotion regulation capacities mediated this relation. A sample of $n = 194$ inpatient adolescents was assessed (65.5 % female, $M_{age} = 15.45$ years, SD = 1.44) at admission and discharge and analyses were conducted in accordance with the aforementioned objectives including testing of moderation and mediation models. We found that securely attached adolescents experienced greater reduction in internalizing symptoms from admission to discharge, even when controlling for length of stay. Nonacceptance of emotional responses mediated the relation between maternal attachment security and internalizing symptom change. These findings did not hold for externalizing symptoms, nor when paternal attachment was explored. Attachment plays an important role in symptom change for internalizing problems, with nonacceptance of emotional responses partially mediating this link. Possible explanations for the absence of moderation for paternal attachment and externalizing problems are discussed, as are explanations for the mediating effect of emotion regulation.

A. Venta · C. Sharp (✉)
Department of Psychology, University of Houston,
126 Heyne Building, Houston, TX 77204, USA
e-mail: csharp2@uh.edu; csharp2@central.uh.edu

C. Sharp · E. Newlin
The Menninger Clinic, Houston, USA

Keywords Adolescent · Psychotherapy · Symptom change · Emotion regulation · Attachment

Introduction

Attachment theory has long guided conceptualizations of the emergence and treatment of psychopathology, in large part, because of the literature tying attachment insecurity to psychopathology in childhood [1], adolescence [2], and adulthood [3]. Moreover, attachment security has been identified as a key factor in treatment outcomes in a variety of groups including veterans in group treatment for PTSD [4]; survivors of abuse completing inpatient treatment [5]; adults receiving cognitive-behavioral treatment for depression [6]; and women receiving eating disorder treatment [7]. A substantive implication of this research is that attachment security is an important consideration in determining how effective treatment will be and should therefore influence treatment selection at least to some degree [8]. However, the clinical utility of this research is limited to adult samples, in which it was conducted, and no study has explored the relation between attachment security and symptom reduction in adolescents. Indeed, only one study has even considered the role of attachment in treatment outcome among children—a pilot study which found support for the hypothesis that symptom reduction in children was associated with their mothers' attachment security [9]. Although this study did not measure the child's attachment security, it suggests that attachment-related variables may also be important for symptom change in youth.

Examining how adolescent's own attachment security relates to symptom change represents an important extension to existing research given the very high prevalence of

Published online: 22 March 2014

diagnosable psychopathology [10] and uniqueness of attachment relations during this developmental stage. Indeed, adolescence is characterized by the development of autonomy and therefore attachment relations are subject to longer separations as well as emotional distancing that is not typical of younger children's attachment relations [11, 12], highlighting the necessity to explore the relation between attachment security and symptom change in this developmentally unique group. Despite the need for downward extension of adult studies of the predictive value of attachment for treatment outcome to adolescents, no descriptive data currently exist. Therefore, it was our aim to provide, for the first time, descriptive data on symptom change as a function of attachment security (to both mothers and fathers given the dearth of studies examining attachment to fathers [13, 14]) in adolescents undergoing clinical treatment. Data were collected from an inpatient unit that utilizes an interpersonally based milieu treatment approach emphasizing mentalization skills for adolescents with treatment-refractory behavior and mood disorders (see "Discussion").

Assuming predictive utility of attachment security, we were also interested in what it is about securely attached individuals that allows them to improve more rapidly with psychotherapy in a naturalistic setting. Research on the core interpersonal processes in psychotherapy has suggested that emotion regulation plays a key role [15–17]. Defined generally, difficulties in emotion regulation include "dysfunctional [emotional] understanding, reactivity, and management" [18] and are strongly tied to early attachments, such that children learn to regulate emotions because caregivers are present and comforting [19, 20]. What Chen et al. [21] call the coregulation of affect between caregiver and child is then internalized by the child and affects his or her ability to tolerate and regulate emotions. This theory of the development of emotion regulation therefore suggests that emotion regulation capacity will mediate the relation between attachment and symptom reduction, with securely attached individuals showing greater emotion regulation and improved therapy outcome.

Aims of the study

Against this background, the current study sought to provide important first data on the descriptive relation between attachment security and symptom change in adolescents undergoing treatment in a naturalistic setting. Moreover, this study sought to explore the role of emotion regulation as a mediator of the relation between attachment security and symptom change, and, therefore the present study speaks to a possible mechanism by which attachment influences symptom change.

Methods

Participants

This study was approved by the appropriate institutional review board. 293 consecutive admissions to an adolescent inpatient unit at a large private-pay psychiatric hospital were approached for consent on the day of admission. If parent consent was granted, adolescents were approached for assent. Of those approached, 19 declined, 2 were discharged prior to completion of the assessments, 2 began assessments and then revoked consent, and 20 were excluded from the study. The inclusion criteria adopted were age between 12 and 17 and English fluency. Adolescents were excluded from study participation if clinicians conducting intake evaluations noted psychosis or mental retardation upon admission. The sample was thereby reduced to 250 adolescents.

Missing data (at admission) for two participants was sufficient to necessitate that they be excluded from all analyses, resulting in a sample of 248 adolescents with complete data at admission. However, 54 (21.77 %) adolescents did not complete assessments at discharge due to sudden decisions to discharge made by the adolescent's parents or treatment team. There were no significant differences between these 54 adolescents and those who completed discharge assessments with regard to age, sex, IQ, attachment security, overall emotion regulation, internalizing symptoms, or externalizing symptoms at admission. This study relied upon complete-case analysis (thereby excluding cases that did not have discharge data and reducing the sample to 194) because this method is known to be appropriate in a pre- and post-test design when data is missing at random, as is suggested by the lack of group differences among those who did and did not complete discharge assessments [22].

