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Anxiety Trajectories in Adolescents and the Impact of Social Support and Peer Victimization

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Abstract
This paper examines whether adolescents can be reliably categorized into subgroups based on their patterns of anxiety levels over time and whether low levels of social support from parents, peers, and their school, and high levels of peer victimization, predict a pattern of increasing anxiety. Participants were 3392 youth from the Longitudinal Study of Australia's Children (LSAC). Youth-reported anxiety was measured at three occasions at ages 12/13 years, 14/15 years, and 16/17 years, with social support and victimization assessed at age 12/13 years. Anxiety trajectories were identified using latent class growth mixture modelling, and predictors of class membership were examined using multinomial logistic regression analyses. Three discrete classes of anxiety trajectories were identified. Most youth fell within a stable-low anxiety symptom class (89.5% males; 78.2% females), with smaller percentages in low-increasing (5.6% males; 14.4% females) or high-decreasing (4.9% males; 7.4% females) classes. Low support from parents and teachers, low sense of school belonging, and high peer victimization predicted membership of the low-increasing anxiety trajectory class, irrespective of gender. Social support did not moderate the effect of peer victimization upon the risk of developing anxiety, with peer victimization remaining a risk factor even when adolescents experienced good social support from parents, peers, and school. The findings highlight the need for screening in early adolescence to identify those who are experiencing low social support and high peer victimization and are thus at increased risk of developing anxiety problems. These youth could then be offered targeted intervention to reduce the likelihood of anxiety development.

Introduction

Given the relatively high prevalence of anxiety problems among adolescence and the association with adverse psychosocial functioning (Polanczyk et al., 2015; Spence et al., 2018), it is important that researchers and clinicians identify risk factors for anxiety development during adolescence. Such evidence will inform the design of preventative and early intervention programs. The focus of the present study is on the role of social support (SS) from parents, peers, and school, and the impact of peer victimization in the development of adolescent anxiety.

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Latent class growth mixture modelling is a statistical approach that is particularly valuable in identifying specific classes of developmental trajectories of anxiety and then determining factors that predict membership of trajectory classes indicative of increasing or persistent levels of anxiety. (Allan et al., 2014). To date, few studies have used this approach to identify discrete classes of anxiety trajectories among adolescents in community contexts and the limited evidence available has produced conflicting results. For example, Crocetti et al. (2009) found that a two-class solution provided the best fit of the data (increasing versus stable-low anxiety; $N = 1313$, 4-year follow-up, assessed annually), whereas Morin et al. (2011) identified 5 classes (stable-very low; stable-low; stable-moderate; high-decreasing-then-increasing; and increasing-then-decreasing; $N = 1034$, 4-year follow-up, assessed annually), but with less than 5% in the latter 2 classes. Different again were the results of Miers et al. (2013) that found 3 trajectory classes for social anxiety (high and changing; moderate and decreasing; low and decreasing; $N = 331$, 3-year follow-up, assessed annually). Three trajectory classes were also found by

Prinzie et al. (2014) but with a different pattern (stable-low; moderate fluctuating, and high-decreasing; $N = 290$, 6-year follow-up, assessed every 3 years). The variation in results across studies likely reflects differences in methodology and participants, such as sample sizes, age range, number and timing of measurement occasions, measure and type of anxiety, length of follow-up, and variation in the statistical criteria used to determine classes. While recognizing the variation in results to date, the present study used a latent class growth mixture modelling approach to identify latent classes of anxiety symptom trajectories in a large, national cohort of adolescents and to examine the role of SS and peer victimization as potential predictors of anxiety trajectories indicative of increasing anxiety.

Poor SS from parents, teachers and peers has been proposed to play an important role in the development of youth anxiety as it reduces the assistance provided by others to help the young person to cope with stressful situations, reduces perceived self-efficacy for overcoming difficulties, and increases feelings of isolation and loneliness (Peter et al., 2017; Raknes et al., 2017). Social support has been defined and assessed in various ways over many years, such as the number, quality or functional content of social relationships with specific persons; the extent to which individuals feel attached to significant others as measured by the degree to which they feel that the significant other understands, respects, responds to, and is sensitive to their emotional states, needs and desires; sense of belonging within a network or community; perception of the availability and quality of support, including being cared for, loved, valued, recognised and respected; and the behaviour of others in providing emotional support, information, tangible help, material assistance, and assistance with problem solving (Barrera, 1986; Cobb, 1976; House et al., 1985; Pearson, 1986; Zubrick, 2007). Consistent with the recommendation of House et al. (1985), the present study assessed SS from the perspectives of multiple informants (parents and youth), persons providing the support (parents, peers and school), and type of support. Thus, it examined SS in terms of a) parent report of warmth and support towards their child; b) the young person's perceptions of parents', peers', and teachers' sensitivity to and respect for their feelings/needs, and support in dealing with problems, and c) the young person's sense of belonging within their school community.

Although there is good evidence of a significant association between SS and youth depression and internalizing problems more broadly (see meta-analysis by Rueger et al., 2016), there has been relatively little research examining the role of SS in the development of youth anxiety. The limited evidence to date has produced conflicting findings. Cross-sectionally, several studies have found SS from parents, teachers, or peers to be significantly associated with anxiety for adolescent boys and girls (Auerbach et al., 2011; Duru et al., 2019; Peñate et al., 2020; Raknes et al., 2017; Rueger et al., 2008). However, the evidence for a longitudinal relationship is unclear. For example, Auerbach et al. (2011) failed to find a significant longitudinal association between parent or peer support and anxiety among adolescents using a multi-wave design over a 6-month period. In contrast, Rueger et al. (2008) found a longitudinal association between perceived SS (from parents, teachers and peers) and anxiety at 9-month follow-up, but only for girls. Peñate et al. (2020) found that SS from family and friends significantly predicted increased anxiety over the subsequent 4-weeks, but these associations were no longer evident after 4 months.

