

Associations between insecure attachment styles to parents and suicidal ideation in adolescents with depression

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Abstract

Objective: Suicidal ideation and depressive symptoms are often interrelated in clinical settings. Insecure attachment may be a risk factor for suicidal ideation in depressed adolescents. To our knowledge, this study is the first to examine the association between self-reported insecure attachment styles to both parents and suicidal ideation in a clinical sample of adolescents with depression.

Methods: Fifty clinically depressed adolescents (13-17 years, 84% girls) completed self-reported measures of suicidal ideation, depressive symptoms, and attachment style to parents.

Results: There was a statistically significant bivariate association between higher levels of attachment anxiety in relation to mothers and fathers and higher levels of suicidal ideation. When attachments to both parents were included in the same multivariate model, only attachment anxiety to the mother was significantly associated with the level of suicidal ideation. Self-reported depressive symptoms remained significantly associated with the level of suicidal ideation in all analyses. Younger adolescents with attachment anxiety reported higher levels of suicidal ideation than older adolescents.

Conclusion: Conclusions about directionality and causality of associations between insecure attachment and suicidal ideation are limited due to the cross-sectional design. Our findings suggest that attachment anxiety in relation to the mother and father is associated with increased levels of suicidal ideation. Implication of these findings for treatment selection is discussed.

Keywords: Suicidal ideation; attachment; depression; adolescents; family therapy; insecure attachment

Introduction

The relationship between suicidal ideation and depressive symptomatology is well known (1). Between 60-85 % of adolescents with clinical depression report suicidal ideation, while the lifetime prevalence of suicidal ideation in general adolescent populations is much lower, about 9.2 % (2-4). Suicidal ideation is commonly defined as ideas and thoughts about death and harming or killing oneself (5). It spans a spectrum from passive wishes for death, to serious and specific plans of taking one's life. More severe suicidal ideations, such as "I wish to kill myself", are far less prevalent than milder forms, such as "I have thoughts of killing myself, but I would not carry it out" (6, 7). Adolescence is a period

of significant change, both physically and cognitively, and the number of youth experiencing emotional and behavioral problems increases. As adolescents face new challenges and encounter increased pressure on several domains, there is a striking increase in suicidal ideation from childhood into adolescence (8). Young adolescents are particularly vulnerable to perceiving problems as overwhelming and given the earlier timing of their pubertal development, girls are most vulnerable and report more suicidal ideation and emotional problems (9).

Suicidal ideation is one of the strongest risk factors for suicide attempts and death by suicide both in adolescence and adulthood. Adolescents who report suicidal ideation are 12 times more likely to have

attempted suicide by the age of 30 (10). Only a small subset of adolescents who report suicidal ideation later die by suicide (11, 12), however suicidal ideation has an important predictive value and has the potential to inform clinical interventions (13). Suicide is one of the leading causes of death among adolescents in many countries (3, 14). Not only does suicidal ideation increase the risk of suicide attempts and death by suicide in adolescents, suicidal ideation is an important marker for an array of significant impairments, such as higher risk of school dropout, poor psychosocial functioning, mood disorders, and externalizing disorders (10, 15). These problems can often persist long into adulthood if they go unrecognized (16). Among the potential risk factors implicated for suicidal ideation (14, 17-20), insecure attachment to parents may be particularly important to address in treatment. A better understanding of the role of relational factors, such as attachment style, in the development of suicidal ideation, is important for developing effective preventive strategies and interventions for adolescents who are experiencing clinical depression.

Attachment and suicidal ideation

Attachment theory might be a suitable developmental framework for understanding the interaction of interpersonal relationships with other factors that can lead to increased vulnerability to suicide (21). Attachment is an affective bond to one's significant others. It is a specific aspect of the relationship between a child and caregiver that is involved in making the child feel safe, secure and protected (22). Adolescence is a period where multiple new attachment bonds are formed, but the attachment to parents remains important for developing a sense of self-reliance and social competence (23). Attachment to parents during adolescence differs from earlier ages because it emphasizes emotional autonomy while maximizing levels of support (24). Insecure attachment can be described in a two-dimensional model of avoidant and anxious attachment styles (25) based on Bowlby's (23) original theory of internal working models. Adolescents with an avoidant attachment style, also called dismissive, tend to have a negative internal model of others and expect them to be unavailable and unsupportive, while adolescents with an anxious attachment style, also called preoccupied, are thought to have a negative internal model of themselves and low self-esteem. Early attachment experiences may serve as predisposing factors to suicidal ideation through their effects on self-esteem, emotion regulation, relationship functioning, and expectations for the future. Insecure attachment (high attachment anxiety and/or avoidance) is associated with a variety of ill effects on health,

adjustment and well-being (26-29), and, importantly, increased risk of suicidal ideation (30).