65.5 % of the sample ($n = 127$) was female and the average age was 15.45 years (SD = 1.44). 6.7 % of the sample was Hispanic and the racial breakdown was as follows: 90.9 % Caucasian, 5.7 % Asian, 2.3 % African–American, and 1.1 % Multiracial. At admission, the most common diagnoses (not mutually exclusive) in this sample (based on a structured interview) were: major depressive disorder (47.1 %); obsessive compulsive disorder (25.9 %), and oppositional defiant disorder (24.6 %). Socioeconomic status was generally high.

Procedures

All assessments were conducted in private on the unit by doctoral psychology students and trained clinical research assistants. Because participants' emotional states could differ relative to the length of time elapsed since admission

or prior to discharge, assessment timing was standardized such that assessments were conducted within 3 days of admission and then again on the day of discharge. The average length of stay in the adolescent unit in this sample was 33.49 days (SD = 12.20, max = 77; min = 5).

Measures

Attachment security

The Child Attachment Interview (CAI [23]) is an interview-based measure assessing attachment style by accessing youths' mental representations of their attachment figures. The CAI accomplishes this by isolating attachment figures of particular importance to the child and then asking about the affective qualities of the relationship described. To that end, the interviewer asks the child to describe each attachment figure by choosing three words and then probes further for episodic examples of what happens when the attachment figure is angry or the child needs help. The latter serves to elicit information about the responsiveness of attachment figures and the child's valuing of attachment experiences by asking questions regarding illness, loss, abuse, and separation. All CAI's were completed in private, videotaped, transcribed, and coded by clinical research assistants or doctoral students who had completed training with the measure's authors. Coding the CAI requires 3 days of training and attainment of 85 % agreement with the measure's authors in attachment classification on specified training cases. In this study, all coders were blind to the participant's reason for admission, diagnosis, etc.

Interviews are rated on the basis of 11 subscales: emotional openness, balance of positive and negative reference to attachment figures, use of examples, preoccupied anger (separate for each parent), idealization (separate for each parent), dismissal (separate for each parent), resolution of conflicts, and overall coherence; which then inform a dichotomous classification (secure or insecure). The emotional openness scale assesses ability to express and label emotions; the balance scale rates level of positive and negative descriptions of attachment figures; the use of examples' scale reflects ability to provide relevant examples; the preoccupied anger scale rates the ability to describe conflict with little preoccupation; the idealization scale assesses how plausible and consistent the interview narrative is; the dismissal scale measures the extent to which the importance of attachment figures is minimized; the resolution of conflict scale concerns ability to describe constructive resolutions to conflict; and the overall coherence scale is rated based on ability to demonstrate consistency, cooperation, and openness in the interview as a whole.

These subscales are used, together, to assign an overall attachment classification for each relationship identified in the interview (e.g., one for mother and one for father). The secure classification is indicated by relatively high emotional openness, balance, use of examples, resolution of conflicts, and overall coherence as well as relatively low scores on the idealization, dismissal, and preoccupied anger subscales. The insecure classification, on the other hand, is indicated by relatively low scores on the scales relating to attachment security and relatively high scores on the following: idealization, dismissal, and/or preoccupied anger. These "constellations" of expected scores are provided in the CAI coding and classification manual [23]. In this study, the two-way (secure vs. insecure) classification scheme for the CAI was employed (rather than a three-way: secure vs. dismissing vs. preoccupied scheme) to simplify data analysis by relying on the "main classifications" [23] and remain in line with previous studies using the CAI in this way among adolescents [24].

Adequate reliability and validity for this measure was demonstrated by the authors [25] as well in a complete construct validity study undertaken with an inpatient adolescent sample [26]. Interrater agreement in this sample was based on 38 randomly selected interviews using two independent coders who had completed the reliability training. Interrater agreement for the secure vs. insecure classification was substantial—$\kappa = 0.64$ for mother and $\kappa = 0.56$ for father.

Psychopathology

Internalizing and externalizing symptoms were assessed continuously at both admission and discharge using the Youth Self-Report (YSR [27]), a self-report-based questionnaire for use with adolescents between the ages of 12 and 17. The measure contains 112 problem items, each scored on a 3-point scale (0 = not true, 1 = somewhat or sometimes true, or 2 = very or often true) and yields eight symptom subscales. For the present study, the internalizing (includes the withdrawn/depressed, anxious/depressed, and somatic complaints subscales) and externalizing (includes rule-breaking behavior and aggressive behavior subscales) scales were used to explore broad-band, rather than disorder-specific, relations between attachment security and treatment outcome. Psychometric evaluation of this measure was conducted by the authors and demonstrated adequate reliability and validity [27].