It appears therefore that the association between SS and anxiety is complex and likely to be influenced by a range of factors such as length of follow-up, type of anxiety being measured, type of SS being assessed, person giving the support, and intra-individual characteristics of the young person such as gender. Gender differences in the impact of SS on anxiety, in particular, warrant examination given evidence that parents tend to engage differently with boys and girls, and mothers and fathers tend to differ in parenting styles that may have a differential impact upon anxiety development depending on child gender (Endendijk et al., 2017; Morris & Oosterhoff, 2016). The present study aims to add to the limited evidence regarding the impact of SS upon anxiety development in adolescents by examining not only the impact of SS upon anxiety development directly, but also the potential moderating effect of gender upon the relationship between different forms of SS upon anxiety development.

Sense of school belonging is another aspect of SS that has been proposed to influence the development of anxiety in adolescents, although there has been relatively little research to date examining the association (Rapee et al., 2020). School-belongingness refers to students' beliefs of being personally accepted, respected, included, and supported by others in their school social environment (Goodenow, 1993) and represents an element of SS as outlined above. Cross-sectionally, for boys and girls, low school-belongingness has been found to be associated with greater anxiety (Rapee et al., 2020; Shochet et al., 2006). However, Shochet et al. (2006) found the effect only significant for girls when examined longitudinally and proposed that school-belongingness may impact differently on girls than boys, with girls tending to place a higher value on SS than boys. The present study will add to the limited research to date by examining the association between school belonging and anxiety development in youth, including exploration of the potential moderating role of gender.

Peer victimization is another important element of peer relationships that has been proposed to increase the risk of anxiety problems (Adrian et al., 2019). There are many definitions of peer victimization but in brief, it refers to repeated experiences of aggressive actions from peers that

are perceived by the recipient as harmful and may be overt (physical aggression), relational (eg. being excluded or ridiculed) or reputational (eg. a victim of rumours or lies) (see: Casper & Card, 2017). Several studies have demonstrated that high peer victimization predicts increased anxiety longitudinally in adolescents (Forbes et al., 2019; Morin et al., 2011). However, evidence suggests that not all young people who experience high peer victimization develop anxiety problems suggesting that certain characteristics within the individual or their environment may either exacerbate or reduce the risk of adverse mental health outcomes following peer victimization (Stapinski et al., 2015). Social support, in particular, has been proposed to reduce the adverse impact of peer victimization upon anxiety. For example, high SS from family friends and teachers (and especially from family) was found to reduce the negative effect of peer relational violence (eg. social isolation, exclusion, and rejection) upon anxiety in adolescents (Duru et al., 2019). Thus, not only does SS appear to directly reduce the risk of developing anxiety, and peer victimization to increase such risk, these variables can interact such that the adverse impact of peer victimization is reduced by high SS. Furthermore, there is some suggestion that SS, in terms of school belongingness, may also reduce the adverse effect of peer victimization on anxiety, with Wright and Wachs (2019) reporting that victimization had a lower effect upon anxiety for youth with high levels of school-belongingness.

To summarize, it is clear from the evidence to date that there are many unanswered questions relating to the role of SS and peer victimization in the development of anxiety and therefore there is a strong need for further research to clarify the nature of this complex relationship. The present study provides an advance on prior research through the use of latent class growth mixture modelling to identify trajectory classes for anxiety within a large, representative, community sample. This design enabled examination of the predictive effects of SS and peer victimization upon the development of anxiety longitudinally, whereas most research to date in this area has been limited to cross-sectional associations.

The aims and hypotheses of the present study are summarized as follows:

1) to determine whether SS significantly predict latent class membership indicative of increasing levels of anxiety during adolescence. It was hypothesized that low levels of SS at age 12/13 years would predict increased probability of membership of a class indicative of an increasing anxiety trajectory compared to a stable-low class.
2) to determine whether peer victimization significantly predict latent class membership indicative of increasing levels of anxiety during adolescence. It was hypothesized that high levels of peer victimization at age 12/13 years would predict increased probability of membership of a class indicative of an increasing anxiety trajectory compared to a stable-low class.
3) to determine whether SS moderates the adverse impact of high peer victimization upon anxiety. Specifically, it was hypothesised that adolescents who experience high peer victimization at age 12/13 years would be less likely to be categorized within a trajectory class indicative of increasing anxiety if they have high SS, compared to youth with low SS.
4) to examine whether the predictive effects of SS and peer victimization upon anxiety, or the moderating effect of SS upon the association between peer victimization and anxiety, differ by gender. No specific hypotheses were formulated.

The paper draws on data from a large, national cohort study namely Growing up in Australia: The Longitudinal Study of Australian Children (LSAC) to examine these issues. Online Resource 1 summarizes information about the aims and methodology of the LSAC, prior research that has used the LSAC samples or variables relevant to the present study, and a statement of how the present study can be differentiated from and represents an advance on other LSAC research.

Method

Participants and Procedure

The data were from the Longitudinal Study of Australia's Children (LSAC), a longitudinal study that obtains data biennially from a representative sample of Australian children and their parents/caretakes, drawn randomly from Australia's most comprehensive database, namely Medicare. The design, sample, and method for LSAC have been described in detail by Soloff et al. (2005). Briefly, a 2-stage, clustered, sample design was used. The primary sampling unit was Australian postal codes (stratified according to state of residence and urban versus rural), with approximately 10% of postal codes ultimately being included. Children were then selected randomly from the Medicare (national health insurance) database, in which over 98% of the original 4-year-old cohort were enrolled (henceforth referred to as the K-cohort). The original K-cohort included 5107 children aged 51 to 67 months at the commencement of the study (64.2% response rate). At the commencement of LSAC, the sample was broadly representative of the Australian population in terms of socio-demographic characteristics compared to national census data (see Soloff et al., 2005 for details).

