

# Gender-Specific Developmental Trajectories of Anxiety during Adolescence: Determinants and Outcomes. The TRAILS Study

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## Abstract

**Objective:** To identify developmental trajectories of anxiety symptoms for adolescent girls and boys. Trajectories were compared with regard to early-adolescent risk factors and psychiatric outcomes during adolescence and in young adulthood. **Method:** A community sample of 2,230 adolescents was assessed three times across a six-year interval (10-17 years). Symptom scores of anxiety were analyzed with growth mixture models, stratified by gender. **Results:** Three gender-specific anxiety trajectories were identified for both girls (93.3% low, 4.1% mid-adolescence limited, 2.6% mid-adolescence increasing) and boys (84.4% low, 9.5% mid-adolescence limited, 6.1% early-adolescence decreasing). Child, family and peer factors at baseline predicted group membership of the mid-adolescence limited anxiety trajectory and the early-adolescence decreasing anxiety trajectory in boys. Parental emotional problems predicted the early-adolescence anxiety increase trajectory in girls. Prevalence of anxiety disorders and depression during adolescence and in early adulthood was higher in both the mid-adolescence limited and the mid-adolescence anxiety increase trajectory. **Conclusions:** The longitudinal course of anxiety symptoms during adolescence was characterized by three distinct gender-specific developmental trajectories. The most at-risk trajectory in girls was the mid-adolescence anxiety increase trajectory, and in boys the mid-adolescence limited trajectory. None of the environmental (i.e., child, family and peer) factors distinguished the at-risk trajectories from the other trajectories.

**Key Words:** anxiety, adolescence, developmental trajectories, determinants, and growth mixture modelling

## Résumé

**Objectif:** Identifier les trajectoires développementales des symptômes d'anxiété pour les adolescents et les adolescentes. Les trajectoires ont été comparées à l'égard des facteurs de risque du début de l'adolescence et des résultats psychiatriques durant l'adolescence et le jeune âge adulte. **Méthode:** Un échantillon communautaire de 2 230 adolescents (de 10 à 17 ans) a été évalué à trois reprises sur un intervalle de six ans. Les scores des symptômes d'anxiété ont été analysés à l'aide de modèles de croissance mixtes, stratifiés par sexe. **Résultats:** Trois trajectoires d'anxiété sexospécifiques ont été identifiées pour les filles (93,3 % faibles, 4,1 % limitées à la mi-adolescence, 2,6 % croissantes à la mi-adolescence) et les garçons (84,4 % faibles, 9,5 % limitées à la mi-adolescence, 6,1 % décroissantes au début de l'adolescence). Les facteurs environnementaux des enfants, de la famille et des pairs au départ prédisaient l'appartenance du groupe à la trajectoire d'anxiété limitée de la mi-adolescence ainsi qu'à la trajectoire d'anxiété décroissante du début de l'adolescence chez les garçons. Les problèmes émotionnels parentaux prédisaient la trajectoire d'anxiété croissante du début de l'adolescence chez les filles. La prévalence des troubles anxieux et de la dépression durant l'adolescence et au jeune âge adulte était plus élevée tant dans la trajectoire d'anxiété limitée de mi-adolescence que dans la trajectoire d'anxiété croissante de mi-adolescence. **Conclusions:** L'évolution longitudinale des symptômes d'anxiété durant l'adolescence était caractérisée par trois trajectoires développementales sexospécifiques distinctes. Chez les filles, la trajectoire la plus à risque était la trajectoire d'anxiété croissante de mi-adolescence, et chez les garçons, la trajectoire d'anxiété limitée de mi-adolescence. Aucun des facteurs environnementaux (c.-à-d., enfants, famille, pairs) ne distinguait les trajectoires à risque des autres trajectoires.