Difficulties in emotion regulation

The Difficulties in Emotion Regulation Scale (DERS [28]) is a self-report questionnaire measure that assesses emotion dysregulation. It consists of 36 items that are scored on a

5-point Likert scale, ranging from 1 ['almost never (0–10 %)'] to 5 ('almost always (91–100 %)']. A higher score indicates greater emotion dysregulation. Gratz and Roemer's [28] model and measure of emotion regulation has been found to map onto six factors with related subscales: (1) nonacceptance of emotional responses (i.e., a tendency to have negative reactions to one's negative emotions), (2) difficulties in goal-directed behavior (i.e., difficulty accomplishing goals during negative emotional states), (3) impulse control difficulties, (4) lack of emotional awareness (i.e., tendency to ignore emotions), (5) limited access to emotion regulation strategies (i.e., beliefs that little can be done to resolve negative emotional states), and (6) lack of emotional clarity (i.e., extent to which individuals know which emotions they experience). Psychometric evaluation of the DERS has revealed good internal consistency, construct and predictive validity, and test–retest reliability across 4–8 weeks in adults [28]. The DERS has also been validated in adolescents [29].

Full scale IQ

Either the Wechsler Adult Intelligence Scale III or IV (WAIS [30, 31]) or Wechsler Intelligence Scale for Children IV (WISC [32]) was administered by a licensed clinical psychologist according to the adolescent's age. In this study, the Full Scale IQ of each participant was used to ensure that group differences in IQ did not account for symptom change.

Results

Preliminary analyses

Based upon the CAI, 25.3 % ($n = 49$) of the sample was coded as secure with regard to mother and 25.9 % ($n = 49$) was coded as secure with regard to father. Overlap between maternal and paternal attachment was high, with 91.5 % of adolescents securely attached to one parent being coded as securely attached to the other as well. Five adolescents in the sample did not have a father figure and, therefore, the total number of participants for analyses with respect to paternal attachment was reduced to 189 (as opposed to 194 with respect to maternal attachment).

Given known relations between gender and attachment [33] and age and psychopathology [34], we considered these covariates in the present study by controlling for them in our analyses. Moreover, in light of some evidence pointing to a relation between attachment security and IQ [35] and the possible role of language proficiency in representational measures of attachment, full scale IQ was also considered as a covariate in this study. At admission, adolescents coded as secure with either parent did not differ from their insecurely attached counterparts with regard to sex, age, IQ, total household income, internalizing symptoms, or externalizing symptoms. These results, as well as descriptive information for each variable, are presented in Table 1. Securely and insecurely attached adolescents did differ, however, in the length of stay on the unit and therefore the delay between admit and discharge assessments. With regard to maternal attachment, secure adolescents stayed an average of 30.10 days compared with 34.63 for those coded as insecure ($t = 2.27$, $p = 0.02$). This significant group difference did not appear, however, when comparing adolescents on the basis of paternal attachment ($t = -1.43$; $p = 0.15$), with adolescents coded as secure with their fathers staying an average of 31.35 days compared with 34.22 for those coded as insecure. Insecurely and securely attached adolescents were compared with regard to emotion regulation (measured at admission) and significant group differences were noted on the nonacceptance and the awareness scales, indicating that insecurely attached adolescents had greater nonacceptance of emotional responses and greater lack of emotional awareness at admission (see Table 1).

Independent samples t tests were conducted to compare internalizing and externalizing symptoms at discharge for insecurely and securely attached adolescents. The only significant group difference noted was with regard to internalizing symptoms which, at discharge, were significantly lower for adolescents coded as secure with regard to their mother ($t = -2.52$, $p = 0.01$).

Correlations between CAI subscales and internalizing symptom change were examined to further unpack relations between attachment security and emotion regulation and internalizing symptom change. These results are presented in Table 2 and revealed that higher balance of descriptions, resolution of conflict, and overall coherence were associated with greater internalizing symptom reduction. Increased preoccupied anger with regard to father, however, was associated with less internalizing symptom reduction. In addition, several DERS subscales were associated with CAI subscales. Specifically, nonacceptance of emotional responses was negatively correlated with balance of descriptions and resolution of conflict and positively correlated with preoccupied anger with regard to mother. Lack of emotional awareness was negatively correlated with use of examples, resolution of conflict, and overall coherence and positively correlated with dismissal with regard to both mother and father. Finally, impulse control difficulties were positively correlated with preoccupied anger with regard to both mother and father.

Maternal attachment moderation analyses

The first aim of this study was to determine if attachment security moderates symptom change. Moderation analyses

Table 1 Sample characteristics at admission

	Maternal classification, *M* (SD)			Paternal classification, *M* (SD)			Total sample, *M* (SD)
	Secure ($n = 49$)	Insecure ($n = 145$)	*t*	Secure ($n = 49$)	Insecure ($n = 140$)	*t*	
Age	15.59 (1.29)	15.40 (1.48)	0.81	15.78 (1.21)	15.34 (1.50)	1.85	15.45 (1.44)
IQ	107.75 (13.49)	105.58 (14.07)	0.76	109.66 (13.62)	104.93 (13.88)	1.66	106.15 (13.90)
Length of stay	30.10 (8.556)	34.63 (13.04)	−2.78**	31.35 (9.81)	34.22 (12.79)	−1.63	33.49 (12.20)
Internalizing	63.08 (11.58)	64.86 (12.10)	−0.90	63.61 (11.30)	65.07 (12.19)	−0.73	64.41 (11.97)
Externalizing	59.69 (10.32)	62.26 (10.96)	−1.44	58.96 (9.97)	62.44 (11.03)	−1.95	61.61 (10.83)
Nonacceptance	12.37 (5.69)	14.83 (6.86)	−2.86**	12.79 (5.58)	14.76 (6.97)	−2.28*	14.15 (6.64)
Goals	18.10 (4.94)	18.38 (5.24)	−0.37	18.34 (4.96)	18.30 (5.29)	0.06	18.30 (5.15)
Impulse	15.26 (6.41)	16.54 (6.96)	−1.32	15.60 (6.53)	16.49 (6.99)	−0.90	16.19 (6.83)
Awareness	15.69 (5.71)	17.93 (5.71)	−2.76**	15.75 (5.54)	17.97 (5.82)	−2.70**	17.32 (5.79)
Strategies	22.46 (8.51)	24.07 (9.02)	−1.28	23.12 (8.86)	23.87 (9.02)	−0.58	23.63 (8.90)
Clarity	12.97 (4.47)	14.01 (5.16)	−1.48	13.55 (4.78)	13.80 (5.12)	−0.35	19.79 (4.99)