Specific subtypes of insecure attachment may lead to different developmental trajectories with specific risk profiles. Adolescents with avoidant attachment in relation to their parents often have problems with intimacy and trusting others. They devalue interpersonal relationships, trying to avoid proximity, denying attachment needs, and avoiding closeness and interdependence in relationships (31). Deactivation or an avoidant strategy is also used in emotion regulation; in stressful situations they often attempt to block or inhibit any emotional state that can cause distress, as a consequence they often have more restricted expressions of emotions (26, 32). Mikulincer and Shaver (33) describe adolescents with an anxious attachment style as individuals who are sensitive to negative emotional experiences and extremely dependent on others and have an exaggerated need for support and validation from others. According to attachment theory, people with attachment anxiety are guided by an unfulfilled wish for more attention from attachment figures. Therefore, they tend to exaggerate and over-emphasize their sense of helplessness and vulnerability to arouse attention and care. Over time, this strategy may lead parents to reject the attachment need of these adolescents, which may lead to a vulnerability to developing suicidal ideation (34).

A better understanding of the association between specific subtypes of insecure attachment to either parent and suicidal ideation can provide valuable knowledge about who is at greater risk for suicidal ideation and inform interventions. Identifying predictors of suicidal ideation in clinical samples is important to reach adolescents who are at risk for suicidal attempt or death by suicide. A major limitation of previous studies on the association between insecure attachment style in adolescents and suicidal ideation is the lack of inclusion of fathers. Despite increased interest in fathers' contributions to child and family (35), several studies have not differentiated between attachment to mother and attachment to father. Mostly, insecure attachment to parents have been assessed in general or limited to the parent who most likely influenced the child, or the composite sum of attachment to mother and father has been reported (36). The increased involvement of fathers in childrearing, particularly after infancy, underscores the need for more research exploring child-father attachment relationships and their association with suicidal ideation. Additionally, previous studies have typically not distinguished between adolescents with suicidal ideation and adolescents who make a suicide attempt when analyzing the association with insecure attachment (8, 37-39). Adolescents who experience suicidal