**Mots clés:** anxiété, adolescence, trajectoires développementales, déterminants, et modèles de croissance mixtes

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## SUPPLEMENTARY ONLINE MATERIALS

[http://www.cacap-acpea.org/uploads/documents//Gender\\_Specific\\_Developmental\\_Legerstee\\_2013\\_02.pdf](http://www.cacap-acpea.org/uploads/documents//Gender_Specific_Developmental_Legerstee_2013_02.pdf)

Online materials include: Methods; Table A1 (Attrition analyses); Table A2 (Model fit statistics of anxiety trajectories stratified by gender); Table A3 (Parameter estimates of developmental trajectories of anxiety symptoms stratified by gender).

## Introduction

Anxiety disorders are highly prevalent, cause considerable distress (e.g., strong association with suicidal ideation and attempts), and impose a substantial burden on society (Kessler et al., 2005; Boden, Fergusson, & Horwood, 2007). Adolescence is a risk phase for the development of anxiety disorders (Beesdo, Knappe, & Pine, 2009). Almost one in every three adolescents suffers from anxiety disorders and girls even more than boys (Merikangas et al., 2010). Also at a symptom level, adolescent girls experience higher levels of anxiety than boys (Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008; Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2009; van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2011). Longitudinal studies have shown that although anxiety disorders can be limited to adolescence, they often persist into adulthood (Pine, Cohen, Gurley, Brook, & Ma, 1998). Moreover, anxiety disorders in adolescence increase the risk of other psychiatric disorders later in life, particularly depressive disorders (Bittner et al., 2004; Copeland, Shanahan, Costello, & Angold, 2009). Given the homotypic and heterotypic longitudinal persistence of anxiety disorders, early identification of at-risk adolescents is crucial as targeted prevention programs can then be delivered.

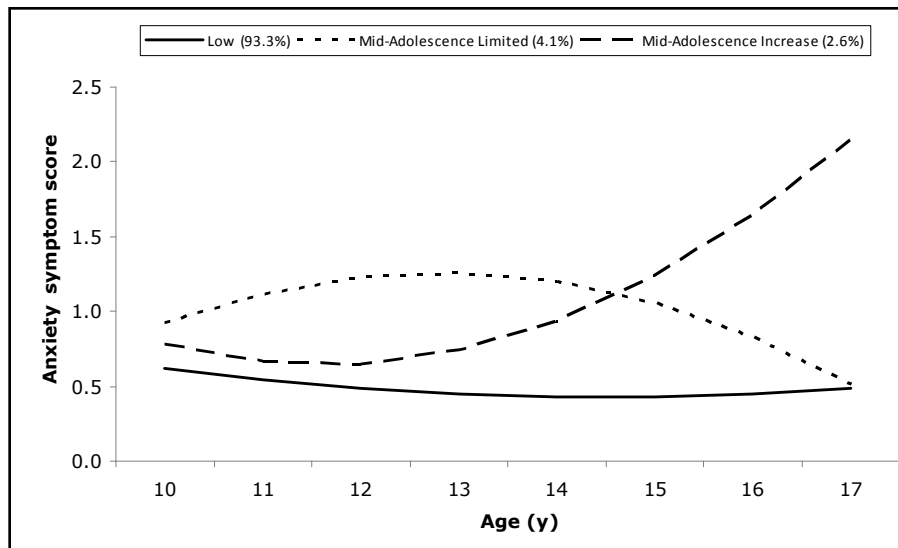
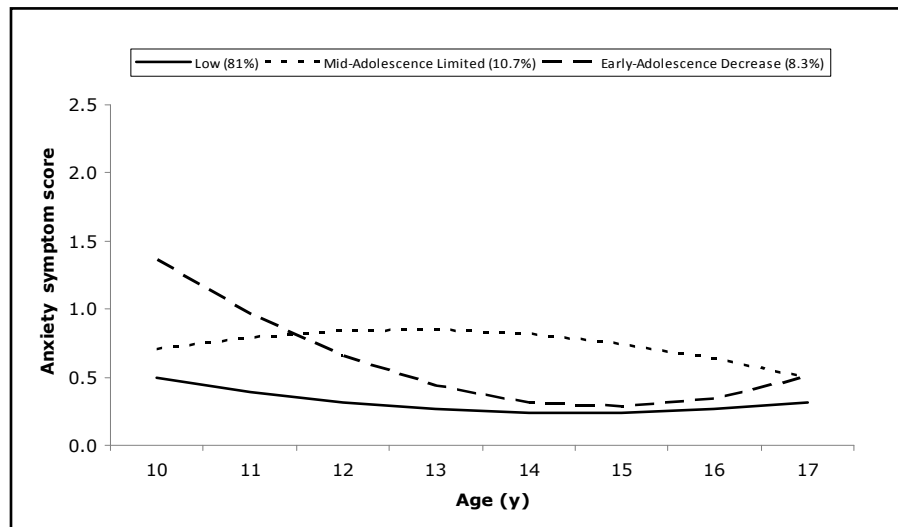
A statistical modelling technique to identify subgroups of individuals that will experience elevated levels of anxiety during adolescence is growth mixture modelling (Jung & Wickrama, 2008). Growth mixture modelling is used to ascertain subgroups of individuals within a population which follow a unique developmental pattern that is distinct from other subgroups. Growth mixture modelling cannot only improve our understanding of heterogeneity in the developmental course of anxiety problems across adolescence, but could also provide clues for early identification of adolescents prone to develop anxiety and depression by pinpointing early determinants of specific developmental anxiety trajectories and by clarifying the association between these anxiety trajectories and later psychopathology.