With regard to maternal attachment, 69.4 % of the secure group and 64.1 % of the insecure group was female ($X^2 = 0.45$, $p = 0.504$). In addition, 59.3 % of the secure group and 61.1 % of the insecure group had a household income exceeding $100,000 ($X^2 = 0.030$, $p = 0.863$). With regard to paternal attachment, 71.4 % of the secure group and 62.9 % of the insecure group was female ($X^2 = 1.17$, $p = 0.279$). In addition, 51.9 % of the secure group and 63.6 % of the insecure group had a household income exceeding $100,000 ($X^2 = 1.21$, $p = 0.272$)

* $p < 0.05$

** $p < 0.01$

Table 2 Correlations between CAI subscale scores, emotion regulation, and internalizing symptom change

	DERS subscales						Internalizing change
	Nonacceptance	Goals	Impulse	Awareness	Strategies	Clarity	
Emotional openness	0.02	0.04	0.03	−0.12	0.04	0.03	−0.14
Balance of descriptions	−0.150*	−0.06	−0.14	−0.14	−0.09	−0.05	−0.185*
Use of examples	−0.10	−0.03	−0.04	−0.196**	−0.06	−0.03	−0.11
Preoccupied anger mother	0.153*	0.08	0.173*	0.06	0.14	0.11	0.09
Preoccupied anger father	0.05	0.11	0.176*	0.00	0.12	−0.05	0.232***
Idealization mother	0.02	0.07	0.12	−0.12	0.09	−0.12	0.02
Idealization father	−0.08	−0.01	−0.01	−0.05	−0.06	−0.03	−0.11
Dismissal mother	−0.01	−0.08	−0.06	0.261***	−0.08	0.08	0.12
Dismissal father	0.11	−0.02	−0.04	0.216***	−0.01	0.07	0.11
Resolution of conflict	−0.142*	−0.09	−0.05	−0.227***	−0.11	−0.09	−0.195**
Overall coherence	−0.11	−0.01	−0.04	−0.142*	−0.03	−0.03	−0.160*

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

using the repeated measures general linear model procedure, with internalizing and externalizing symptoms as the within-subject factor (2 levels: admission and discharge) and attachment security as the between-subjects factor were conducted to test the hypothesis that attachment security moderates symptom change. First, analyses were conducted using internalizing symptoms as the within-subject factor and maternal attachment as the between-subjects factor. This revealed a main effect of time, such that internalizing symptoms decreased from admission to discharge for the whole sample ($F = 52.55$, $p < 0.001$), and an interaction between attachment security and internalizing symptoms, such that securely attached adolescents reported a greater decrease in internalizing symptoms than insecurely attached adolescents ($F = 4.12$, $p = 0.044$). These results are depicted in Fig. 1. To ensure that the relation between maternal attachment and reduction in internalizing symptoms was not attributable to the significant difference in length of stay between the two groups, length of stay was included as a covariate in this model.

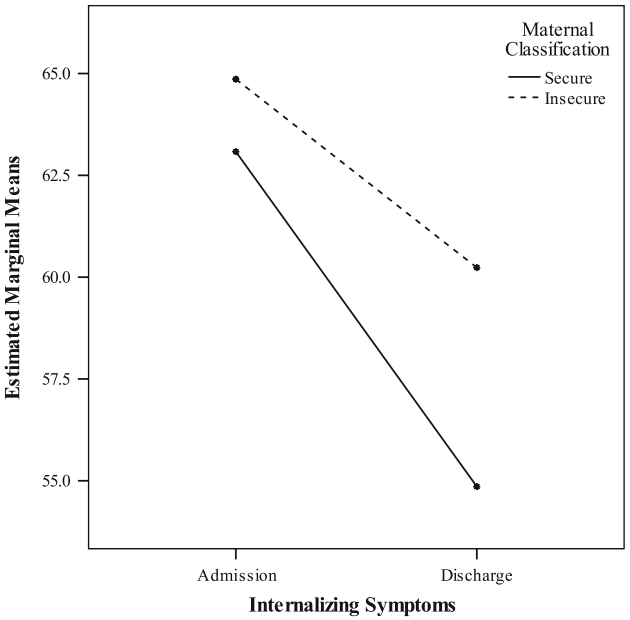

Fig. 1 Maternal attachment moderates internalizing symptom change from admit to discharge

Second, these analyses were repeated using externalizing symptoms as the within-subject factor and revealed only a main effect of time such that externalizing symptoms decreased from admission to discharge for the whole sample ($F = 28.64$, $p < 0.001$).