The present paper involved the K-cohort from Waves 5, 6, and 7 (W5; W6; W7), with data collected at two yearly intervals at ages 12/13, 14/15, and 16/17 years, in 2012, 2014 and

2016 respectively. These Waves were selected as youth anxiety was not specifically assessed in prior or later Waves of the study. Of the 3956 families who completed assessments at W5, 3537 (89.4%) remained at W6 and 3089 (78.1%) at W7. Analyses were restricted to youth who completed the anxiety scale at W5 and on at least one of W6 or W7. This provided data for 3392 youth. The mean age of participants in the final sample was 12.88 years at W5 and included 1721 (50.5%) males and 1680 (49.5%) females. Wave 5 data were provided by 3333 (98.3%) mothers and 2917 (86.0%) fathers. Youth participants completed the survey questionnaire using computer-based delivery, with parent report being based on parent-report questionnaires or face-to-face interviews with the child's primary caregiver at W5, generally the biological mother (97.0%). Table 1 summarizes the demographic characteristics of the families in the present study, with the sample being broadly representative of the Australian population (Australian Bureau of Statistics, 2017). For example, 22.8% of mothers were born overseas, coming from 89 different countries, 11.4% mainly spoke a language other than English at home, and 35.3% had not completed Year 12 schooling. As the LSAC is a national study, participants were selected from all Australian States and regions, and 303 postcodes, and attended 1717 schools, with mean number of students per school of 1.95 ($SD = 1.52$).

The research methodology and survey content of the LSAC was reviewed and approved by the Australian Institute of Family Studies Ethics Committee. Ethical approval for use of the LSAC data for the present study specifically was provided by the Griffith University Human Research Ethics Committee (Ref No: 2021/075). Written, informed consent was obtained from caregivers at W5, and caregivers and youth participants at W6 and W7. Thus, written informed consent was available from both caregiver and youth for all participants in the present study.

Table 1 Demographic characteristics of the sample in the present study

Wave 5 (Age 12/13 years)	Study Sample $N = 3392$ mean (SD)/ n (%)
Child female gender	1679 (49.5)
Child age (years) at W5 assessment	12.88 (0.31)
Child has an Indigenous Australian or Torres Strait Islander parent	70 (2.4%)
Mother age	43.40 (5.00)
Father age	45.82 (6.10)
Mother not born in Australia	736 (22.8%)
Father not born in Australia	691 (24.6%)
Mother mainly speaks non-English at home	380 (11.4%)
Father mainly speaks non-English at home	308 (10.6%)
Mother education – Completed Year 12	2155 (64.7%)
Father education – Completed Year 12	1578 (55.2%)
Child lives with both biological parents	2578 (76.0%)
Family structure – two parent family	2860 (84.4%)
Mother in full-time employment	1439 (43.2%)
Father in full-time employment	2605 (89.7%)
Social economic position (SEP2)	0.06 (0.99)
Main language spoken at home is English	3123 (92.1%)
Lives in outer regional or remote area	482 (14.2%)

Measures

Family Demographic Characteristics

Parents were asked to report on their child's gender and age in months, as well as parental age and education, family structure, whether the child was living with both biological parents, main language spoken at home (English vs other) and living in a regional/remote area. The overall measure of socio-economic status of the family (SEP-2: Socio-Economic Position) was a LSAC-derived composite based on family income, caregiver educational level, and occupation prestige (See Baker et al., 2017). It is standardized to a mean of 0 and standard deviation of 1. These demographic variables were assessed to check the characteristics of those included in the present study compared to those who dropped out during the study period. In addition, socio-economic position (SEP2) was used as a control variable in all predictor analyses. Gender was included as a control variable in predictor analyses and examined as a potential moderator of predictor effects.

Outcome Variable For Anxiety Trajectory Over Time

Youth report of anxiety symptom severity was obtained at Waves 5–7 using the Children's Anxiety Scale (CAS-8), an 8-item scale adapted from the Spence Children's Anxiety Scale (Spence, 1998). Items reflecting symptoms of anxiety are rated on a 4-point scale (0 = Never, 3 = Always), with scores ranging from 0 to 24. The CAS-8 has demonstrated good reliability and provides population-level, gender-specific standardized norms (Spence et al., 2014). In the present study, internal consistency was Cronbach's $\alpha = 0.86$ at W5, 0.89 at W6, and 0.91 at W7.

Predictor Variables

Parent support was assessed using multiple informants:

a) mother report and father report (where available) of their support for their child was obtained using 5 items from the parent warmth/support scale of the Child Rearing Questionnaire (Paterson & Sanson, 1999). Parents were asked to rate how often, over the past 6 months, they

"Express affection by hugging, kissing, or holding this child"; "Hug or hold this child for no particular reason"; "Tell this child how happy he/she makes you"; "Have warm, close times together with this child"; and "Enjoy doing things with this child". Items were rated on a 5-point scale from 1 (never) to 5 (almost always). Item scores were summed (range 5 - 25), with higher scores indicating supportive parenting behaviours. Internal consistency at W5 was Cronbach's $\alpha = 0.88$ for mothers and 0.87 for fathers.

b) youth report of support from their parents was obtained using 8 items from the trust and communication subscales of the Inventory of Parent and Peer Attachment (IPPA: Armsden & Greenberg, 1987). Example items include "My parents understand me"; "I trust my parents"; and "If my parents know that something is bothering me, they ask me about it". Items are rated on a 5-point scale from 1 (almost never true) to 5 (almost always true) and summed for a total score (range 8 – 40), with higher scores indicating higher parent support. Internal consistency at W5 was Cronbach's $\alpha = 0.92$.

Peer support was assessed through youth report using 8 items from the IPPA described above, with the same rating scale and scoring system. Example items are "My friends sense when I'm upset about something"; "My friends respect my feelings"; and "My friends listen to what I say". Internal consistency at W5 was Cronbach's $\alpha = 0.90$.

