

Distinct trajectories of separation anxiety in the preschool years: persistence at school entry and early-life associated factors

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Background: Little is known about how children differ in the onset and evolution of separation anxiety (SA) symptoms during the preschool years, and how SA develops into separation anxiety disorder. In a large, representative population-based sample, we investigated the developmental trajectories of SA symptoms from infancy to school entry, their early associated risk factors, and their associations with teachers' ratings of SA in kindergarten. **Methods:** Longitudinal assessment of SA trajectories and risk factors in a cohort of 1,933 families between the ages of 1.5 and 6 years. **Results:** Analyses revealed a best-fitting, 4-trajectory solution, including a prevailing, unaffected Low-Persistent group (60.2%), and three smaller groups of distinct developmental course: a High-Increasing (6.9%), a High-Decreasing (10.8%), and a Low-Increasing group (22.1%). The High-Increasing group remained high throughout the preschool years and was the only trajectory to predict teacher-assessed SA at age 6 years. Except for the High-Increasing, all trajectories showed substantial reduction in symptoms by age 6 years. The High-Increasing and High-Decreasing groups shared several early risk factors, but the former was uniquely associated with higher maternal depression, maternal smoking during pregnancy, and parental unemployment. **Conclusions:** Most children with high SA profile at age 1.5 years are expected to progressively recover by age 4–5. High SA at age 1.5 that persists over time deserves special attention, and may predict separation anxiety disorder. A host of child perinatal, parental and family-contextual risk factors were associated with the onset and developmental course of SA across the preschool years. **Keywords:** Separation anxiety, trajectories, risk factors, internalising disorders, development.

Introduction

The diagnostic category of Separation Anxiety Disorder (SAD) is conceptually appealing, as it represents a dysfunctional exaggeration in duration and intensity of an otherwise adaptive, evolution-derived behaviour common to virtually all mammals, namely physiological separation anxiety (SA) (Ainsworth, Blehar, Waters, & Wall, 1978). The earliest manifestation of SA probably coincided with the phylogenetic transition from reptiles to paleomammals (MacLean, 1985; Panksepp & Biven, 2010), and coalesced with the behavioural and neuro-functional plasticity that underlies neomammals' evolutionary success. Today, parental nurturing and offspring–parent interactions would be difficult to conceive without the regulatory role of SA.

By recognising SAD as an exaggerated and/or age-inappropriate manifestation in continuity with physiological SA, the DSM-V is consistent with prior diagnostic formulations (American Psychiatric Association, 2013). Exacerbations and remissions of

anxiety about separation are commonly observed in children; accordingly, limited periods of heightened SA manifestations do not necessarily warrant a diagnosis of SAD (American Psychiatric Association, 2013), and may constitute transient and possibly adaptive responses to changing environments. Consistent with this notion, meta-analyses confirm that both family-wide and child-specific environmental factors affect SA and SAD throughout childhood over and above genetic influences (Scaini, Ogliari, Eley, Zavos, & Battaglia, 2012).

It has recently become clear that SAD is far from rare and without consequences; with 4% prevalence in population samples (Copeland, Angold, Shannah, & Costello, 2014) and 7.6% in paediatric clinical samples (Ginsburg et al., 2014), childhood SAD has been identified as a possible gateway to both physical and psychiatric problems in adolescence and early adulthood (Battaglia et al., 1995; Copeland et al., 2014; Ginsburg et al., 2014; Klein, 1995; Kossowsky et al., 2013; Milrod et al., 2014; Shear, Jin, Ruscio, Walters, & Kessler, 2006). However, since childhood anxiety disorders can be transient and often remit spontaneously (Ginsburg et al.,

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2014), it is paramount to identify factors that maintain elevated anxiety profiles over time, and predict a likely evolution towards clinical chronic disorders. These considerations are especially salient for SAD, due to its association with physiological SA. While large-scale epidemiological studies have reported age 6 years as the age of onset for typical SAD (Shear et al., 2006), recent paediatric primary care surveys indicate that SAD may be quite common among preschool children (Franz et al., 2013). However, very little is known about the early manifestations of SA and their bearing on the development of clinical SAD. Specifically, no study has described the longitudinal trajectories of SA in the general population, and documented whether any specific SA course of high intensity/stability predates full-blown SAD.