Growth mixture modelling has been used in several child studies on anxiety (e.g., Feng, Shaw, & Silk, 2008; Duchesne, Larose, Vitaro, & Tremblay, 2010; Côté et al., 2009). Duchesne et al. (2010), for instance, examined trajectories of anxiety symptoms in 2,000 children who were followed

from kindergarten to the end of elementary school. They found a low (34%), low-increasing (20%), high-declining (32%), and high (14%) developmental trajectory of anxiety. Children in the high anxiety trajectory were more often inattentive and exposed to disciplinary practices at home, and less prosocial. Fairly similar anxiety trajectories (i.e., low, low-increasing, high-declining, and high-increasing) were found among boys between the ages of two and ten years in the study of Feng et al. (2008). Côté examined combined anxiety and depression symptoms trajectories, and also identified increasing trajectories and a low trajectory.

Two studies examined distinct developmental trajectories of anxiety symptoms across adolescence with a growth mixture modelling approach (Crocetti, Klimstra, Keijsers, Hale, & Meeus, 2009; Morin et al., 2011). In a five-wave longitudinal study starting between the ages of 10 and 20 years, Crocetti et al. (2009) found that 91% of the adolescents followed a trajectory characterized by initial low levels of anxiety that decreased over time, and 9% by higher initial levels that further increased over time. Girls were more likely to follow the high-increasing trajectory than boys. In the study of Morin and colleagues (2011) anxiety status in adolescents was evaluated six times, starting around the age of 12 years, during a four-year period. They identified five distinct anxiety trajectories, of which three trajectories were characterized by a stable pattern of no, a low level, or a high level of anxiety symptoms. The other two trajectories followed a curvilinear pattern, with one showing high levels at both entrance and leaving of secondary school and lower levels in between, and the other a peak during secondary school years. Despite the overrepresentation of girls in high or increasing anxiety trajectories, both studies did not statistically model developmental trajectories for girls and boys separately. As the typical longitudinal course of anxiety across adolescence differs between girls and boys (Hale et al., 2008, 2009; van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2009), we hypothesized gender-specificity in the trajectories.

The aim of this study was to examine: (1) gender-specific developmental trajectories of anxiety symptoms during adolescence; (2) which factors determine group membership of anxiety trajectories; and, (3) associations between anxiety trajectories and anxiety and depressive disorders during adolescence and in early adulthood. With respect to determinants of developmental trajectories, we examined a number of child (self-competence, temperament), family (parenting style, parental internalizing psychopathology, and life events) and peer factors (peer victimization), which were identified as risk indicators of high levels of anxiety during adolescence in a previous study in the same sample (van Oort et al., 2011).

**Figure 1. Developmental trajectories of anxiety for girls****Figure 2. Developmental trajectories of anxiety for boys**

Note: The Y-axis shows mean item scores on the anxiety questionnaire (0–3) and the X-axis shows age in years (10–17).

