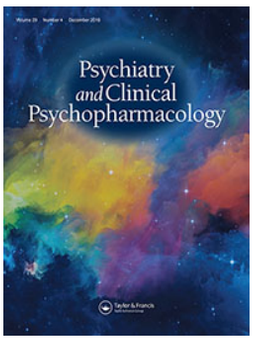

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Psychiatry and Clinical Psychopharmacology

ISSN: 2475-0573 (Print) 2475-0581 (Online) Journal homepage: https://www.tandfonline.com/loi/tbcp21

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To cite this article: Nurullah Bolat, Kayi Eliacik, Mesut Yavuz, Ali Kanik, Hilal Mertek, Baris Guven, Buket Dogrusoz & Ali Rahmi Bakiler (2019) Adolescent mental health, attachment characteristics, and unexplained chest pain: a case–control study, Psychiatry and Clinical Psychopharmacology, 29:4, 487-491, DOI: 10.1080/24750573.2018.1454374

To link to this article: https://doi.org/10.1080/24750573.2018.1454374

Published online: 26 Mar 2018.

PSYCHIATRY AND CLINICAL PSYCHOPHARMACOLOGY
2019, VOL. 29, NO. 4, 487–491
https://doi.org/10.1080/24750573.2018.1454374

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Adolescent mental health, attachment characteristics, and unexplained chest pain: a case–control study

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ABSTRACT

OBJECTIVES: Psychological factors may be the underlying causes in unexplained chest pain (UCP). Chest pain symptom may influence the emotional status and peer relationships of the children and adolescents negatively. However, the number of studies focussing on the aetiology and consequences of the adolescent UCP are still limited. The aim of this study is to investigate the relationships among psychological problems, attachment characteristics, and the UCP in a group of adolescents.

METHODS: Seventy-three adolescents with UCP and seventy-one healthy adolescents were included in the study. The adolescents completed the short form of Inventory of Parent and Peer Attachment (s-IPPA), and Strengths and Difficulties Questionnaire (SDQ), while their parents completed the parental form of the SDQ.

RESULTS: Contrary to expectations, there was no significant interaction between total parental attachment levels and UCP in the adolescents with UCP. There were significant correlations between the attachment problems and total difficulties score of SDQ. Binary logistic regression analysis revealed that higher emotional and conduct problems and lower pro-social characteristics predict the UCP in adolescents, significantly.

CONCLUSIONS: The results suggested that emotional/behavioural problems and lower pro-social behaviour scores are associated with UCP. However, further studies are needed for better understanding about the relationships between the UCP and attachment quality.

ARTICLE HISTORY
Received 6 January 2018
Accepted 12 March 2018

KEYWORDS
Chest pain; attachment; emotion; behaviour

Introduction

Chest pain without any obvious organic cause has been labelled as unexplained chest pain (UCP) and sometimes called as non-cardiac chest pain [1,2]. These patients frequently visit the emergency services and paediatric cardiology outpatient clinics. The rate of chest pain episodes in children and adolescents has been reported to be between 10% and 16% [3,4]. Non-cardiac aetiologies are found to be the underlying cause for 70% of the chest pain cases that are referred to paediatric cardiology outpatient clinics and 98% of the chest pain cases that are admitted by the paediatric emergency departments [5,6].

Psychological factors may cause non-organic chest pain [5,7]. High anxiety [8,9] and depression levels [9,10], hypervigilance to the physical sensations and excessive body monitoring [11] may increase the risk of UCP. Although chest pain is rarely caused by cardiac reasons, it still creates significant anxiety because of the potential consequences such as sudden death [12]. Chronic pain may negatively affect mood, cognition, and sleep quality of the individuals [13]. Because of the catastrophic thinking, UCP frequently leads to social avoidance, psychosocial problems [10] and may significantly impair the quality of life [14].

Attachment is one of the essential developmental theories and may have an important role among psychological factors of UCP. The attachment theory was originally developed by Bowlby [15]. Ainsworth described the secure and insecure attachment styles [16]. If parents are perceived as affectionate, reliable, and predictable by the child, attachment develops on secure basis [17]. If the caregivers' responses are inadequate for the child's physical and emotional needs, the attachment style may be insecure or disorganized [18]. Affectionless care [19] and insecure attachment style have influences on pain perception and can increase the severity of pain and the psychological symptoms related with children's illness behaviour [20–22].