Moreover, we do not know which factors are associated with heightened or more persistent SA manifestations in early childhood. In previous longitudinal studies, family dysfunction (Côté et al., 2009; Ginsburg et al., 2014; Patton et al., 2014; Weeks et al., 2014), maternal depression, and child's externalised problems (Côté et al., 2009; Weeks et al., 2014) have been associated with early-onset and more severe course of internalised/anxious problems. However, there is a dearth of longitudinal information on SA specifically, let alone on the prenatal, perinatal, parental and social factors associated with the onset and developmental course of high SA in the preschool years.

Some reported associations between SAD, specific risk factors, and adult psychopathology appear counterintuitive. One conundrum relates to the role of real- versus feared separation/loss in the aetiology of SA/SAD, and the later development of panic disorder (PD). In both clinical and community-based adult samples (Bandelow et al., 2001; Battaglia et al., 2009), a history of childhood SAD was found to predict PD in early adulthood (Kossowsky et al., 2013), and childhood parental loss has been associated with heightened risk for PD (Battaglia et al., 2009; Kessler, 2000). However, correlations between separation/loss events and retrospective assessments of childhood SAD were found close to zero (Bandelow et al., 2001; Battaglia et al., 2009). This suggests heterogeneous, or independent pathways from childhood adversities to the SAD-PD developmental continuum (Battaglia, Ogliari, D'Amato, & Kinkead, 2014).

In this study of a large longitudinal birth cohort followed from age 1.5 years to age 6 years, we addressed three main questions, aimed at differentiating time-limited SA from the persistent and more pronounced SA manifestations that likely precede SAD. First, can we identify discrete patterns of temporal occurrence and strength of SA manifestations in the population? Second, what are the early life factors that are associated with differential stability and strength of SA manifestations? Third,

which longitudinal preschool profile of parent-rated SA predicts teacher-rated SA manifestations at school entry?

Methods

Setting

This study was part of the Quebec Longitudinal Study of Child Development (QLSCD) (Petitclerc, Boivin, Dionne, Zoccolillo, & Tremblay, 2009), which surveyed a representative sample of children born in 1997–98 in the province of Québec, Canada, except for children living in Cree or Inuit territories, Indian reserves, and northern Quebec. All children were recruited through the Quebec Master Birth Registry, by means of a stratified procedure based on living area and birth rate. Families were included if the pregnancy had lasted between 24 and 42 weeks, and the mother could speak French or English.

Participants

Initially, 2,675 families were invited to participate in the study by mail and by telephone: 2,223 (83.1%) agreed to receive a first home visit when their index child was approximately 5 (4.5 ± 0.6) months old. All families had received detailed information by mail about the aims and procedures of the research program and signed a consent form. The protocol was approved by the Quebec Institute of Statistics.

Of the 2,223 families met for a first visit, 2,120 agreed to proceed and be reassessed almost yearly until the age of 15 years; the first four assessments took place at 1-year interval, and successively during the spring of the following years. Here, we focus on a period spanning the age 5 months to the age 6 years (73.8 ± 3.1 months, end of kindergarten), this latter age representing the earliest age at onset for SAD indexed by large-scale epidemiological surveys (Shear et al., 2006). Moreover, Canadian children enter kindergarten at age 6 years, and thus begin to systematically experience separation from attachment figures several hours per day. The age 5 months to the age 6 years period thus involved six consecutive ratings according to the person most knowledgeable about the child (99.7% of times the mother), followed by one teacher rating of participants' SA in kindergarten.

A total of 1,933 families (91.2% of the 2,120 final longitudinal sample) filled out the initial parental ratings, and were then included in this study. Compared to the 1,933 participating families, the 187 families who dropped-out from the study were more likely to report lower income status ($p < .001$), parental unemployment ($p < .001$), mother not having completed a high school diploma ($p = .001$) and having taken alcohol during pregnancy ($p = .001$), divorce ($p = .001$), child's cosleep with parents/siblings ($p < .001$) and child's lower Apgar score 5 min after birth ($p = .008$). Most of these same predictors have been associated with reduced participation in epidemiological studies (Kessler, 2000). Otherwise, the two sets of families did not differ on other measured sociodemographic, familial and individual characteristics (see Table 1 for a complete list).