Paternal attachment moderation analyses

This procedure was repeated using paternal attachment as the between-subjects factor. First, analyses were conducted with internalizing symptoms as the within-subject factor and revealed only a main effect of time such that internalizing symptoms decreased from admission to discharge for the whole sample ($F = 48.94$, $p < 0.001$). Second, analyses with externalizing symptoms as the within-subject factor revealed only a main effect of time such that externalizing symptoms decreased from admission to discharge for the whole sample ($F = 48.94$, $p < 0.001$).

Mediation analyses

The second aim was to determine if the relation observed between maternal attachment security and change in internalizing symptoms was accounted for by emotion regulation ability. First, Pearson correlations were used to determine the relation between aspects of emotion regulation and YSR internalizing symptom change (YSR internalizing symptoms as discharge—YSR internalizing symptoms at admission). Only the nonacceptance of emotion responses scale was significantly correlated with symptom change ($r = -0.159$, $p = 0.026$) and revealed that greater symptom reduction was associated with lower scores on the nonacceptance of emotional responses scale at admission. Therefore, only the nonacceptance scale was explored as a possible mediator in the aforementioned relation between attachment security and internalizing symptom change. The lack of awareness scale, which was significantly associated with attachment insecurity, was not examined as a mediator due to lack of significant relation to internalizing symptom change. Before formally testing for mediation, detection-tolerance and the variance inflation factor (VIF) were used to assess multicollinearity. Because multicollinearity was not a problem, with tolerance >0.2 and a VIF <4, centering the predictor variable was not necessary [36, 37].

Preacher and Hayes' [38] test of the indirect effect was used to assess whether emotion regulation (specifically nonacceptance of emotional responses) mediated the relation between maternal attachment (CAI) and internalizing symptom change. This model is represented graphically and path coefficients are presented in Fig. 2. This test was used instead of a traditional Sobel test because it provides a bootstrap test of the indirect effect (confidence interval) and allows for the inclusion of covariates, such as length of stay [38]. In this study, 5,000 bootstrap samples were used to create 95 % bias-corrected and accelerated bootstrap confidence intervals of the indirect effect. Maternal attachment security served as the independent variable, length of stay as a covariate, nonacceptance of emotional responses as the mediator, and YSR internalizing symptom change as the dependent variable. The test of the indirect effect indicated that nonacceptance of emotion responses mediated the relation between maternal attachment and internalizing symptom change, with the mean of the indirect effect across all bootstrap samples estimated at −0.71 and a resulting confidence interval that did not include 0 (CI = −1.86 to −0.18).

Discussion

The aim of the present study was to provide the first descriptive data on symptom change as a function of attachment security and emotion regulation in a sample of adolescents completing inpatient treatment in a naturalistic setting. We found that maternally securely attached adolescents experienced greater decline in internalizing symptoms than their insecure counterparts. The interaction between attachment security and internalizing symptom change was significant despite controlling for group differences in length of stay (insecurely attached adolescents stayed longer). This finding did not hold for externalizing symptoms, nor when paternal attachment was explored.

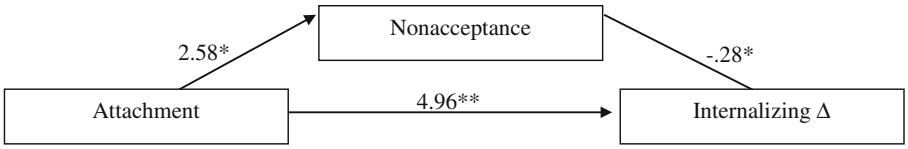

Fig. 2 Indirect effect of maternal attachment on internalizing symptom change through nonacceptance of emotional responses as a mediator. Values are unstandardized path coefficients. Length of stay was included as a covariate in this model. *Attachment* maternal attachment security from Child Attachment Interview, *nonacceptance* nonacceptance of emotional responses from the Difficulties in Emotion Regulation Scale, *internalizing Δ* Youth Self-Report internalizing symptoms as discharge—Youth Self-Report internalizing symptoms at admission

Nonacceptance of emotional responses mediated the relation between attachment security and internalizing symptoms.

The relation between attachment security and internalizing symptom reduction mirrors previous work tying attachment security to improved treatment outcome. Although not evaluated in this study, a popular explanation for this link is that attachment security is associated with interpersonal strengths in psychotherapy and therefore better outcome—indeed, Bowlby [39] described the therapeutic relationship as a temporary attachment relationship, therefore inherently interpersonal and subject to the consequences of early insecure attachments. Moreover, previous research ties attachment security to positive alliance [40, 41], alliance strength [42], and alliance formation [43], which together mediate the relation between attachment security and treatment outcome. Finally, Dykas and Cassidy [44] review empirical literature supporting the notion that attachment-related internal working models function like cognitive schemas, influencing the ways in which individuals obtain, organize, and operate on social information. Therefore, individuals are likely to use a given attachment-related set of social information-processing rules in both the context of a therapeutic relationship and in the larger interpersonal domain [45]. While none of these studies have explored emotion regulation alongside therapeutic alliance or other relational aspects of psychotherapy, it is likely that emotion regulation affects these interpersonal factors, highlighting a multiple mediation hypothesis as an important area for further research. These findings point to the potential of teaching emotional acceptance to insecurely attached adolescents, a cross-cutting feature of most new therapies including Acceptance and Commitment Therapy [46], Dialectical Behavior Therapy [47], and mentalization-based therapies [48].