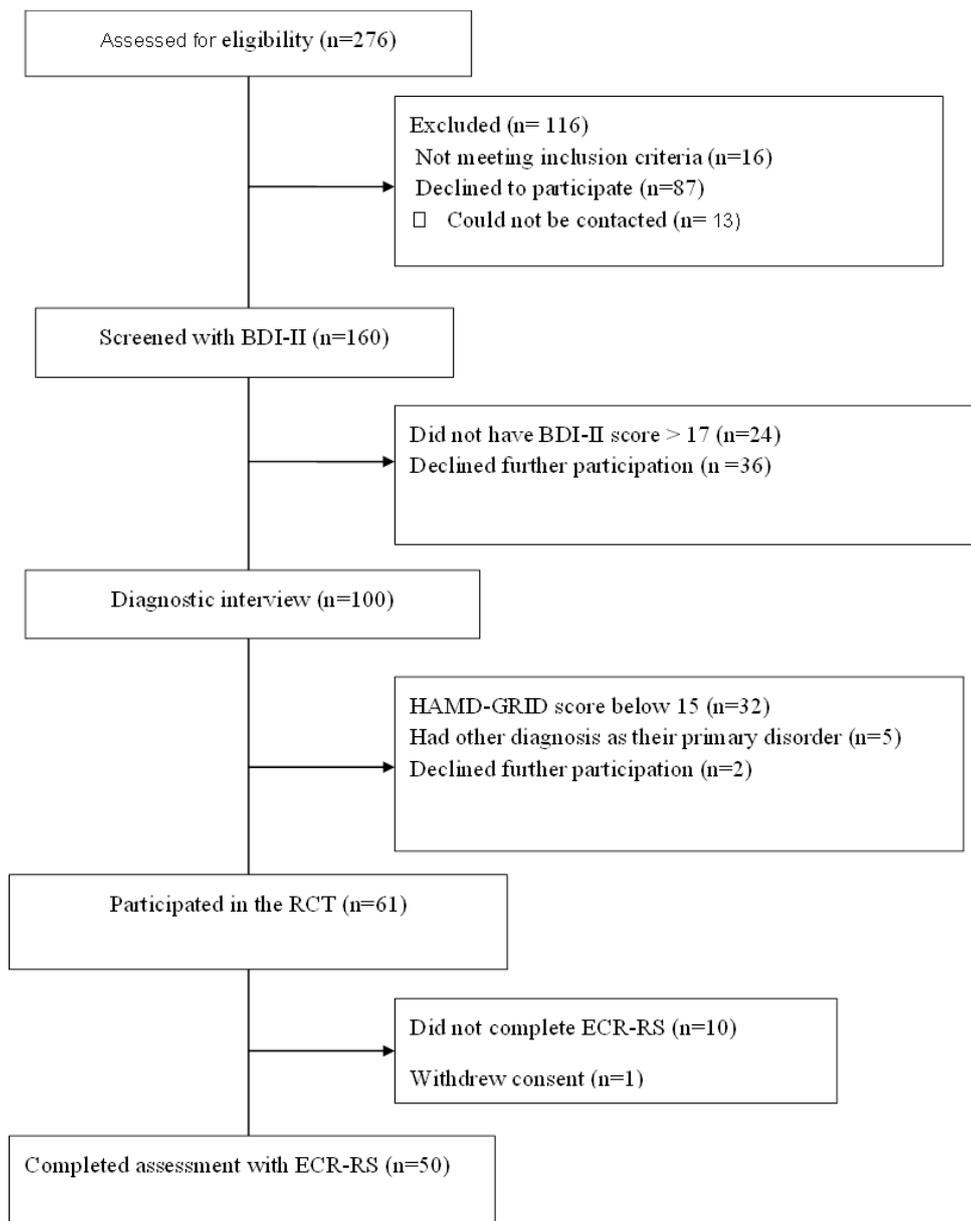
ideation are different from adolescents who attempt suicide in their clinical presentation (11, 40). Combining these two groups complicates interpretations and the generalizability of findings. To our knowledge, this is the first study to examine the association between insecure attachment types to both parents and suicidal ideation.

Aims

The primary aim of this study was to investigate the association between attachment avoidance and

attachment anxiety in relation to both mother and father, and suicidal ideation in a clinical sample of depressed adolescents. We hypothesized that both insecure attachment styles would be associated with suicidal ideation, but we expected that attachment anxiety in relation to either parent would be associated with higher levels of reported suicidal ideation because of negative self-view and sense of helplessness. Our secondary aim was to examine the unique association between the style of attachment to one's mother versus father and suicidal ideation.

FIGURE 1. Study participants from initial screening through analysis



Methods

Participants

Data for this study came from a randomized controlled trial (RCT) of adolescents with depression conducted at two Child and Adolescent Mental Health Service clinics in the county of Akershus, Norway. From October 2013 to January 2016, a total of 276 adolescents were screened for inclusion in the study. Progression through the assessment process is summarized in Figure 1. Participants were required to be currently living with an adult who had been one of their primary caregivers since before age four (to make sure participants had an early attachment relationship with their primary caregiver). Clinically referred adolescents (13-17 years old) and their parents were eligible to participate in the study if: 1) depression was listed as a reason for referral or 2) adolescents had been referred for reasons other than depression, but the adolescent scored > 6 on the Affective Problems subscale of the Youth Self Report form(41) at intake. Next, participants were assessed with Beck Depression Inventory-II (BDI-II) (42), those who scored > 17 went on to complete the full assessment which included a diagnostic interview. Adolescents meeting the DSM-IV-TR criteria for a current major depressive episode (43) and with a baseline score of 15 or above on clinician-rated Grid Hamilton Depression Rating scale (44), were included in the trial. Clinician-rated and self-reported measures of depression were both included in the screening, to get a clinical confirmation of the self-reported depressive symptoms. Adolescents meeting DSM-IV-TR criteria for any psychotic disorder, anorexia nervosa, bipolar disorder, intellectual disability or pervasive developmental disorders were excluded from the study. Eligible adolescents and parents provided written, informed consent and were then randomized to either Attachment Based Family Therapy (ABFT) or treatment as usual (TAU). The RCT study sample consisted of 61 adolescents (45). One patient withdrew consent shortly after randomization, 10 patients did not complete the Experiences in Close Relationships - Relationships Structure questionnaire (ECR-RS)(46). The current sample consisted of 50 adolescents, with a mean age of 15 years ($SD = 1.3$), 84% ($N=42$) of participants were girls. The project was approved by the Regional Committee for Medical Research Ethics.