Measures

Separation anxiety. Separation anxiety was assessed at age 1.5, 2.5, 3.5, 4, 5 and 6 years through parental ratings (0 = never or rarely; 1 = sometimes; 2 = often) of three items adapted from the Child Behavior Checklist (CBCL/11/2-5, Achenbach, 1991), which were examined by interviewers in a face-to-face structured interview: does your child: 'react badly when a parent is away', 'not want to sleep alone', 'cling to

Table 1 Child characteristics, maternal characteristics and family-wide factors associated with trajectories of separation anxiety from birth to 29 months of age ($n = 1,933$)

Child, maternal and familial factors	Missing ($n = 1,333$)	Trajectories of separation anxiety				<i>p</i>
		High-I ^a ($n = 134$)	High-D ^b ($n = 208$)	Low-I ^c ($n = 427$)	Low-P ^d ($n = 1,163$)	
<i>Child characteristics</i>		<i>n (%) / mean (SD)</i>	<i>n (%) / mean (SD)</i>	<i>n (%) / mean (SD)</i>	<i>n (%) / mean (SD)</i>	
<i>At birth</i>						
Sex (girls)	0 (0.0)	70 (52.2)	96 (45.9)	223 (52.2)	578 (49.7)	.47
Low birthweight (<2,500 g)	11 (0.0)	4 (3.0)	5 (2.4)	21 (5.0)	36 (3.1)	.26
Prematurity (<37 weeks)	0 (0.0)	7 (5.2)	9 (4.3)	32 (7.5)	45 (3.9)	.03
Type of delivery (caesarean)	18 (0.0)	21 (16.4)	22 (10.6)	83 (19.5)	169 (14.7)	.02
Apgar (at 5 min) [†]	32 (0.0)	8.2 ± 1.0	9.3 ± 1.0	9.3 ± 0.9	9.4 ± 0.7	<.001
<i>At 17 months</i>						
Child age (months) [†]	0 (0.0)	17.1 ± 0.5	17.0 ± 0.5	17.1 ± 0.5	17.0 ± 0.5	.18
Externalised problems [†]	18 (0.0)	2.8 ± 1.9	2.8 ± 1.8	2.6 ± 1.7	2.2 ± 1.6	<.001
Nighttime sleep (<6 consecutive hours)	119 (0.1)	18 (14.6)	25 (13.1)	29 (7.2)	50 (4.5)	<.001
Sleep (parents' bedroom or siblings')	90 (0.0)	63 (49.2)	89 (44.7)	104 (25.9)	220 (19.7)	<.001
Child diseases	9 (0.0)	15 (11.3)	17 (8.2)	42 (9.9)	109 (9.4)	.80
Child medical admissions (at least one)	8 (0.0)	23 (17.3)	26 (12.5)	45 (10.6)	143 (12.3)	.24
<i>Maternal characteristics</i>						
<i>During pregnancy</i>						
Maternal alcohol consumption	10 (0.0)	37 (28.0)	73 (35.3)	149 (35.1)	448 (38.6)	.08
Maternal postnatal depression	3 (0.0)	44 (33.3)	68 (32.7)	148 (34.7)	328 (28.2)	.06
Maternal smoking	10 (0.0)	47 (35.6)	59 (28.5)	129 (30.4)	250 (21.6)	<.001
<i>At 17 months</i>						
Maternal age (years) [†]	10 (0.0)	30.2 ± 6.4	29.1 ± 5.6	30.0 ± 5.2	30.7 ± 4.9	<.001
Maternal education (no high school diploma)	10 (0.0)	50 (37.6)	62 (29.8)	87 (20.6)	126 (10.9)	<.001
Maternal depression [†]	18 (0.0)	2.2 ± 1.8	1.5 ± 1.4	1.5 ± 1.4	1.1 ± 1.2	<.001
Maternal impact perception [†]	68 (0.0)	7.4 ± 2.2	8.0 ± 2.1	8.1 ± 1.9	8.7 ± 1.6	<.001
Maternal overprotection [†]	79 (0.0)	6.3 ± 2.5	5.7 ± 2.3	5.2 ± 2.3	4.2 ± 2.2	<.001
Maternal efficacy [†]	85 (0.0)	8.4 ± 1.3	8.3 ± 1.4	8.3 ± 1.4	8.4 ± 1.2	.31
Maternal coercion [†]	79 (0.0)	3.5 ± 2.4	3.4 ± 2.5	3.4 ± 2.3	3.3 ± 2.4	.83
<i>Familial-wide factors</i>						
<i>At 17 months</i>						
Low socioeconomic status	31 (0.0)	57 (43.8)	62 (30.5)	107 (25.7)	135 (11.7)	<.001
Parental unemployment	10 (0.0)	29 (21.8)	19 (9.2)	43 (10.1)	34 (2.9)	<.001
<i>At 29 months</i>						
Parental divorce	137 (0.1)	17 (14.5)	22 (11.7)	51 (13.1)	76 (6.8)	<.001
Death of a family member	125 (0.1)	0 (0.0)	0 (0.0)	1 (0.3)	2 (0.2)	.87