## Methods (summary)

This study is part of the TRacking Adolescents' Individual Lives Survey (TRAILS), a prospective cohort of 2,230 Dutch adolescents initially aged 10–12 years, who are followed bi- or triennially, until the age of 25 (Huisman et al., 2008). So far, four data collection waves have been completed: T1 (N=2,230; response rate 76.0%; mean age (SD)=11.1 (0.6) years), T2 (N=2,149; response rate 96.4% of baseline participants; mean age (SD)=13.6 (0.5) years), T3 (N=1,816; response rate 81.4% of baseline participants; mean age (SD)=16.3 (0.7) years), and T4 (N=1,584

completed CIDI; response rate 71% of baseline participants; mean age (SD)=19.2 (0.6) years).

Anxiety symptoms were measured with a well-validated and reliable self-report measure (Revised Child Anxiety and Depression Scale; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000) at the first three waves (10–17 years). The models were fit based on the RCADS scores at specific ages, rather than at each assessment.

At T1 (10–12 years), the following child, family and peer factors were measured with different questionnaires (see Supplementary Materials Section): self-competence,

temperament (shyness, frustration, and effortful control), perceived parenting (overprotecting and rejecting parenting), life events up to T1 (illness and death in the family), parental current and lifetime internalizing problems, and peer victimization (victim, bully and bully-victim). At T4 (18-20 years), DSM-IV anxiety disorders and major depressive disorder were assessed retrospectively (10-17 years) and over the past year with the Composite International Diagnostic Interview 3.0 (Kessler & Ustun, 2004).

More extensive details of the study design, measures and statistical methods are given in the online Supplementary Materials section.

## Results

### **Developmental trajectories of anxiety**

Growth mixture modelling (GMM) was used to identify distinct developmental trajectories of anxiety symptoms. Three distinct curvilinear anxiety trajectories were identified for both girls and boys (Figure 1 and 2). Model fit and parameter estimates of these trajectories are given in supplementary Tables A2 and A3.

The first trajectory in girls was one of low anxiety symptoms (low trajectory;  $n=1,055$ ; 93.3%). The second trajectory had an inverted u-shape (mid-adolescence limited (MAL) trajectory;  $n=46$ ; 4.1%), reflecting an increase of anxiety symptoms between the ages of 10 and 13, followed by a decrease of anxiety between the ages of 13 and 17. The anxiety level of the MAL-trajectory decreased to the anxiety level of the low trajectory by the age of 17 years. The third trajectory was characterized by an initial small decrease of anxiety symptoms in early-adolescence followed by progressively increasing anxiety symptoms starting in mid-adolescence (mid-adolescence increase (MAI) trajectory;  $n=29$ ; 2.6%).

For boys, a low trajectory ( $n=924$ ; 84.4%) and MAL-trajectory ( $n=104$ ; 9.5%) were identified, fairly similar to those in girls. The third trajectory was characterized by a progressive decrease of anxiety symptoms during early adolescence followed by a small increase of anxiety symptoms between 15 and 17 years (early-adolescence decrease (EAD) trajectory;  $n=67$ ; 6.1%). With the current time window it is unclear whether the increase in anxiety symptoms in EAD-trajectory will continue into young adulthood.

### **Early determinants of developmental trajectories of anxiety**

Tables 1 and 2 show the results of the multinomial logistic regression analyses regarding child, family and peer factors between 10 and 12 years as predictors of developmental anxiety trajectories for girls and boys.

For girls, group membership of the MAL-trajectory was predicted by low self-competence, rejecting and overprotective parenting, death in the family, and being a bully/victim. Group membership of the MAI-trajectory was predicted by lifetime parental internalizing problems and illness in the family. Compared with girls in the MAI-trajectory, girls in the MAL-trajectory had more rejecting ( $OR=5.0$ ;  $p<.001$ ) and overprotective ( $OR=3.7$ ;  $p<.05$ ) parents, and lower self-competence ( $OR=4.0$ ;  $p<.01$ ) in early adolescence.