We aimed to investigate the relationships among the attachment characteristics, mental health problems, and

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UCP in adolescents which would be helpful for a better management of this prevalent and unestablished issue.

Material and methods

Sampling and study design

This research was conducted between 01.02.2016 and 01.06.2016. The UCP group was composed of 73 adolescents (49 females and 24 males) aged between 12 and 18 years, who applied to a paediatric cardiology outpatient clinics with a complaint of chest pain. Physical examination, routine chest radiographs, and echocardiographic examinations were done for all participants by paediatric cardiologists. Subjects with chest pain caused by cardiac, musculoskeletal, respiratory, gastrointestinal and traumatic reasons, or any other organic factors were excluded from the study. After the paediatric cardiology visit, adolescents who were diagnosed with UCP were invited to participate in the study. The control group (CG) consisted of 71 adolescents (49 females and 22 males) who visited the paediatric outpatient clinics for routine health control without any chronic disease or pain. All the participants completed socio-demographic data form, short form of Inventory of Parent and Peer Attachment (s-IPPA), and Strengths and Difficulties Questionnaire (SDQ), while the parents completed the parental form of SDQ. The local ethical committee approved the study procedure. The participants were informed about the aim and the procedure of the study. All adolescents and parents gave their written informed consent. The study protocol was approved by the Institutional Review Board (19.01.2016/17/26).

Evaluation tools

Socio-demographic Data Form: Socio-demographic data form was used to collect demographic data including the age and gender of the participants, marital status of the parents, and monthly household income.

Short Form of Inventory of Parent and Peer Attachment (s-IPPA): The original scale was developed by Armsden and Greenberg [23] and consists of 28 items. The short version of the scale (s-IPPA) was developed by Raja et al. [24] It is a seven-level Likert type scale: 1 (never) to 7 (always). It has three subscales: trust (e.g. "My mother/father respects my feelings"), communication (e.g. "I tell my mother/father about my problems and troubles"), and alienation (e.g. "My mother/father has their own problems, so I don't bother her/his with mine"). Each of the subscales has four items. Higher scores indicate better attachment quality in all subscales of father and mother attachment and trust and communication. As to the alienation subscale, higher scores indicate insecure attachment patterns. s-IPPA's parental part has been adapted to Turkish by Gunaydin et al. [25]. Gunaydin et al. reported that trust, communication, and alienation factors of the scale did not emerge for the Turkish sample. The peer attachment part of the scale has not been adapted to Turkish due to low psychometric properties [25].

Strength and Difficulties Questionnaire (SDQ): The SDQ was developed by Goodman [26]. It has parental and self-report versions. It is a three-point Likert type scale: 0 (not true) to 2 (absolutely true). The questionnaire has hyperactivity–inattention, emotional symptoms, peer problems, conduct problems, and pro-social behaviour subscales. Each subscale contains five items. The four of the five subscales assess the problematic behaviours, and the fifth (pro-social) subscale assesses positive behaviours. The Turkish validity and reliability of the SDQ was performed by Guvenir et al. [27].

Statistical analysis

We used the Statistical Package for Social Sciences Software version 21 (SPSS 21, Chicago, IL, USA) for statistical analyses. The comparison between the socio-demographic characteristics of patients and controls was made by using χ^2 test. The s-IPPA and SDQ scores were compared with the independent sample *t*-test. Pearson product moment correlation test was used to analyse the correlations between s-IPPA and SDQ. The significant factors of the univariate analysis were put in a binary logistic regression analysis separately due to the significant correlations between them. Moreover, age and sex were included in all the models in order to avoid the potential effect of confounding factors. It was performed to determine the effect of possible risk factors such as emotional symptoms, conduct problems, and negative pro-social characteristics on the development of UCP in adolescents. The significance level was considered as $p < 0.05$ for all statistical analysis.

Results

There were no significant differences between the groups in terms of age, gender, and marital status of the parents, and monthly household income (Table 1).

Total scores of attachment to parents did not differ significantly between the groups. Details of s-IPPA results are shown in Table 2.

Table 1. Socio-demographic features of the participants.

	UCP group ($n = 73$)	Control group ($n = 71$)	*p*
Age (mean years ± SD)	14.5 ± 1.8	14.8 ± 2.1	0.383*
Gender			
Girls	49	49	0.808*
Boys	24	22	
Marital status of the parents			
Married	70	71	0.513***
Divorced	3	2	
Household income	1877 ± 1015 TL	1974 ± 774 TL	0.521**

UCP: Unexplained chest pain; *Independent sample *t*-test; **Chi-square test; ***Fisher's exact test.