Chi-square tests were used for categorical variables (n , %).

ANOVAs were used for continuous variables[†] (mean ± *SD*).

^aHigh-I refers to a trajectory of High-Increasing separation anxiety.

^bHigh-D refers to a trajectory of High-Decreasing separation anxiety.

^cLow-I refers to a trajectory of Low-Increasing separation anxiety.

^dLow-P refers to a trajectory of Low-Persistent separation anxiety.

Data are courtesy of the Quebec Institute of Statistics.

Bold values indicate statistically significant values.

adults and is too dependent'). The same three items were independently rated by teachers at age 6 years. These three behaviours closely match the manifestations of SA (distress related to separation, reluctance to sleep separated from a major attachment figure, fear of being alone, or without an attachment figure) that best discriminate children with higher versus lower SA according to item-response analyses (Cooper-Vince, Emmert-Aronson, Pincus, & Comer, 2014).

Principal component analyses of the SA items at each of the six parental assessment times systematically yielded a single factor solution accounting for 46.7–50.5% of variance, with items' loadings of comparable magnitude: 0.74–0.78 for 'reacts badly when a parent is away', 0.70–0.77 for 'clings to adults, too dependent', and 0.52–0.60 for 'does not want to sleep alone'. Cronbach alphas (mean $\alpha = .80$) were also consistently high across measurements. The SA factor scores derived from

the single factor solution were used in the successive analyses to estimate SA trajectories.

Perinatal and early-life factors. At 5 months, the face-to-face interview with the 'Person most knowledgeable about the child' provided data on maternal education, child sex, age, birthweight (low <2,500 g), prematurity (gestation <37 weeks), type of delivery, and Apgar at 5 min after birth (as reported in the birth medical registry). Maternal smoking during pregnancy was coded present if the mother had smoked at least one cigarette/day while pregnant, and prenatal alcohol exposure was coded present if the mother endorsed having drunk alcohol at least once per week during pregnancy. Low economic status was determined through the combination of three indicators, family income, family size, and area of residence

(ZIP code), according to Statistic Canada Low Income Cut-Offs (LICOs).

Postnatal individual and family-wide factors. History of maternal postpartum depression was coded positive/negative at the 5 month interview; symptoms of current maternal depression were successively rated at the 17 month interview with the 12-items version ($\alpha = .85$) of the Center for Epidemiologic Studies Depression Scale (CES-D) (Poulin, Hand, & Boudreay, 2005), by referring to the last week. Response categories ranged from 0 (none) to 3 (all the time), and the scores were then rescaled on a 10-point scale. Interviews at 5, 17 and 29 months also covered familial employment, parental separation, divorce, and death of 1st degree relatives. Physical health problems were investigated by two variables: (a) 'Child's diseases' (allergies, respiratory, cardiovascular, urologic, neurological conditions, as diagnosed by a health professional and lasting ≥ 6 months), and (b): 'Medical Admissions' (i.e. admissions to a health facility due to a medical/surgical condition). Externalised problems were similarly assessed through CBCL items at 17 months, as defined by a composite score ($\alpha = .78$) of hyperactivity (Galera et al., 2011) and physical aggression (Côté et al., 2007). Child's sleep problems: (a) < 6 consecutive hours slept per night (< 6 hr), and (b) cosleeping (i.e. sharing a room/bed with the parents/siblings) were also assessed at 17 months (Touchette et al., 2005). The Parental Cognition and Conduct Toward the Infant Scale (Boivin et al., 2005) was administered to the person most knowledgeable about the child to monitor four dimensions of parenting: hostile-reactive (e.g. raising voice, getting angry or resorting to corporal punishment in response to challenging behaviour), overprotection (e.g. keeping child close most time, uncomfortable about letting child to a babysitter), self-efficacy (e.g. feeling good at soothing, playing with child), and perceived parental impact (e.g. thinks his/her parenting affects the intellectual, emotional development of the child), according to a 0–10 point Likert scale.