Assessments

All assessments used in this study were conducted before randomization to either treatment. The adolescents and parents were assessed by a clinical psychologist at the clinic using a comprehensive assessment battery, including a diagnostic interview (Kiddie-Schedule for Affective Disorders and

Schizophrenia School-Age Children-Present and Lifetime version) (47) and self-report measures.

Suicidal ideation was measured with the Suicidal Ideation Questionnaire-Junior (SIQ-Jr) (48). SIQ-Jr is a 15-item self-report questionnaire measuring frequency and severity of suicidal thoughts on a 7-point scale with a total score ranging from 0 to 90 with higher scores indicating more suicidal thoughts. A score of 31 is the recommended clinical cutoff (89th percentile of the normative sample). Internal consistency in the current sample was $\alpha = .95$.

The BDI-II (42) - a widely used 21-item self-report inventory - was used to assess the severity of depressive symptoms through the two weeks prior to inclusion in the study. Internal reliability was $\alpha = .94$.

Attachment style to parents was measured using the ECR-RS (46), a nine-item self-report scale originally developed for adults, but it is also a highly useful and robust self-report attachment measure for adolescents (49). ECR-RS is based on ECR-R (50) item pool. The adolescents were encouraged to rate their relationship with both parents, regardless of whether or not they currently lived with them or had a close relationship with them. Some adolescents only had one caregiver and therefore provided information about only one. The attachment scores were computed into separate sum scores for attachment anxiety and attachment avoidance in relation to each parent. The anxious subscale consisted of 3 items ($\alpha = .73$ for mother and $\alpha = .79$ for father), and the avoidance subscale consisted of 6 items ($\alpha = .88$ for mother $\alpha = .91$ for father).

Data analytic strategy

Descriptive statistics were calculated for demographic variables, attachment variables, depression, and suicidal ideation. Due to the small sample size, and uneven number of mothers and fathers in the sample, separate analyses were performed initially to detect any potential association between the variables. To adjust for the potentially confounding influence of sex, age, and depression, these measures were included as independent variables in all models and in a separate model (Model 0). In the final model (Model 3), all attachment style measures that were significant in Models 1 and 2 were included to gauge the unique contribution of attachment anxiety and attachment avoidance in relation to each parent on suicidal ideation. Statistical analyses were conducted using SPSS Version 23 (51) for Windows. Missing data were mainly due to adolescents not completing the questionnaire. For adolescents declining to report on attachment relationship to either of the parent, the data were not imputed, this resulted in some cases being excluded from the analyses. Missing data were

imputed using the Multiple Imputation method available in SPSS.

Results

Participant characteristics and a correlation matrix are presented in Table 1 for each variable used in the analyses. Sixty per cent of the adolescents scored

above the clinical cut-off score on the SIQ-Jr. The results for the multiple regression analyses (Models 0 to 3) are presented in Table 2. In the null model (Model 0), not containing any attachment variables only level of depressive symptoms ($t [42] = 3.23, p < .01$) was associated with suicidal ideation.