Teacher support was assessed through youth report using 8 items adapted from the IPPA described above, with the same rating scale and scoring. Example items include "My teachers respect my feelings"; "I trust my teachers"; and "There is a teacher at my school that I can rely on when I have a problem". Internal consistency at W5 was Cronbach's $\alpha = 0.91$.

School-belongingness was assessed through youth report with 12 items from the Psychological Sense of School Membership scale (PSSM: Goodenow, 1993). Items are rated on a 5-point scale, ranging from 1 (not at all true) to 5 (completely true). One third of items are worded in a negative direction and reverse scored. Example items include "Other students here like me the way I am"; "Sometimes I don't feel as if I belong here"; and "The teachers here respect me". Total scores ranged from 12 to 64, with higher scores indicating greater school belonging. Internal consistency at W5 was Cronbach's $\alpha = 0.85$.

Peer victimization was assessed through youth report, on a 4-point scale, in terms of the frequency with which the respondent was the recipient of 7 types of physical or verbal/relational forms of victimization over the past 30 days at school. Items were drawn from peer victimization actions identified by Cornell and Brockenbrough (2004) and the Edinburgh Study of Youth Transitions and Crime (Smith et al., 2002), with an additional item relating to cyber bullying. Example items include "Kids hit or kicked me on purpose"; "Kids threatened to hurt me or take my things"; and "Kids sent me a mean text message/email; or posted mean things about me on the internet (eg. on Facebook, MySpace)". Young people were asked to report how often, over the past month they had experienced each item, with frequency responses ranging from 1 (never) to 4 (several times a week). Ratings were summed to give a total score (range 7 – 28), with higher scores reflecting greater peer victimization.

Data Analysis

Latent Class Growth Mixture Modelling

Latent class growth mixture modelling (LCGMM) with MPlus version 8.1.7 (Muthén & Muthén, 2017) was used to determine distinct subgroups of trajectories of anxiety over the 3 Waves. This approach classifies heterogeneity of individual trajectories of symptoms into a discrete number of latent classes. Given only three time points, linear but not quadratic slopes were included.

Prior to identification of the final best model in terms of number of latent classes, the data were examined for gender invariance of the class probabilities, intercepts, and slopes of classes to establish whether a multi-group analysis approach would be preferable. This involved comparison of models in which class probabilities, slopes, and trajectories for each class were allowed to vary versus models in which these parameters were constrained to equality between genders. Log-likelihood ratio tests were conducted, using scaling correction factors, to provide a chi-square difference test (Muthén & Muthén, 2017).

To determine the most appropriate number of classes, the following approach was used: comparing i) the unconditional model; and ii) successive analyses adding a trajectory class and comparing fit. The intercept and slope were allowed to vary between classes. Classification quality for the selection of the most appropriate number of classes was determined using a multiple criterion approach (Asparouhov & Muthén, 2014; Edgerton et al., 2019): (1) a Bayesian information criterion (BIC) value being closer to zero; (2) entropy, with values > 0.80 indicating that individuals are classified with accuracy and that latent classes are adequately distinct and (3) each class contained at least 5% of participants within a gender.

Predictors of Latent Class Membership

Potential predictors of class membership included mother and father report of supportive parenting, and child report of support from parents, teachers and peers, sense of belonging

in school, and level of peer victimization. These were dichotomized based on cut-off points approximating 1SD below the mean score for SS variables, and 1 SD above the mean for peer victimization for the full sample.

Multinomial logistic regressions with MPlus were used to identify significant predictors of class membership. All analyses controlled for socio-economic position (SEP2) and gender. Variables that were significant in univariate analyses were then entered simultaneously into a multivariate model, with variables being deleted in a subsequent multivariate model if they were not significant at the prior analysis. Statistical significance for inclusion in the final model was set at $p < 0.05$.

Missing Values

Missing values for predictor variables were handled using multiple imputation under a missing-at-random assumption to create 10 data sets with pooled results used in subsequent analyses examining predictors of outcome. This resulted in imputation of 1.69% of predictor variable data points. Given the higher level of missing data for father report, separate analyses were conducted to examine the influence of paternal factors rather than using multiple imputation. It was not necessary to replace missing values for anxiety scores at W6 and W7 as LCGMM accounts for missing values within growth trajectory variables using full information maximum likelihood (FIML).

Results

Preliminary Analyses

Comparison Between the Study Sample and the Original Wave 5 Sample

In order to determine the representativeness of the study sample (with CAS8 data at W5 and/or W6 or W7), participants' responses to the CAS8, demographic variables, and predictor variables were compared with those for youth who were not retained in the study as, although they provided W5 CAS8 data, they did not do so at either W6 or W7. Results are shown in Online Resource 2 and indicate that, at W5 (aged 12/13yrs), those in the study sample were still broadly representative of the Australian population in comparison to national census statistics (Australian Bureau of Statistics, 2017). However, youth who were retained were significantly more likely than those not retained to be slightly younger, to live with both biological parents or in a two-parent family, to have parents who were older, better educated, in full time employment, and who were less likely to be of Indigenous Australian or Torres Strait Islander heritage. There was no significant difference between groups in W5 CAS8 scores, nor for most family, peer, and school predictors other than children in the study sample tended to report higher W5 levels of teacher-support and school sense of belonging.