For boys, group membership of the MAL-trajectory and of the EAD-trajectory was predicted by low self-competence, rejecting and overprotective parenting, and peer victimization; membership of the EAD-trajectory was also predicted by illness in the family. Whereas predictors overlapped for the trajectories in boys, the two groups differed from each other: compared with boys in the MAL-trajectory, boys in the EAD-trajectory were more likely to have an overprotective parent ( $OR=2.1$ ;  $p<.05$ ), to have low self-competence ( $OR=4.0$ ;  $p<.001$ ), and to have more illnesses in the family ( $OR=2.4$ ;  $p<.01$ ) in early adolescence.

### **Developmental trajectories of anxiety and anxiety and major depressive disorders (MDD)**

Tables 3 and 4 show the results of the binary logistic regression analyses regarding the association between anxiety trajectories and anxiety disorders and MDD during adolescence and in early adulthood for girls and boys.

For girls, during adolescence the rate of anxiety disorders was elevated in the MAI-trajectory compared with the low and MAL-trajectory. The rate of MDD was elevated in both the MAL- and MAI-trajectories compared with the low trajectory during adolescence. The MAI-trajectory was strongly predictive of subsequent anxiety disorders and MDD in early adulthood. The MAL-trajectory did not predict a higher rate of anxiety disorders and MDD in early adulthood. Girls in the MAI-trajectory had significantly more MDD than girls in the MAL-trajectory in early adulthood.

For boys, during adolescence, the MAL-trajectory was associated with a higher rate of anxiety disorders, but the EAD-trajectory was not. No differences in the rate of MDD in adolescence were found between the three trajectories. Both the MAL- and EAD-trajectories predicted a higher rate of anxiety disorders in early adulthood. Only the MAL-trajectory predicted a higher rate of MDD in early adulthood. No significant differences were found in the rate of anxiety disorders and MDD between the MAL- and EAD-trajectories, neither during adolescence nor in early adulthood.

**Table 1. Early determinants of anxiety trajectories for girls**

Early determinants <sup>a</sup>	Anxiety trajectories														
	Low N = 1051		MAL N = 46		MAI N = 28		MAL <sup>b</sup> (95%CI)			MAI <sup>b</sup> (95%CI)			MAI <sup>c</sup> (95%CI)		
	%		%		%		OR		OR		OR		OR		OR
Low self-competence	21.1	52.2	21.4	4.07	(2.24-7.41)***	1.02	(0.41-2.54)	0.25	(0.09-0.73)**						
Shyness	24.4	17.3	23.9	0.65	(0.28-1.48)	0.96	(0.35-2.65)	1.49	(0.44-2.06)						
Frustration	17.5	26.6	19.1	1.71	(0.81-3.58)	1.10	(0.38-3.17)	0.59	(0.28-1.23)						
Effortful control	20.8	26.5	25.9	1.37	(0.68-2.76)	1.32	(0.53-3.31)	0.96	(0.32-2.91)						
Parenting – rejection	15.1	45.7	14.3	4.73	(2.58-8.67)***	0.94	(0.32-2.75)	0.20	(0.06-0.66)**						
Parenting – overprotection	18.5	50.0	21.4	4.40	(2.42-8.01)***	1.20	(0.48-3.00)	0.27	(0.09-0.80)*						
Parental internalizing problems															
Lifetime	16.9	22.9	32.1	1.46	(0.72-2.99)	2.33	(0.99-5.44)*	1.59	(0.53-4.72)						
Current	20.9	27.4	28.6	1.42	(0.71-2.87)	1.50	(0.58-3.86)	1.05	(0.34-3.28)						
Illness in the family	37.1	50.1	58.2	1.70	(0.94-3.09)	2.37	(1.08-5.19)*	1.39	(0.53-3.66)						
Death in the family	2.8	15.2	3.9	6.20	(2.55-15.04)***	1.38	(0.18-10.57)	0.22	(0.03-1.92)						
Peer victimization															
Victim	21.9	23.9	21.4	0.88	(0.52-1.49)	1.15	(0.52-2.54)	1.31	(0.51-3.35)						
Bully-Victim	7.9	23.9	7.9	2.42	(1.41-4.18)***	1.06	(0.34-3.29)	0.44	(0.13-1.50)						
Bully	13.6	15.2	7.1	0.90	(0.46-1.68)	0.62	(0.20-1.91)	0.69	(0.19-2.46)						

<sup>a</sup> Continuous variables were dichotomized at p80. <sup>b</sup> Low anxiety trajectory was the comparison class. <sup>c</sup> MAL trajectory was the comparison class.