Procedure

Prenatal, perinatal, parental and social predictors of preschool SA were collected at 5, 17, and 29 months of age through the person most knowledgeable about the child. Around age 6 years, from April to June, about 8 months after having entered kindergarten, teachers independently rated the same three SA items that had been previously longitudinally rated by the person most knowledgeable about the child from age 1.5 to 6 years.

Statistical analyses

In keeping with the three main questions of the study, we sought to: (a) differentiate benign, time-limited SA from the persistent and pronounced SA trajectories, (b) identify predictors specific to persistent and pronounced SA trajectories, and (c) investigate the correspondence between parentally assessed and teacher-assessed SA in kindergarten.

Specific trajectories based on the six longitudinal ratings of SA provided by the person most knowledgeable about the child were first estimated through semiparametric modelling (Nagin, 1999). We expected to find one trajectory of physiological, self-limiting SA, and 1/more trajectories of more persistent and pronounced, potentially clinical SA. Trajectory models allowing 2–5 trajectories of various shapes (intercept -0-, linear -1-, quadratic -2-, cubic -3-) were estimated and then mutually compared using the PROC TRAJ SAS procedure (Jones, Nagin, & Roeder, 2001). The maximum Bayesian information criterion (BIC) was employed to determine the optimal number and shape of trajectories that best fitted the data. Once the best-fit model established, each individual was assigned to a specific

SA trajectory, based on the highest posterior probability of belonging to a trajectory.

To identify the predictors of persistent/pronounced SA trajectories, we adopted a two-step method. First, we estimated by general tests (Chi-square/ANOVA) the strength of the associations between 25 explanatory variables -from perinatal to the 29 months' assessment- and the trajectories; by Bonferroni correction, significance of these associations was set by an alpha of $p < .002$ ($0.05/25$). Successively, we entered the significant variables into a multivariate multinomial regression that tested their longitudinal association with persistent/pronounced SA trajectories, as compared to a trajectory self-limiting SA (see also results section).

Finally, a univariate general linear model (GLM) was run to estimate which parentally assessed trajectory could predict teacher-assessed SA at age 6 years. The latter analyses were run with the SPSS statistical software (SPSS Inc., 2011).

Results

Trajectories of SA

A four trajectory solution with a '2 2 3 1' profile (2 quadratic, 1 cubic and 1 linear trajectories) was identified as the best-fitting model ($BIC = -13,942.45$). Figure 1 depicts the four trajectories that best fitted the course of parent-rated SA courses from age 1.5 to 6 years. The most common trajectory (Low-Persistent, 60.2%, $n = 1,163$) showed a pattern of low SA symptoms that remained constant throughout preschool. Two trajectories showed noticeable changes across time: one trajectory (High-Decreasing, 10.8%, $n = 209$) was initially high on SA, but decreased steadily over time to reach a level close to that of the Low-Persistent trajectory by age 5 years; the second evolving trajectory (Low-Increasing, 22.1%, $n = 427$) had a curvilinear shape: it started low, then increased moderately until age 3.5, before abating to approximate the levels of the Low-Persistent and High-Decreasing SA by age 6 years. The fourth, and less common trajectory