Table 2. Comparison of the SDQ and s-IPPA scores between the UCP group and the controls.

	UCP group mean (SD)	Controls mean (SD)	*t*	*p*
SDQ adolescent form				
Emotional symptoms	3.56 (2.40)	2.04 (1.54)	−4.16	**
Conduct problems	2.50 (1.76)	1.79 (1.62)	−2.24	0.027*
Hyperactivity/ inattention	3.62 (1.95)	3.02 (1.69)	−1.80	0.75
Peer relationship problems	2.65 (1.64)	2.79 (1.07)	0.55	0.586
Pro-social behaviour	8.22 (1.78)	9.22 (1.30)	3.62	**
Total difficulties	12.12 (5.56)	9.50 (3.64)	−2.96	0.004*
SDQ parent form				
Emotional symptoms	3.75 (2.60)	3.51 (2.20)	−0.48	0.629
Conduct problems	2.28 (2.06)	1.08 (1.57)	−3.16	0.002*
Hyperactivity/ inattention	3.98 (2.48)	3.83 (1.98)	−0.30	0.762
Peer relationship problems	3.19 (1.76)	3.69 (1.47)	1.44	0.154
Pro-social behaviour	7.85 (1.97)	8.80 (1.31)	2.84	0.006*
Total difficulties	13.22 (6.80)	11.64 (5.36)	−1.18	0.243
s-IPPA scale				
s-IPPA maternal attachment	65.58 (19.99)	67.52 (17.19)	0.56	0.579
s-IPPA Paternal attachment	58.25 (16.66)	61.92 (14.26)	−1.25	0.211

SDQ: Strengths and difficulties questionnaire; UCP: unexplained chest pain; s-IPPA: short form of the inventory parent and peer attachment; *$p < 0.05$, **$p < 0.001$.

Regarding the subscales of parental SDQ, the conduct problem scores were significantly higher and pro-social behaviour scores were significantly lower in the UCP group compared to CG. Emotional symptom, conduct problem, and the total difficulties scores of the self-report SDQ were significantly higher and pro-social behaviour scores were lower in the UCP group compared to CG (Table 2).

Mother and father attachment scores were positively correlated with the total difficulties scores on the SDQ. The correlation analysis results of the s-IPPA and the SDQ scales are shown in Table 3.

Binary logistic regression analysis showed that higher total difficulties on SDQ, emotional symptoms, and conduct problems increase the risk of UCP while higher pro-social behaviour scores decrease it. The statistical results of the logistic regression analysis are shown in Table 4.

Table 3. Pearson correlation analysis of the s-IPPA mother and father attachment and the self-report SDQ results.

	SDQ total score	MA	PA
SDQ total score	1		
MA	−0.383**	1	
PA	−0.482**	0.517**	1

SDQ: Strength and difficulties questionnaire; MA: maternal attachment; PA: paternal attachment; s-IPPA: short form of the inventory and peer attachment; **$p < 0.001$.

Discussion

This study was conducted on the adolescents with a specific type of pain. To our knowledge, this is the first study that investigates the attachment characteristics of adolescents with UCP. Our findings showed that emotional and behavioural problems are associated with UCP in adolescents.

Previous studies point out that attachment problems increase the severity and frequency of pain episodes [21,28]. In addition, it is indicated that high anxiety levels can cause UCP [29] and insecure attachment patterns are related to high levels of anxiety [30–32]. Loiselle et al. [33] reported that interventions aimed to improve the relationship quality between adolescents and their parents may reduce the healthcare utilization of the children with UCP. In this study, we hypothesized that attachment quality would be lower in the adolescents with UCP. However according to our findings, total attachment levels did not have significant influence on UCP.

The unexpected results of insignificant association between the total attachment problems and UCP may be because of the bias in self-report measures [34]. In addition, the attachment, emotional and behavioural problems can differ in different types of pain cases. This issue can be addressed in further research where the UCP is compared with other types of pain, such as headache and abdominal pain, in terms of their relation with the attachment levels. Our results showed that there was a moderate correlation between total problem scores and attachment scores. Emotional and behavioural problems were found to be the independent risk factors for the development of UCP. We suggest that attachment problems may indirectly contribute to UCP by increasing the emotional and behavioural problems.