\*p<0.05; \*\* p<0.01; \*\*\*p<0.001.

MAI = mid-adolescence-increase; MAL = mid-adolescence-limited

## Discussion

The present study showed that growth mixture modelling is a valuable approach to detect heterogeneity in the developmental course of anxiety symptoms in adolescence, to identify at-risk subgroups of adolescents, and to provide clues for early prevention and intervention. The course of anxiety symptoms during adolescence was best described by three gender-specific trajectories.

In line with previous studies (Crocetti et al., 2009; Morin et al., 2011) we found that the vast majority of both girls and boys experience constant low anxiety levels throughout adolescence. A subgroup of girls and boys showed transient elevated anxiety levels. Morin et al. (2011) reported a similar MAL-trajectory. The initial increase in anxiety may be due to a stressful transition from primary to secondary school (Morin et al., 2011). The main concerns of adolescents are bullying, fear of getting lost, increased homework, and peer relationships in regard to the secondary school transfer (e.g., Zeedyk et al., 2003; Rice, Frederickson, & Seymour, 2011). These concerns in combination with a low self-competence, parental rejection and overprotection as well as being bullied could make the school transition overwhelming and anxiety-provoking (West, Sweeting, & Young, 2010).

The third trajectory was gender-specific. A subgroup of girls experienced a progressive increase in anxiety that sets off in mid-adolescence. In contrast, a subgroup of boys experienced a progressive decrease of anxiety symptoms during early adolescence followed by a small increase of anxiety symptoms between 15 and 17 years. The significant higher rate of anxiety disorders in boys in early adulthood might suggest that the later increase in anxiety level in the EAD-trajectory continues after the age of 17 years, yet only the prevalence of specific phobia in young adulthood was elevated in this group. The

MAI- and EAD-trajectories were also found by Morin (i.e., based on Mplus defaults; 2011), and find support in previous findings that anxiety symptoms generally stabilize or decrease in boys, whereas girls generally show an increase throughout adolescence (Hale et al., 2008; Beesdo et al., 2009).

In girls, the MAI-trajectory was the most at-risk anxiety trajectory for the development of psychiatric disorders during adolescence and in early adulthood. In the MAI-trajectory almost 40% of the girls suffered from an anxiety disorder and 25% from a major depressive disorder in early adulthood, and in adolescence these rates were even higher. Girls in this at-risk trajectory had more parents with lifetime anxiety and depression as well as illnesses in the family as compared to girls in the low anxiety trajectory, but not as compared to girls in the MAL-trajectory. Thus we were not able to identify environmental (i.e., child, family and peer) factors that are specifically predictive of anxiety increase in mid-adolescent girls. This MAI-trajectory in girls might reflect the expression of underlying biological, including genetic, vulnerabilities (Zavos, Gregory, & Eley, 2012). Future research is needed to elucidate underlying mechanisms of anxiety increase in mid-adolescence. For prevention purposes, these findings stress the importance of either to provide a targeted prevention program in early-adolescence or to attentively following children during adolescence and to intervene when these children experience increased feelings of anxiety in mid-adolescence (Barrett, Farrell, Ollendick, & Dadds, 2006; Legerstee et al., 2008).