Determining the Number of Trajectory Classes

The basic growth curve model, with intercept and slope not constrained to zero, demonstrated significant variance in the intercept (Variance = 9.757, SE = 0.682, $p < 0.001$) and slope (Variance = 3.691, SE = 0.408, $p < 0.001$), thereby justifying the disaggregation of the sample into classes through (LCGA) analyses. The sample overall showed a mean intercept at W5 of 5.719, SE = 0.068 and a significant slope of 0.502, SE = 0.048, $p < 0.000$, indicative of an increase in anxiety scores across time. Initial examination of the data suggested that either a 3- or 4-class model would be most appropriate, but also indicated the need for a multi-group approach given that significant gender differences were evident for the intercept, slope, and class probabilities. Gender invariance testing used a multiple-group, latent-class, growth mixture model approach for the 3- and 4-class models, comparing models with a) class probabilities, intercepts and slopes of anxiety scores being allowed to vary across genders for each class versus b) class probabilities, intercepts and slopes constrained to equality between genders. Model fit was significantly improved when the parameters were allowed to vary across genders for both the 4-class (LL ratio test $\chi^2 = 25.11$ (4) $p < 0.001$) and the 3-class models (LL ratio test $\chi^2 = 33.35$ (3) $p < 0.001$). Thus, it was deemed preferable to proceed with a multiple-group approach in which models were allowed to vary by gender for intercepts, slopes, and class probabilities for each class. Table 2 shows the fit statistics from the multi-group, latent class growth model analyses for models with 1 to 5 classes, with intercepts, slopes and class probabilities being allowed to vary between gender and class for all models.

In determining the most appropriate number of classes, Table 2 shows that, although BIC values improve for each model as the number of classes increase, there was a marked improvement in BIC values between the 2- and 3-class models, but a marginal improvement between 3- and 4-classes, and no improvement in entropy between 3- and 4-classes (0.91 for both models). The three-class model included i) stable low, ii) low-increasing, and iii) high-decreasing anxiety symptom trajectories. Class sizes exceeded the 5% criterion for both genders for all classes except for 4.9% of males in the high-decreasing class. The 4-class model included classes of i) stable low, ii) stable-moderate, iii) high-decreasing, and iv) low-increasing anxiety symptom trajectories. However, in this model there were low numbers for boys in the stable-high (2.7%) and

Table 2 Results of Latent Class Growth Analysis Comparing Models for Number of Classes for Multiple-Group Analyses

MODEL	*N* (%) in each class based on most likely class pattern Boys	*N* (%) in each class based on most likely class pattern Girls	BIC	Entropy	Loglikelihood	Loglikelihood Ratio Test Comparing with model with 1 less class *p* value
1-class model	C1 1712 (100%)	C1 1680 (100%)	58,248.45	1.00	-29,079.52	
2-class model	C1 1622 (94.7%) C2 90 (5.3%)	C1 1515 (90.2%) C2 165 (9.8%)	57,709.07	0.95	-28,785.44	< .001
3-class model	C1 1533[a] (89.5%) C2 95[b] (5.6%) C3 84[c] (4.9%)	C1 1313[a] (78.2%) C2 242[b] (14.4%) C3 125[c] (7.4%)	57,380.75	0.91	-28,596.89	< .001
4-class model	C1 1522[a] (88.9%) C2 89[b] (5.2%) C3 63[c] (3.7%) C4 38[d] (2.2%)	C1 1301[a] (77.4%) C2 194[b] (11.5%) C3 81[c] (4.8%) C4 104[d] (6.2%)	57,269.53	0.91	-28,516.89	< .001
5-class model	C1 1469 [a] (85.8%) C2 22 [b] (1.3%) C3 60 [c] (3.5%) C4 34 [d] (2.0%) C5 127[e] (7.4%)	C1 1077 [a] (64.1%) C2 71 [b] (4.2%) C3 87 [c] (5.2%) C4 71[d] (4.2%) C5 374[e] (22.3%)	57,218.02	0.88	-28,466.75	< .001

Intercepts, slopes and class probabilities were allowed to vary between gender and class for all models

[a]stable-low anxiety trajectory; [b]low-increasing; [c]high-decreasing; [d]stable-high, [e]low-slight increasing

high-decreasing (3.9%) classes, and in the high-decreasing class for girls (4.8%). Furthermore, for both boys and girls, the number of participants within each cell for some of the dichotomous predictor variables by class was below $N = 10$ which was not the case for the 3-class model. Thus, given the close level of fit between the 3- and 4-class models, the 3-class model was selected as being the most parsimonious to enable examination of predictors of class membership. The proportion of participants in each of the three classes by gender, with intercepts and slopes, are shown in Table 3 and Fig. 1. For both genders, the majority showed a stable and low level of anxiety symptoms, with small numbers in the low-increasing and high-decreasing classes. A significantly great proportion of girls than boys were categorized as being in the low-increasing class, χ^2 (1) = 79.50, $p < 0.001$, and the high-decreasing class χ^2 (1) = 14.61, $p < 0.001$ (See Table 3). Furthermore, girls in the high-decreasing class tended to show a lower rate of reduction in anxiety symptoms than boys.

Predicting Membership of Trajectory Classes

Table 4 summarizes the percentage of youth in the three trajectory classes for each potential predictor variable, with means and SDs for each predictor by class and gender shown in Online Resource 3. Univariate, multinomial logistic regression analyses were used to identify significant univariate predictors of latent class membership within the multigroup LCGMM, allowing variation by gender for class probabilities and intercepts and slopes of anxiety trajectories for each of the 3 classes. The stable-low trajectory class was the reference category. Preliminary analyses showed that young people in the low-increasing anxiety class were significantly more likely to be female, from lower socio-economic backgrounds, thus these demographic variables were controlled for in examination of predictor variables. The univariate analyses for potential predictors showed that young people in the low-increasing anxiety class were significantly more likely to experience low levels of support from parents and teachers, low sense of

Table 3 Summary of 3-class multiple group model showing anxiety trajectory class percentages, intercepts and slopes by gender