That attachment security predicted change in internalizing, but not externalizing symptoms is interesting and warrants further discussion. While the scope of this study does not permit any conclusive interpretations, one explanation may have something to do with the nature of the treatment provided in this naturalistic setting. Adolescents underwent milieu-based treatment in which emphasis is placed on forming relationships with clinicians who provide individualized attention in dealing with the problems faced throughout the day. While the unit integrates cognitive-behavioral and family systems approaches, the primary framework is interpersonal-psychodynamic, highlighting its interpersonal nature. Perhaps the disruptive behavior of adolescents with externalizing problems interferes with alliance formation [49], making these adolescents less likely to benefit from this interpersonally oriented treatment regardless of attachment security. Second, it is possible that clinicians tailor treatment for internalizing adolescents to be more interpersonal (e.g., perhaps relying upon greater group work, family therapy sessions, etc.) than treatment for externalizing problems (more behaviorally oriented), and that therefore the interpersonal difficulties associated with attachment insecurity [50] limit symptom reduction in internalizing symptoms only. Third, internalizing problems may require more interpersonally based treatment and individuals with internalizing problems may rely more on the therapeutic alliance such that it plays a more dominant role in the mechanism of change. In that case, the known difficulty with working alliance among insecurely attached adults [8] may explain the limited symptom reduction in insecurely attached adolescents. Finally, it may be that the internalizing symptoms endorsed by securely and insecurely attached adolescents are not uniform, but rather represent clusters of symptoms that are differentially reactive to this treatment. Notably, the present study does not reveal a general association between attachment insecurity and internalizing symptoms, rather an interaction such that secure adolescents experience greater reduction in internalizing symptoms following treatment.

That emotion regulation, in particular nonacceptance of emotional responses, mediated the relation between attachment security and symptom change points to the particular importance of this subscale for attachment and treatment outcome. In Gratz and Romer's [28] model, nonacceptance of emotional responses refers to the tendency to be non-reflective of own emotions and thoughts in addition to feeling a need to repress these unwanted thoughts. In this regard, this subscale represents the

opposite of a mentalizing response (the ability to reflect on one's own mind [51]) and rather reflects experiential avoidance ("unwillingness to remain in contact with uncomfortable private events" [52]). Importantly, nonacceptance also maps onto the constructs of emotional openness and dismissal in attachment theory (as operationalized in the CAI) in that it relates to whether an adolescent is able to express, own, and appreciate negative emotions as well as convey feelings of dependency and vulnerability when upset. Indeed, the theoretical alignment between attachment insecurity and nonacceptance of emotional responses may explain why this subscale revealed a significant association with attachment insecurity whereas several others did not. The mediational model explored here, while limited by a cross-sectional design, suggests that attachment insecurity is associated with the denial or avoidance of negative emotions and difficulty in expressing emotional vulnerability (nonacceptance of emotional responses) which, in turn, is associated with factors that limit the symptom reduction.

A negative finding in the current study that warrants further reflection is that paternal attachment did not relate to either internalizing or externalizing symptom change. The lack of relation between paternal attachment and treatment outcomes stands in contrast to the literature emphasizing the importance of paternal attachment in wellbeing [13, 14]. This finding is even more curious given the over 90 % concordance in maternal and paternal attachment in the current study. Our data does not permit much interpretation of this finding, bar the fact that the CAI may be limited in its assessment of paternal attachment [26]. Nonetheless, the high concordance between maternal and paternal attachment, alongside differential relations to symptom change, point to a larger question in the assessment of attachment among adolescents—whether separation between maternal and paternal attachments is warranted and necessary. The present study assessed attachment security using the CAI, which differentiates between attachments to mother and father. This approach to assessment in adolescents is supported by substantial previous research pointing to differences in level of security among adolescents with regard to mothers and fathers [53–55] as well as by studies indicating that maternal and paternal attachments are differentially predictive of adolescent mental health trajectories [53]. Indeed, differential relations between maternal and paternal attachment and symptom change in this study echo these previous findings. Still, a great deal of research with adolescents is conducted using the Adult Attachment Interview (AAI [56]), an assessment that does not differentiate between caregivers but rather rates attachment security as a single state of mind. In the present study, the high degree of concordance between maternal and paternal attachments suggests that perhaps this approach is sufficient with older adolescent samples (as in the present study). Whether adolescent attachment is best assessed separately by caregiver or as a single state of mind was outside the scope of this study but remains an important area for future research, with no previous studies comparing interview-based measures like the CAI and AAI directly among adolescents.

An important caveat to the findings presented here is that tightly controlled treatment evaluation was not the aim of the present study, which instead sought to provide descriptive data on symptom reduction as a function of attachment security and emotion regulation in a naturalistic treatment setting. While adolescents did admit to, live, and receive treatment on the same unit, variability in the treatment provided was not assessed nor controlled in this naturalistic setting. Without tightly controlled clinical treatment and environs, these possibilities remain limitations of the existing study and important considerations in future research, particularly true treatment studies. In addition, the design of this study precludes causal or temporal interpretations of the significant mediation. Specifically, because emotion regulation and attachment were assessed at the same time point (admission), the current study design cannot evaluate attachment as an antecedent of emotion regulation, as is proposed in previous research [19, 20]. Indeed, the possibility remains that emotion regulation could serve as the predictor and attachment as the mediator of internalizing symptom change. The latter can only be addressed with a longitudinal design in which both processes are measured at several time points—an important direction for future research. Moreover, all of the measures employed in this study, despite differing in mode of administration (i.e., interview and self-report) rely upon adolescent report, neglecting information that could be gleaned from clinician and parent reports. Although adolescents are likely reliable reporters of internalizing symptoms, future research should seek multiple sources of information to bolster the findings of this study. In addition, the correlation between symptom change and nonacceptance of emotional responses was small, leaving replication of this relation and the mediational model as targets for future research. The relatively small effect size in this regard could be accounted for by weaknesses in our measurement of emotion regulation—relying upon self-report rather than experimental measures, leaving this open, as well, as a valuable area for future research. Also, the sample described in this study is hardly representative of a typical inpatient setting in the United States, with an average length of stay exceeding 1 month. Although this study may therefore prove useful in extension to European clinical settings, in which longer stays are typical, generalization of these findings to acute mental health care units in the United States requires further investigation in those