In boys, both the EAD- and the MAL-trajectories predicted subsequent anxiety disorders. These trajectories were predicted by low-self-competence and rejection by parents and peers. Perhaps these are the children that cope less well with the turmoil of adolescence,

**Table 2. Early determinants of anxiety trajectories for boys**

	Anxiety trajectories					
	Low N = 919		MAL N = 102		EAD N = 65	
	%	%	OR	MAL <sup>b</sup> (95%CI)	OR	EAD <sup>c</sup> (95%CI)
Early determinants <sup>a</sup>						
Low self-competence	13.0	28.7	61.5	2.71 (1.68-4.35)***	10.74 (6.28-18.38)***	3.97 (2.05-7.69)***
Shyness	19.1	24.8	17.5	1.39 (0.84-2.28)	0.89 (0.44-1.78)	0.64 (0.28-.45)
Frustration	23.4	26.7	33.8	1.19 (0.74-1.93)	1.67 (0.95-2.92)	1.40 (0.70-2.81)
Effortful control	15.6	15.9	6.5	1.02 (0.57-1.83)	0.37 (0.12-1.15)	0.36 (0.10-1.26)
Parenting – rejection	20.6	35.3	47.7	2.11 (1.36-3.26)***	3.52 (2.11-5.88)***	1.67 (0.89-3.15)
Parenting – overprotection	18.7	34.3	52.3	2.27 (1.46-3.53)***	4.76 (2.85-7.98)***	2.10 (1.11-3.96)*
Parental internalizing problems						
Lifetime	16.8	14.6	23.8	0.85 (0.47-1.52)	1.55 (0.84-2.84)	1.82 (0.82-4.07)
Current	21.4	20.2	30.1	0.93 (0.55-1.57)	1.58 (0.89-2.81)	1.70 (0.81-3.58)
Illness in the family	37.3	33.6	54.7	0.85 (0.55-1.32)	2.03 (1.22-3.38)**	2.39 (1.25-4.55)**
Death in the family	3.8	3.0	3.2	0.78 (0.24-2.61)	0.83 (0.19-3.53)	1.05 (0.17-6.51)
Peer victimization						
Victim	17.3	24.7	21.1	2.57 (1.79-3.69)	3.32 (2.20-5.01)	0.94 (0.53-1.65)
Bully-victim	11.4	31.3	41.0	1.33 (0.91-1.93)***	1.24 (0.78-1.98)***	1.29 (0.79-2.13)
Bully	21.1	10.8	13.9	0.48 (0.29-0.78)***	0.61 (0.35-1.05)	1.27 (0.63-2.59)

<sup>a</sup> Continuous variables were dichotomized at p80. <sup>b</sup> Low anxiety trajectory was the comparison class. <sup>c</sup> MAL trajectory was the comparison class.

\* p<0.05; \*\* p<0.01; \*\*\*p<0.001.

MAL = mid-adolescence-limited; MAI = mid-adolescence-increase; EAD = early-adolescence decrease

**Table 3. Association between anxiety trajectories and psychiatric disorders for girls**

Psychiatric disorders	Anxiety trajectories																				
	Low			MAL			MAL			MAL <sup>a</sup>											
	n	(%)	N = 797	n	(%)	N = 31	n	(%)	N = 24	OR	(95%CI)	MAL <sup>a</sup>	OR	(95%CI)	MAL <sup>a</sup>	OR	(95%CI)	MAL <sup>b</sup>	OR	(95%CI)	
Adolescence																					
Any anxiety disorder	119	(14.9)	6	(19.4)	11	(45.8)	1.37	(0.55-3.40)	4.82	(2.11-11.01)***	3.53	(1.06-11.70)									
Major depressive disorder	132	(16.6)	10	(32.3)	12	(50.0)	2.40	(1.10-5.21)*	5.04	(2.22-11.46)***	2.10	(0.70-6.30)									
Early adulthood																					
Panic disorders / agoraphobia	18	(2.3)	1	(3.2)	3	(12.5)	-	-	-	-	-	-									
Generalized anxiety disorder	19	(2.4)	3	(9.7)	7	(29.2)	-	-	-	-	-	-									
Specific phobia	105	(13.2)	5	(16.1)	3	(12.5)	-	-	-	-	-	-									
Social phobia	68	(8.5)	4	(12.9)	8	(33.3)	-	-	-	-	-	-									
Any anxiety disorder	176	(22.1)	10	(32.3)	13	(54.2)	1.68	(0.78-3.63)	4.17	(1.84-9.47)***	2.48	(0.83-7.46)									
Major depressive disorder	88	(11.0)	7	(22.6)	13	(54.2)	2.35	(0.98-5.61)	9.55	(4.14-21.90)***	4.05	(1.27-12.97)									

<sup>a</sup> Low anxiety trajectory was the comparison class. <sup>b</sup> MAL trajectory was the comparison class.