	Anxiety trajectory class	N (%) of gender	Intercept	Slope
Male ($N = 1712$)	Stable-low	1533 (89.6%)	4.44	-0.15
	Low-increasing	95 (5.5%)	5.93	4.60
	High-decreasing	84 (4.9%)	14.62	-4.27
Female ($N = 1680$)	Stable-low	1313 (78.2%)	5.22	0.62
	Low-increasing	242 (14.4%)	7.50	4.74
	High-decreasing	125 (7.4%)	15.73	-2.62

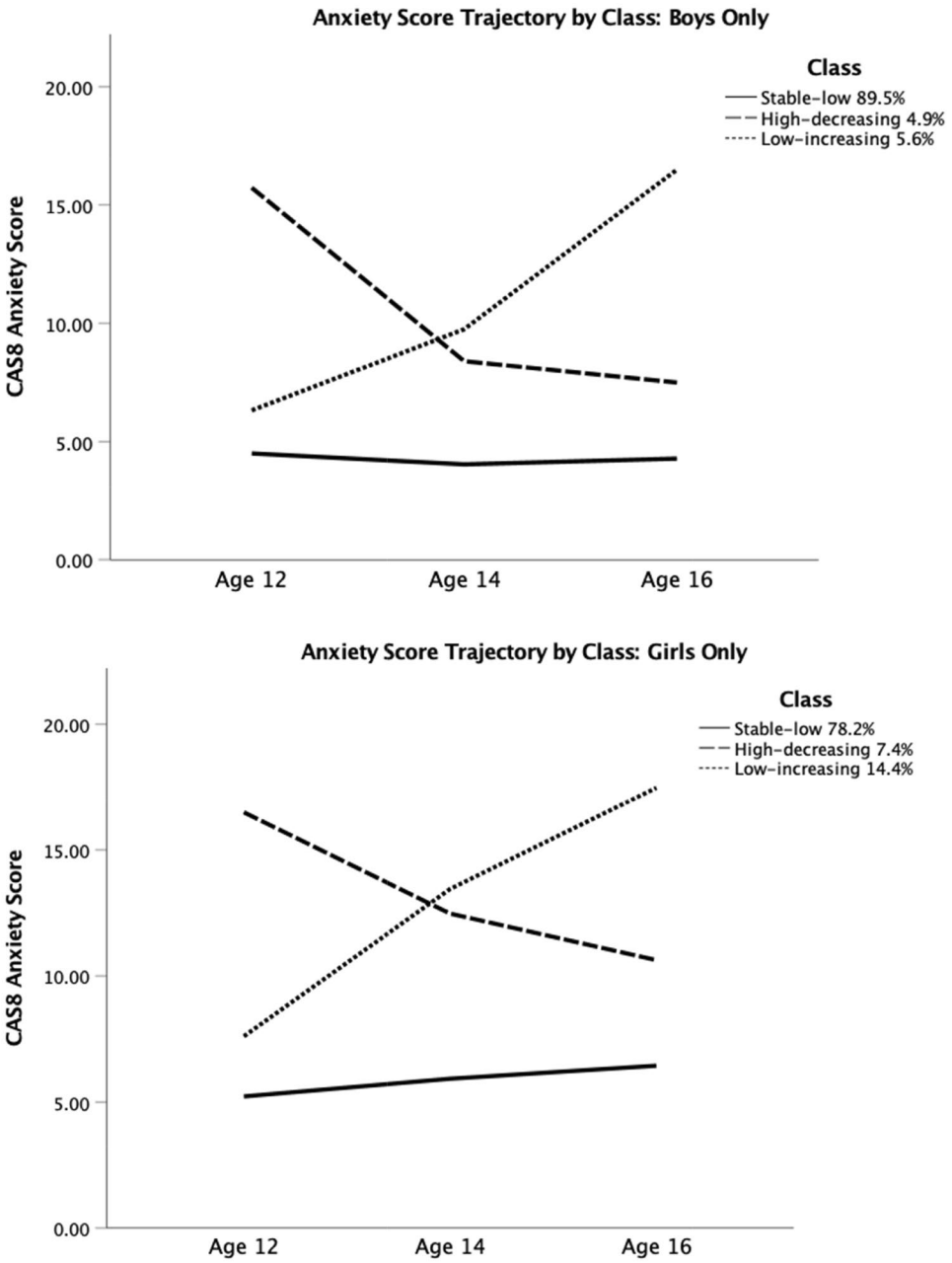

Fig. 1 Anxiety Score Trajectories by Class for Boys and Girls Separately

school-belonging, and high peer victimization than those in the stable-low anxiety trajectory class (see Online Resource 4).

The significant univariate predictors were then entered simultaneously into a multivariate, multinomial logistic regression analysis, controlling for gender and socioeconomic position. Teacher-support no longer predicted class membership when entered simultaneously with school-belongingness and this may reflect the strong correlation (0.70) between these variables. As shown in Table 5, the odds ratios for the final multivariate model indicate that low levels of parent-support, low sense of school-belonging and high peer victimization at age 12/13 years significantly increased the likelihood of being in low-increasing anxiety trajectory class than the stable-low class. Low perceived parent-support, low school-belonging and high victimization also increased the probability of belonging to the high-decreasing anxiety trajectory class.

There were no significant interactions between predictor variables (parent, peer, or teacher SS, school-belongingness, or peer victimization) with gender in the prediction of class membership in either the univariate or multivariate multinomial logistic regression analyses.