TABLE 1. Descriptive statistics and correlation matrix of study variables

Variable	N	IQR	M	SD	1	2	3	4	5	6	7	8
1. Suicidal ideation (SIQ)	50	18.75-60.25	40.12	23.48	-							
2. Depression score (BDI-II)	49	30-41	35.43	8.76	.54**							
3. Age	50	14-16	14.98	1.3	-.19	-.04						
4. Gender	50				-.13	-.20	.05					
5. Attachment avoidance - mother	49	2.67-4.83	3.72	1.42	.36*	.15	-.04	.15				
6. Attachment anxiety - mother	49	1.3-17	2.26	1.36	.36*	.04	.09	.09	.23			
7. Attachment avoidance - father	45	3.17-5.58	4.21	1.64	.20	.05	-.1	.11	.23	.12		
8. Attachment anxiety - father	45	1.17-4.17	2.79	1.36	.27	.04	.26	-.07	-.09	.45**	.30	-

Notes. IQR = interquartile range.

* Significance at the $p < .05$. level (2-tailed); ** significance at the $p < .01$ level (2-tailed)

Insecure attachment to the mother and suicidal ideation

To investigate whether insecure attachment to the mother was associated with suicidal ideation after controlling for potentially confounding variables, such as age, gender, and depressive symptoms, multiple regression analyses were performed. Regression analysis in Model 1, revealed that whereas attachment anxiety in relation to the mother was significantly associated with suicidal ideation ($t [42] = 2.80, p < .01$) (see Table 2), attachment avoidance was not. The adolescent's age ($t [42] = -1.99, p = .05$) was significantly associated with suicidal ideation, as was level of depressive symptoms ($t [42] = 3.40, p < .01$) across all models.

Insecure attachment to the father and suicidal ideation

Next, the same analyses were conducted for attachment styles to the father. Regression analyses (Model 2) revealed that the patterns for association between both types of insecure attachment in relation to the father were similar to those for the mother. Whereas attachment anxiety in relation to the father ($t [42] = 1.99, p < .05$), age ($t [42] = -2.17, p < .05$), and depressive symptoms ($t [42] = 3.14, p < 0.01$) were significantly associated with suicidal ideation, attachment avoidance in relation to father was not.

TABLE 2. Insecure attachment in relation to the mother and father. Multiple linear regression analyses with suicidal ideation as the dependent variable (N=43)

Independent variable	Model 0			Model 1 Insecure attachment styles in relation to mother			Model 2 Insecure attachment styles in relation to father			Model 3 Attachment anxiety in relation to mother and father		
	B	SE	CI (95%)	B	SE	CI (95%)	B	SE	CI (95%)	B	SE	CI (95%)
Gender	-6.65	8.61	[-23.53, 10.23]	-4.02	7.99	[-19.67, 11.63]	-8.14	8.48	[-24.76, 8.48]	-7.60	7.75	[-22.79, 7.60]
Age	-3.80	2.20	[-8.11, .52]	-3.97	1.99	[-7.89, -.06]	-4.84	2.22	[-9.19, -.48]	-4.90	2.03	[-8.87, -.93]
Depression score	1.20	.37	[.47, 1.93]	1.14	.34	[.49, 1.80]	1.11	.35	[.42, 1.80]	1.10	.33	[.43, 1.73]
Attachment avoidance - mother				2.01	2.10	[-2.11, 6.12]						
Attachment anxiety - mother				5.65	2.02	[1.69, 9.61]				4.93	2.11	[.80, 9.06]
Attachment avoidance - father							1.18	1.98	[-2.71, 5.07]			
Attachment anxiety - father							3.83	1.92	[.06, 7.59]	2.56	1.80	[-.96, 6.08]
R ² _{adj}		.26			.40			.34			.42	

Notes. B = Unstandardized Beta; SE = Standard Error; R² = Adjusted Effect size

Insecure attachment to the mother and father

Finally, a multiple regression analysis, Model 3, was conducted to examine if attachment anxiety in relation to the mother and/or father was associated with suicidal ideation, when entered into the same model. In Model 3, attachment anxiety in relation to the mother ($t [42] = 2.34, p < .05$), age ($t [42] = -2.42, p < .05$), and level of depressive symptoms ($t [42] = 3.27, p < .01$) remained unique and significant predictors of suicidal ideation. Attachment anxiety in relation to the father was not significantly associated to suicidal ideation any more ($t [42] = 1.42, p = .15$).

Discussion

The current study examined the associations between anxious and avoidant attachment in relation to mothers and fathers and suicidal ideation in clinically depressed adolescents. Our results indicated that insecure attachment was associated with level of suicidal ideation in adolescents and this association was beyond the effects of depressive symptoms. As expected, adolescents with attachment anxiety in relation to mother and father reported higher levels of suicidal ideation. Attachment avoidance was not associated with suicidal ideation.