\* p<0.05; \*\* p<0.01; \*\*\*p<0.001.

MAL = mid-adolescence-increase; MAL = mid-adolescence-limited

**Table 4. Association between anxiety trajectories and psychiatric outcomes for boys**

Psychiatric disorders	Anxiety trajectories																				
	Low			MAL			MAL			MAL <sup>a</sup>											
	n	(%)	N = 602	n	(%)	N = 79	n	(%)	N = 43	OR	(95%CI)	MAL <sup>a</sup>	OR	(95%CI)	MAL <sup>a</sup>	OR	(95%CI)	EAD <sup>b</sup>	OR	(95%CI)	
Adolescence																					
Any anxiety disorder	39	(6.5)	12	(15.2)	4	(9.3)	2.59	(1.29-5.18)***	1.48	(0.50-4.36)	0.57	(0.17-1.90)									
Major depressive disorder	41	(6.8)	10	(12.7)	4	(9.3)	1.98	(0.95-4.14)	1.40	(0.48-4.12)	0.71	(0.21-2.41)									
Early adulthood																					
Panic disorders / agoraphobia	5	(0.8)	4	(5.1)	0	(0.0)	-	-	-	-	-	-									
Generalized anxiety disorder	2	(0.3)	5	(6.3)	0	(0.0)	-	-	-	-	-	-									
Specific phobia	17	(2.8)	5	(6.3)	6	(14.0)	-	-	-	-	-	-									
Social phobia	21	(3.5)	14	(17.7)	3	(7.0)	-	-	-	-	-	-									
Any anxiety disorder	41	(6.8)	20	(25.3)	7	(16.3)	4.64	(2.55-8.44)***	2.66	(1.12-6.35)*	0.57	(0.22-1.49)									
Major depressive disorder	31	(5.1)	9	(11.4)	5	(11.6)	2.37	(1.08-5.18)*	2.42	(0.89-6.59)	1.02	(0.32-3.27)									

<sup>a</sup> Low anxiety trajectory was the comparison class. <sup>b</sup> MAL trajectory was the comparison class.

\* p<0.05; \*\* p<0.01; \*\*\*p<0.001.

MAL = mid-adolescence-increase; MAL = mid-adolescence-limited; EAD = ; EAD = early-adolescence decrease

as the predictors include vulnerability factors that are quite general for adjustment problems in adolescence (Merikangas, 2005; Grills-Taquechel, Norton, & Ollendick, 2010). One may argue that the MAL-trajectory represents natural developmental variation and that moderately elevated anxiety levels are temporarily and surmountable. Challenges here are to decide whether or not such a group of adolescents should be targeted with interventions. Further, it remains to be studied why girls in the MAL-trajectory were at much lower risk for anxiety disorders.

## Conclusion

The present study aimed to increase our understanding of the nature of anxiety development throughout adolescence, its determinants, and subsequent outcomes. Moreover, the results can be informative for further development of interventions and policy for prevention by providing background information on subpopulations to target (risk indicators), at which age (corresponding with changes in anxiety) and how urgently (associations with psychopathology).

Clinicians should be attentive for girls who experience increased feelings of anxiety in mid-adolescence. It is important to intervene early and offer these girls an evidence-based treatment program as they are at-risk for developing anxiety and major depressive disorders. It is also important for clinicians to keep in mind that the some adolescent girls and boys experience the transition from primary to secondary school as stressful, and that elevated anxiety levels during this transition are often transient, but associated with later disorders in boys. It is debatable whether intervention is needed to promote a successful transition to secondary school or whether it is better to monitor anxiety levels before offering an intervention.

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