samples. Generalization may be even further limited by a predominantly Caucasian sample.

Notwithstanding these limitations, the findings of the present study are also strengthened in several ways. Specifically, attachment was measured using an interviewer-based, developmentally appropriate, psychometrically sound measure [26]. Furthermore, assessments were collected at two time points, admission and discharge, providing the longitudinal design needed for providing descriptive data on symptom change. Moreover, the study used a relatively large sample of inpatient adolescents. Finally, the present study represents a new and significant area of research which may encourage future research in the importance of attachment security for treatment outcome.

Acknowledgments This project was funded by the Child and Family Program of the Menninger Clinic.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

1. DeKlyen M, Greenberg MT (2008) Attachment and psychopathology in childhood. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 637–665
2. Allen JP (2008) The attachment system in adolescence. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 419–435
3. Dozier M, Stovall-McClough KC, Albus KE (2008) Attachment and psychopathology in adulthood. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 718–744
4. Forbes D et al (2010) Attachment style in the prediction of recovery following group treatment of combat veterans with post-traumatic stress disorder. J Nerv Ment Dis 198(12):881–884
5. Stalker CA, Gebotys R, Harper K (2005) Insecure attachment as a predictor of outcome following inpatient trauma treatment for women survivors of childhood abuse. Bull Menn Clin 69(2): 137–156
6. McBride C et al (2006) Attachment as moderator of treatment outcome in major depression: a randomized control trial of interpersonal psychotherapy versus cognitive behavior therapy. J Consult Clin Psychol 74(6):1041–1054
7. Tasca GA et al (2006) Attachment scales predict outcome in a randomized controlled trial of two group therapies for binge eating disorder: an aptitude by treatment interaction. Psychother Res 16(1):106–121
8. Slade A (2008) The implications of attachment theory and research for adult psychotherapy: research and clinical perspectives. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 762–782
9. Guzder J et al (2011) The relationship between alliance, attachment and outcome in a child multi-modal treatment population: pilot study. J Can Acad Child Adolesc Psychiatry 20(21804848): 196–202
10. Merikangas KR et al (2010) Lifetime prevalence of mental disorders in U.S. adolescents: results from the national comorbidity survey replication-adolescent supplement (NCS-A). J Am Acad Child Adolesc Psychiatry 49(20855043):980–989
11. Allen JP, Land D (1999) Attachment in adolescence. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications. Guilford Press, New York, pp 319–335
12. Kobak R et al (2006) Attachment, stress, and psychopathology: a developmental pathways model. In: Cicchetti D, Cohen DJ (eds) Developmental psychopathology, vol 1: theory and method, 2nd edn. Wiley, Hoboken, pp 333–369
13. Grossmann K et al (2002) The uniqueness of the child–father attachment relationship: fathers' sensitive and challenging play as a pivotal variable in a 16-year longitudinal study. Soc Dev 11(3):307–331
14. Grossmann K et al (2008) A wider view of attachment and exploration: the influence of mothers and fathers on the development of psychological security from infancy to young adulthood. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 857–879
15. Marroquín B (2011) Interpersonal emotion regulation as a mechanism of social support in depression. Clin Psychol Rev 31(8):1276–1290
16. Mennin DS, Fresco DM (2010) Emotion regulation as an integrative framework for understanding and treating psychopathology. In: Kring AM, Sloan DM (eds) Emotion regulation and psychopathology: a transdiagnostic approach to etiology and treatment. Guilford Press, New York, pp 356–379
17. Mennin D, Farach F (2007) Emotion and evolving treatments for adult psychopathology. Clin Psychol Sci Pract 14(4):329–352
18. Mennin DS et al (2007) Delineating components of emotion and its dysregulation in anxiety and mood psychopathology. Behav Ther 38(3):284–302
19. Calkins SD (2004) Early attachment processes and the development of emotional self-regulation. In: Baumeister RF, Vohs KD (eds) Handbook of self-regulation: research, theory, and applications. Guilford Press, New York, pp 324–339
20. Mikulincer M, Shaver PR, Pereg D (2003) Attachment theory and affect regulation: the dynamics, development, and cognitive consequences of attachment-related strategies. Motiv Emot 27(2):77–102
21. Chen H et al (2004) Adolescent personality disorders and conflict with romantic partners during the transition to adulthood. J Pers Disord 18(6):507–525
22. White IR, Horton N, Carpenter J (2009) Complete-cases analysis is appropriate for randomised trials with pre-test–post-test designs. Psychiatry Res 168(3). doi:10.1016/j.psychres.2009.01.003
23. Target M, Fonagy P, Shmueli-Goetz Y, Datta A, Schneider T (2007) The child attachment interview (CAI) protocol. University College London, London, England (unpublished manuscript)
24. Scott S et al (2011) Attachment in adolescence: overlap with parenting and unique prediction of behavioural adjustment. J Child Psychol Psychiatry 52(10):1052–1062
25. Shmueli-Goetz Y et al (2008) The child attachment interview: a psychometric study of reliability and discriminant validity. Dev Psychol 44(4):939–956
26. Venta A, Shmueli-Goetz Y, Sharp C (2014) Assessing attachment in adolescence: a psychometric study of the child attachment interview. Psychol Assess 26(1):238–255. doi:10.1037/a0034712
27. Achenbach TM, Rescorla LA (2001) Manual for the ASEBA school-age forms and profiles. University of Vermont, research center for children, youth and families, Burlington