Adolescents with attachment anxiety may be more vulnerable to suicidal ideation because of their negative self-view. Lessard and Moretti (52) studied a clinical sample of adolescents and found that having an attachment style derived from a negative model of self was associated with suicidal ideation. Joiner (20) argues in his Interpersonal Theory of Suicide that three factors characterize individuals at heightened risk for suicide: feelings of burdensomeness, thwarted belongingness, and learned ability to engage in self-harming behavior. Thwarted belongingness occurs when the fundamental psychological need to belong is unmet and constitutes an important predictor of suicidal ideation (53). Thwarted belongingness can also mediate the association between insecure attachment and suicidal ideation (54). Adolescents with anxious attachment to their parents may experience more feelings of thwarted belongingness, as they seek excessive reassurance and are especially sensitive towards negative emotional experiences. They may perceive every rejection from their parents as a confirmation of their negative self-view. Adolescents with avoidant attachment to their parents, on the other hand, may be more protected against this feeling of thwarted belongingness, due to their deactivating strategies, shifting attention to minimize the distress, avoidance of interdependence, and disbelief in others' capability to help.

Adam (55) conducted a case-control study investigating the association of attachment patterns with a history of severe suicidal ideation. Their

findings were similar to ours; adolescents with a preoccupied attachment structured reported more severe suicidal ideation, while adolescents with a dismissive attachment pattern reported no suicidal ideation or behavior. There may be a functional significance of suicidal ideation in adolescents with anxious attachment to their parents. Adam (1994) argued that suicidal behavior is an extreme attachment expression. Adolescents may express suicidal ideation as a distress signal – they feel emotional pain from a negative sense of self and need help from their parents to process distressful emotions and to feel safe. Suicidal ideation may be a way of expressing anger toward an unresponsive or unavailable attachment figure. Adolescents with avoidant attachment to their parents, on the other hand, do not believe others are able to help and, consequently, may express less suicidal ideation, but their emotional pain may come to surface in other ways. This differentiation may be of importance when working with adolescents with depression. Knowledge about the adolescent's attachment style may inform the clinician about how to understand and target interventions to the adolescent, and be cautious about its implications during assessment of suicidal ideation.

Our secondary aim was to examine the unique contribution of insecure attachment to either parent to suicidal ideation. In the separate analyses of mothers and fathers, anxious attachment in relation to the mother as well as father was significantly related to level of suicidal ideation. This is an important finding, as it points to the necessity of involving fathers as well as mothers when working with depressed adolescents with suicidal ideation. However, when considering the attachment style to both parents together, we found that only attachment anxiety in relation to mother, but not father, was associated with suicidal ideation. This finding is consistent with research demonstrating that variations of insecure attachment to one's mother is an important risk factor for suicidal ideation in adolescents (21, 52, 56). DiFilippo and Overholser (21) found that only the quality of attachment to the mother (not father) accounted for significant variation in levels of depressive symptoms and suicidal ideation in adolescent psychiatric inpatients. However, even if the association between attachment style to fathers and suicidal ideation was not significant in our study when combining mothers and fathers in the same model, there is a need to examine these association with a larger sample. The differences in insecure attachment to mothers and fathers and influence on suicidal ideation may be of much less importance than the similarities (57). For example, de Jong (58) found that students with severe suicidal ideation and/or suicidal attempts had

less secure attachment to both mothers and fathers, compared to depressed students without suicidal ideation. Given the small sample size in our study, we cannot conclude with confidence that attachment anxiety in relation to fathers plays a secondary role in suicidal ideation. Overall, our results suggest that attachment anxiety in relation to fathers plays a role in suicidal ideation, but that attachment anxiety in relation to mothers was more strongly associated with suicidal ideation in this sample.

The sample in this study consisted of adolescents with major depressive disorder seeking treatment. Depressive symptoms were consistently and significantly associated with the level of suicidal ideation. This is a well-established association in suicidal ideation research (59). Experiencing recurrent thoughts of death or suicide are part of the symptoms associated with depression and is often considered an important marker of depression (60). The majority of adolescents in our sample had high levels of suicidal ideation, which underscores the need to carefully assess suicidal ideation in adolescents during treatment for depression.