There may be several explanations for the unexpected results of insignificant association between the total attachment problems and UCP. First, attachment, emotional and behavioural problems may differ in different types of pain cases. This issue can be addressed in further research where the UCP is compared with other types of pain, such as headache and abdominal pain, in terms of their relation with the attachment levels. Second, attachment concept has

Table 4. Binary logistic regression analysis results.

Predicting variables	OR (95% CI)	*p*	Age and sex adjusted OR (95% CI)	*p*
Total SDQ score	1.127 (1.033–1.229)	0.007*	1.127 (1.033–1.227)	0.007*
Emotional symptoms	1.472 (1.192–1821)	**	1.507 (1.208–1.879)	**
Conduct problems	1.288 (1.024–1.620)	0.03*	1.298 (1.026–1641)	0.029*
Pro-social	0.635 (0.477–0.845)	0.002	0.631 (0.472–0.843)	0.002*

OR: Odds ratio; CI: confidence interval; *$p < 0.05$, ** $p < 0.001$.

several dimensions and using different attachment measures may result in different nomenclature for the different styles/patterns, which can create confusion and complicate comparisons [35]. Furthermore, the original s-IPPA basically has three additional subscales (trust, communication, alienation), however, these subscales are not valid in Turkish version. Different dimensions of attachment might be in relationship with UCP. Thus there is a need for further studies which evaluates the relationships between UCP and several dimensions of attachment by different scales. Third, bias factor in self-report measures is another important issue and should also be taken into consideration when interpreting our results. Last but not least, despite the growing evidence in the field of pain, it is difficult to claim a causal relationship between attachment insecurity because of the majority of the studies has been cross-sectional [35]. There is a need for further longitudinal studies to understand better this issue. On the other hand, our results showed that there was a moderate correlation between total problem scores and attachment scores. Emotional and behavioural problems were found to be the independent risk factors for the development of UCP. We suggest that attachment problems may indirectly contribute to UCP by increasing the emotional and behavioural problems.

Our results regarding both parental and self-report SDQ scores indicated that conduct problems were higher in the UCP group than the CG. This finding supports the previous studies which point out that behavioural problems and conduct disorders are more common in the individuals with somatic complaints [36,37]. In addition, it is reported that UCP frequently results in social avoidance. Chronic pain may also lead to social problems such as school absence [38] and impaired peer relationships [39]. Consistent with the previous research [38,39] in the present study, pro-social behaviour scores which assess positive social characteristics were lower in the UCP group compared to CG. However, there was no significant difference between the UCP group and CG in terms of peer relationships. This result differs from the results of Forgeon et al. [39] which suggests that the UCP is associated with impaired peer relationships.

The results of the self-report SDQ indicated that emotional problems in the UCP group were more common compared to CG. This finding was consistent with the expectations, suggesting that high anxiety level is a significant risk factor for the development of UCP [7,9,10]; and UCP itself may cause enormous anxiety [12] and negative perception of self [40] and depressive symptoms [8]. Interestingly, the parental SDQ failed to provide sufficient information about emotional problems of the adolescents. This data suggested that adolescents recognize their negative emotions much better than their parents. It was reported that adolescents tend to keep their emotional problems to themselves rather than expressing those to their parents [41]. This data may help to explain the difference between the adolescents' and parents' results on the emotional subscale of the SDQ.

Although this study yields interesting findings, several limitations should be considered. The cross-sectional nature of the study does not provide a clear statement about the causality and effect. This issue should be addressed by future longitudinal research. Additionally, the results of this study may be different when conducted in other countries and/or ethnic groups. Further research with different nationalities, cultural groups, and age groups (e.g. younger adolescents) may contribute to our knowledge about UCP and its relation with attachment quality and mental health. Despite these shortcomings, this study is the first study which investigates the association between the UCP and the attachment patterns in adolescents by using standardized instruments.

In conclusion, no significant association between total attachment levels and UCP was found. Additionally, adolescents with UCP have high levels of emotional and behavioural problems. In the evaluation of adolescents with UCP, clinicians should focus on mental health of the adolescents and the quality of their relationship with parents. There is a need for replication of our results by further longitudinal studies particularly about attachment and UCP.

Disclosure statement

No potential conflict of interest was reported by the authors.

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