28. Gratz KL, Roemer L (2004) Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. J Psychopathol Behav Assess 26(1):41–54
29. Perez J et al (2012) The difficulties in emotion regulation scale: factor structure and association with nonsuicidal self-injury in adolescent inpatients. J Psychopathol Behav Assess 34(3):393–404
30. Wechsler D (1997) WAIS-III: administration and scoring manual. The Psychological Corporation, San Antonio
31. Wechsler D (2008) Wechsler adult intelligence scale—4th edn. Pearson, San Antonio
32. Wechsler D (2003) Wechsler intelligence scale for children—4th edn. In: technical and interpretive manual. Psychological Corporation, San Antonio
33. Del Giudice M (2009) Sex, attachment, and the development of reproductive strategies. Behav Brain Sci 32(1):1–21
34. Costello EJ, Copeland W, Angold A (2011) Trends in psychopathology across the adolescent years: what changes when children become adolescents, and when adolescents become adults? J Child Psychol Psychiatry 52(10):1015–1025
35. West KK, Mathews BL, Kerns KA (2013) Mother–child attachment and cognitive performance in middle childhood: an examination of mediating mechanisms. Early Child Res Q 28(2):259–270. doi:10.1016/j.ecresq.2012.07.005
36. Aiken LS, West SG (1991) Multiple regression: testing and interpreting interactions. Sage Publications Inc, Thousand Oaks
37. Holmbeck GN (2002) Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. J Pediatr Psychol 27(1):87–96
38. Preacher KJ, Hayes AF (2008) Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav Res Methods 40(18697684):879–891
39. Bowlby J (1988) Developmental psychiatry comes of age. Am J Psychiatry 145(3276225):1–10
40. Mallinckrodt B, Coble HM, Gantt DL (1995) Working alliance, attachment memories, and social competencies of women in brief therapy. J Couns Psychol 42(1):79–84
41. Satterfield WA, Lyddon WJ (1995) Client attachment and perceptions of the working alliance with counselor trainees. J Couns Psychol 42(2):187–189
42. Kalogerakos AF (2010) An examination of therapeutic alliance patterns, client attachment, client interpersonal problems, and therapy outcome in process-experiential and cognitive-behavioural treatment for depression. ProQuest Information & Learning, US
43. Johnson LN et al (2006) Attachment and the therapeutic alliance in family therapy. Am J Fam Ther 34(3):205–218
44. Dykas MJ, Cassidy J (2011) Attachment and the processing of social information across the life span: theory and evidence. Psychol Bull 137(1):19–46
45. Fonagy P (1991) Thinking about thinking: some clinical and theoretical considerations in the treatment of a borderline patient. Int J Psychoanal 72(4):639–656
46. Hayes SC, Strosahl KD, Wilson KG (1999) Acceptance and commitment therapy: an experiential approach to behavior change. Guilford Press, New York
47. Linehan MM (1993) Cognitive-behavioral treatment of borderline personality disorder. Guilford Press, New York
48. Bateman AW, Fonagy P (2004) Mentalization-based treatment of BPD. J Pers Disord 18(15061343):36–51
49. Gallagher R, Kurtz S, Blackwell SC (2010) Engaging adolescents with disruptive behavior disorders in therapeutic change. In: Castro-Blanco D, Karver MS (eds) Elusive alliance: treatment engagement strategies with high-risk adolescents. American Psychological Association, Washington, pp 139–158
50. Berlin LJ, Cassidy J, Appleyard K (2008) The influence of early attachments on other relationships. In: Cassidy J, Shaver PR (eds) Handbook of attachment: theory, research, and clinical applications, 2nd edn. Guilford Press, New York, pp 333–347
51. Fonagy P, Allison E (2012) What is mentalization? The concept and its foundations in developmental research. In: Midgley N, Vrouva I (eds) Minding the child: mentalization-based interventions with children, young people and their families. Routledge/Taylor & Francis Group, New York, pp 11–34
52. Hayes SC et al (1996) Experiential avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. J Consult Clin Psychol 64(6):1152–1168
53. Doyle A, Markiewicz D (2009) Attachment style with father and mother in early adolescence: gender differences and perceived peer competence. Eur J Dev Sci 3(1):80–93
54. Paterson JE, Field J, Pryor J (1994) Adolescents' perceptions of their attachment relationships with their mothers, fathers, and friends. J Youth Adolesc 23(5):579–600. doi:10.1007/BF01537737
55. Youniss J, Smollar J (1985) Adolescent relations with mothers, fathers, and friends. University of Chicago Press, Chicago
56. George C, Kaplan N, Main M (1985) Adult attachment interview protocol. University of California at Berkeley, Berkeley (unpublished manuscript)