Finally, multinomial logistic regression analyses were conducted to determine whether SS moderated the impact of peer victimization upon membership of the low-increasing

Table 4 Percent of participants in each anxiety trajectory class for potential predictor variables at age 12/13 years

Potential predictor at age 12/13 years	Anxiety Trajectory Class		
	Stable-low $N=2846$	Low-increasing $N=337$	High-decreasing $N=209$
Female gender*	46.1%	71.8%[a]	59.8%[b]
Low socio-economic position*	14.8%	22.0%[a]	21.5%[b]
Low mother supportive parenting	17.2%	17.2%	17.2%
Low father supportive parenting	19.5%	20.3%	22.2%
Low parent-support (youth report)	11.2%	22.6%[a]	32.5%[b]
Low peer-support	11.9%	12.2%	31.1%[b]
Low teacher-support	14.9%	20.5%[a]	33.0%[b]
Low school belonging	11.1%	24.0%[a]	47.4%[b]
High peer victimization	10.7%	21.1%[a]	43.1%[b]

For predictor variables "low" = ~1SD below mean for full sample, "high" = ~1SD above mean

*Gender and socio-economic position were control variables

[a]significant chi-square difference low-increasing vs stable-low anxiety trajectory classes $p<.01$

[b]significant chi-square difference high-decreasing vs stable-low anxiety trajectory classes $p<.05$

class compared to the stable-low class. None of the interaction terms between peer victimization and any of the forms of SS, nor any of the three-way interactions between gender x peer victimization x any of the forms of SS significantly predicted membership of the low-increasing anxiety class.

Discussion

The present study identified three distinct trajectories of anxiety from age 12/13 to 16/17 years. Consistent with the few studies that have examined latent class trajectories of anxiety (Crocetti et al., 2009; Morin et al., 2011; Prinzie et al., 2014), for both genders the majority showed a stable and low level of anxiety symptoms over time. Two smaller sub-groups were also identified, namely those who showed high anxiety at age 12/13 that decreased over time, and those who showed low symptoms at age 12/13 years that then increased. Significant differences were found between genders in the probability of belonging to a specific class, with girls being more likely than boys to show increasing or high-decreasing anxiety trajectories. Furthermore, for youth in the high-decreasing class, girls tended to show a slower rate of decrease in symptoms than boys over time. This suggests that the greater level of anxiety during adolescence in girls may reflect not only their greater tendency to develop higher levels of anxiety symptoms, but also their slower rate of recovery. This effect is consistent with previous findings that adolescent girls tend to show a more persistent course for anxiety disorders than boys (Kessler et al., 2012). This is not to suggest, however, that anxiety in young males should not be regarded as a problem, as the present findings highlight the substantial number of males who show a pattern of increasing levels of anxiety during adolescence. This point

Table 5 Results of final multiple-group, multinomial logistic regression analysis showing significant multivariate predictors of anxiety trajectory class

	Low-Increasing Anxiety Trajectory Class					High-Decreasing Anxiety Trajectory Class				
			95% CIs					95% CIs		
	Odds Ratio	S.E	Lower	Upper	*p*-value	Odds Ratio	S.E	Lower	Upper	*p*-value
Predictor variables										
Female Gender	3.12	0.75	1.95	4.99	<.001	2.19	0.73	1.14	4.19	.018
Low socio-economic position	1.55	0.29	1.07	2.23	.019	1.33	0.29	0.87	2.04	.184
Low parent-support	1.88	0.39	1.25	2.84	.003	2.16	0.48	1.41	3.33	<.001
Low school-belonging	2.14	0.50	1.35	3.40	.001	5.88	1.21	3.93	8.80	<.001
High peer victimization	3.41	0.72	2.25	5.14	<.001	7.26	1.45	4.91	10.72	<.001

The reference class is: Stable-low anxiety trajectory

For predictor variables "low" = ~1SD below mean for full sample, "high" = ~1SD above mean

Gender and socio-economic position included as control variables

should not be ignored in the design and implementation of screening, preventative, and early intervention programs.

The identification of a distinct class of adolescents who showed a pattern of increasing anxiety provided an opportunity to examine predictors of anxiety development. Given that the low-increasing group did not show high anxiety symptoms at baseline, it cannot be said that significant relationships between predictor variables and trajectory class could simply reflect cross-sectional associations. Consistent with our hypotheses, the results showed that youth who reported low levels of support from parents and teachers and low sense of school belonging, at age 12/13 years were more likely to be in the class that showed increasing anxiety symptoms. These effects did not differ significantly by gender. This suggests that low SS from these sources significantly increases the risk of developing anxiety problems during adolescence for both boys and girls. This finding is consistent with previous cross-sectional research demonstrating that young people with low SS from parents, teachers and their school tend to experience higher levels of anxiety (Auerbach et al., 2011; Duru et al., 2019; Peñate et al., 2020; Rapee et al., 2020; Rueger et al., 2008; Shochet et al., 2006). The present study extends the existing body of research by demonstrating a longitudinal association between these elements of SS and the emergence of anxiety problems during adolescence. It also supports the proposition of Goodenow (1993) that a positive sense of school belonging is important for adolescent emotional wellbeing as they transition into time in which they start to rely more on extrafamilial relationships, such as those found within the school. Goodenow emphasized the need for schools to promote a climate in which students feel supported by other school members, develop mutually respectful relationships, and feel part of the community. A lack of school belongingness has been proposed to lead to a range of negative emotional states including anxiety, depression and loneliness, and has been linked to low school motivation and drop-out (Osterman, 2000). Thus, the results of the present study provide further support for the need for active efforts within schools to promote a supportive climate, and to identify adolescents who are experiencing low sense of school belonging, and to offer appropriate intervention.

Contrary to our hypotheses, youth report of peer-support did not predict a trajectory of increased anxiety. The finding of a lack of association between peer support and increases in anxiety is consistent with the results of the meta-analysis reported by Chu et al. (2010) in which peer support was not found to predict emotional wellbeing. Taken together the results suggest that, during adolescence, youth's perceived SS from adults such as parents and teachers may be more important than SS from peers in influencing anxiety development. It may be that parents and teachers are in a better position than peers to assist adolescents in dealing with the types of life challenges that they face.