Finally, younger age was associated with higher levels of suicidal ideation, consistent with a recent study that found that suicidal ideation peaks in early adolescents (61). In our sample, younger adolescents who reported more attachment anxiety also reported more suicidal ideation. Studies indicate that adolescents experience more frequent and intense emotions than younger or older individuals (62, 63). Cooper and colleagues (27) studied psychological symptomatology, self-concept, and risky or problem behaviors in a community sample. They found that adolescents with attachment anxiety were most poorly adjusted overall and had less adaptive ways of coping with negative emotions than those with other attachment styles. Adolescents with attachment anxiety in relation to either parent in younger age may be more vulnerable than older adolescents or adolescents with other attachment styles, not only to develop suicidal ideation, but also other emotional problems.

Strengths and limitations

This study has a number of limitations that warrant mentioning. The cross-sectional design does not enable us to conclude empirically about the directionality of the observed associations. The sample size is small and included few boys. The sample is derived from a clinical population and cannot be considered representative of adolescents in the general population. On the other hand, the clinical sample is also the primary strength of this study, examination of adolescents with clinical depression is a necessity, given the high proportion in the adolescent population of girls, in particular,

with depression who experience suicidal ideation. Further, this study included attachments to both fathers and mothers. The majority of previous studies examined insecure attachment only in relation to the mother, as mothers are traditionally regarded as the primary care takers. However, findings point to paternal contributions and future research on attachment and suicidal ideation should strive to include fathers.

Clinical implications

This study's findings are consistent with the increasing evidence indicating that insecure attachment may increase an adolescent's vulnerability to suicidal ideation (26). Especially young adolescents with attachment anxiety appear to be vulnerable for suicidal ideation. This may have implications for primary and secondary prevention strategies for reducing adolescents' depression and suicidal ideations and promoting healthy development.

Attachment style has been implicated in the development and maintenance of adolescent depression and suicidal ideation, less is known regarding its role in treatment. One important implication of the present results may be that assessing attachment style prior to treatment of depression and suicidal ideation, may inform and guide selection of subsequent treatment approaches. While adolescents with a secure attachment style may respond well to cognitive behavioral therapy, which is a recommended treatment option for adolescents with depression, those with an anxious or avoidant attachment style in relation to either of the parents, may benefit from a treatment which focuses on improving the quality of adolescent's relationships. Two therapy methods seems appropriate to mention in this context, Interpersonal Psychotherapy for adolescents (IPT-A) and Attachment Based Family Therapy (ABFT). IPT-A aims to teach adolescent specific interpersonal skills needed to successfully develop close attachment relationships and manage interpersonal stressors related to suicidal ideation or depression (64). ABFT focuses specifically on attachment relationships and family support, they aim to repair attachment ruptured (65, 66). These interventions are promising, given that during adolescence cognitive, social and emotional systems are still in process of development. Early intervention during this stage could take advantage of the malleability of these systems, and help adolescents develop more adaptive interpersonal strategies, which subsequently could help reducing suicidal ideation and depressive symptoms. These changes in to more adaptive interpersonal strategies could potentially be a protective factor against

developing depression and suicidal ideation in adulthood.

The associations between attachment and suicidal ideation are complex and multiple factors are expected to contribute to the development of suicidal ideation. Given the complexity of suicidal ideation in adolescents, one intervention strategy by itself may not be sufficient. Assessing attachment style may be useful in guiding treatment choice for adolescents with suicidal ideation and depression.

Ethical information

The project was approved by the Regional Committee for Medical Research Ethics, South-East Norway and all participants (both parents and adolescents) provided written informed consent.

Availability of data and materials

The data that support the findings of this study are available from Akershus University Hospital, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission of Akershus University Hospital and the Regional Committee for Medical Research Ethics, South-East Norway.

Competing interests

The authors have declared that they have no competing or potential conflicts of interest.

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Authors' contributions

LM was one of the project managers, that planned and designed the study. EWR and LW collected the data. LW and NC prepared the data for analysis and conducted the analysis. LW, EWR and MA prepared the manuscript with repeated revisions commented on, and amended mainly by LM. All authors made significant contributions to and approved the final manuscript.

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