The results of the study also showed that youth who experienced a high level of peer victimization and age 12/13 were more likely to show an increasing trajectory of anxiety symptoms over the next two years. This finding is consistent with prior research (Forbes et al., 2019; Morin et al., 2011) demonstrating that a high level of peer victimization is a risk factor for the development of anxiety among adolescents. However, the findings did not support our hypothesis that strong SS from parents, peers, and school, and positive sense of school belonging would moderate the adverse impact of high peer victimization. Rather, irrespective of gender, peer victimization remained a risk for the development of anxiety regardless of the level of SS from parents, peers, and teachers, and sense of school belonging. Although high SS has previously been shown to reduce the association between peer victimization and anxiety cross-sectionally (Duru et al., 2019), studies have failed to find this effect longitudinally in relation to the mental health impacts of peer victimization more broadly in adolescents (Burke et al., 2017; Noret et al., 2020). Burke et al. (2017) provided various possible explanations for the lack of moderating effect of SS upon the adverse emotional impact of peer victimization in adolescents, whereas this relationship has been more evident in younger children (Bowes et al., 2010). These possibilities included that more complex skills and strategies may be required to deal and cope with peer victimization during adolescence, and peers, parents and teachers may not have the skills required to assist effectively. Another possibility is that, during adolescence, SS may be counterproductive in assisting young people to acquire skills for managing peer victimization and its consequences, particularly if the support is over-protective and impairs the development of autonomy and independence. It is also likely that peer victimization is more persistent and severe in adolescence, resulting in more severe emotional impacts than for younger children, and SS is insufficient to provide a protective effect at high levels of victimization and/or stress. It would be valuable in future research to examine the longitudinal inter-relationships between SS, victimization, and anxiety in greater depth across the child and adolescent age spans to clarify the reasons for the apparent age-related differences. For example, future research into the potential moderating effects of SS upon the impact of peer victimization upon anxiety could examine whether the moderating effect differs according to different forms of peer victimization, such as cyber-victimization, and variation in the length and severity of victimization.

The study has several strengths, include a large, nationally representative sample, and a longitudinal design that enabled examination of class trajectories and predictors of outcome. It also made use of multiple informants in the assessment

of SS. We note, however, that there was evidence of differential attrition, with significant differences in some demographic characteristics between the study sample and those who failed to provide data at both follow-ups. Although the study sample remained broadly representative of the national population, the demographic differences should be considered in interpreting the findings.

Several other limitations are evident. The assessment of anxiety was based on youth-report on a brief rating scale of anxiety symptoms that provide an indication of overall anxiety rather specific types of anxiety. Thus, it is not possible to determine whether the latent class structure and predictors thereof would be applicable to all forms of anxiety or to youth with clinically diagnosed anxiety disorders. Additionally, the study relied on subjective reports of youth and parents regarding SS rather than direct observation and recording, raising questions about the accuracy of measurement. This could be a particular issue for parent-report as parents may be reluctant to report accurately on their own lack of support for their child. A further limitation was the inclusion of only three time points in determining trajectories, precluding the possibility of examining quadratic or curvilinear slopes. Unfortunately, the LSAC only collected data using the anxiety measure at the three time points included here. Also, we note that the measure of peer victimization was brief, and did not provide a definition for the adolescents nor consider the young person's ability to protect themselves as recommended by (Hamburger et al., 2011).

The study also did not examine the impact of time varying predictors and restricted the analyses to the role of predictors assessed at age 12/13. It would be valuable in future research to determine whether factors such as SS and peer victimization fluctuate during adolescence and whether such changes influence and are influenced by anxiety. Furthermore, there are likely to be other factors, not examined here, that influence the development of anxiety in adolescence. Future research could evaluate the effects of factors such as family break-ups, parental mental ill-health, abuse, neglect, traumatic events, and early childhood temperament upon the development of anxiety in adolescence, and the potential buffering effect of SS.

Finally, the researchers determined that the 3-class model provided the most parsimonious fit of the data to enable examination of predictor variables for both genders. We note, however, that the 4-class model also provided a good fit of the data for girls but was not selected as it provided only a marginally better fit and it split the high and decreasing class into two classes, namely stable-high and high-decreasing, resulting in very small cell sizes for some predictor analysis. It may be of value in future research, with a larger sample of girls than the present study, to examine predictors of outcome using the 4-class model if the class of interest were the stable-high anxiety trajectory class. This was not the case in the present study, where the main comparison of interest was between the low-increasing and stable-low anxiety trajectory classes.

The findings have strong implications for practice. If we can identify young people who are experiencing low levels of SS from parents and teachers, poor school-belongingness, and high peer victimization, and then provide them with intervention to address these issues, then we may be able to reduce their risk of developing anxiety problems. Traditionally, anxiety prevention programs have focussed upon teaching coping and anxiety management skills to young people with a view to helping them to deal with stressful life challenges. However, rather than placing the emphasis on assisting the young person to cope with bullying, it may be feasible to develop interventions that aim not only to build supportive environments but also to intervene specifically to reduce peer victimization and thus attenuate risk factors for anxiety.

In summary, the present study contributes to the literature regarding patterns and predictors of anxiety symptoms among adolescents, and the degree to which SS from home, peers and school influences the development of anxiety. The findings identified three distinct trajectories of anxiety symptoms during adolescence. Although boys and girls could be classified reliably within classes of stable-low, low-increasing, and high-decreasing anxiety trajectory classes, there were clear gender differences in the proportions of boys and girls in each class, and in the rates of change in anxiety over time. The study also demonstrated the significant role of low perceived parent support, poor sense of school belonging, and high victimization by peers as risk factors for the emergence of anxiety during adolescents. The findings highlight the need for screening young people in early adolescence to identify those who are likely to be at increased risk of developing significant anxiety symptoms. If we can identify young people who report low levels of perceived parent and teacher support and poor sense of belonging in school, and high levels of peer victimization, it may be possible to provide them with targeted intervention to reduce the likelihood of anxiety development.

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Declarations

Conflict of Interest The authors disclose no conflict of interest.

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