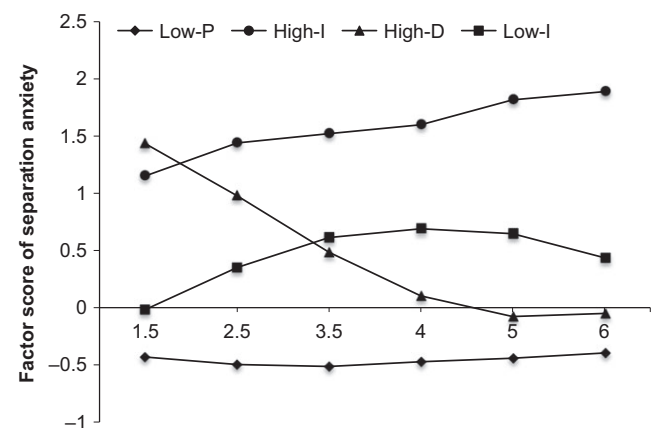


Figure 1 Patterns of separation anxiety at 1.5, 2.5, 3.5, 4, 5 and 6 years of age: ● High-Increasing separation anxiety trajectory ($n = 134$; 6.9%), ▲ High-Decreasing separation anxiety trajectory ($n = 209$; 10.8%), ■ Low-Increasing separation anxiety trajectory ($n = 427$; 22.1%), and ◆ Low-Persistent separation anxiety trajectory ($n = 1,163$; 60.2%). Data courtesy of the Quebec Institute of Statistics

(High-Increasing, 6.9%, $n = 134$) had a clear pattern of high, and steadily increasing SA scores. Due to its level, temporal pattern, and observed prevalence, this trajectory is the most likely to encompass children at risk for SAD.

Table 1 shows that most of the early life factors – at birth, at 17, and at 29 months were differently distributed across the four SA trajectories. The strongest differences across trajectories pertained to indices of family hardship including lower SES/income (prevalence: High-Increasing: 43.8%; High-Decreasing: 30.5%; Low-Increasing: 25.7%; Low-Persistent: 11.7%), divorce, unemployment, suboptimal parenting (low perceived maternal impact perception and overprotection), maternal depression, low education, and smoking in pregnancy. Children of the High-Increasing and High-Decreasing SA trajectories had shorter sleep at night, and were more likely to cosleep with parents and/or siblings. Of interest, hospitalisation and illness, which can be traumatic and may imply separation from attachment figures, were not associated with any of the four SA trajectories.

Table 2 shows the results of the multivariate multinomial regression model, which tested longitudinal associations among risk factors and three trajectories of SA (High-Increasing, High-Decreasing, and Low-Increasing), compared to the Low-Persistent trajectory. The model included all covariates that were previously significantly found associated with the SA trajectories. This last regression model encompassed 1,614 subjects. Low Apgar, maternal overprotection and low parental impact distinguished (albeit at varying levels of significance) all SA trajectories from the Low-Persistent trajectory.

Parental unemployment, maternal depression and tobacco exposure in pregnancy were uniquely associated with the High-Increasing trajectory, while cosleeping characterised both the High-Increasing and High-decreasing trajectories. Interestingly, parental divorce was not associated with either High-Increasing or High-Decreasing SA, and contributed only marginally to the Low-Increasing SA trajectory. Externalised problems were associated only to High-Decreasing and Low-Increasing SA.

Finally, a test of between-subjects effects yielded a significant prediction of teacher-assessed SA by the parentally assessed SA trajectories ($F = 6.61$, $df = 3$, $p < .001$); a post hoc comparison of mean square differences showed that this was accounted for by the High-Increasing trajectory only (mean square = -1.10 , 95% CI = -1.82 to -0.40 , $p < .05$).

Discussion

This study is the first to document the developmental trajectories of SA from infancy to school entry, as well as their early associated factors in a large, representative population-based sample. Four distinct developmental trajectories of SA were revealed from age 1.5 to age 6 years. A Low-Persistent, unaffected group included the majority of children, and thus served as a contrast for the other three, less common, but distinctive developmental trajectories. These latter three trajectories differed in terms of onset and patterns of longitudinal expression of SA, as well as with respect to the early associated factors.

The High-Increasing was probably the most clinically relevant trajectory; with a symptom profile that

Table 2 Associations between significant covariates (from Table 1 $p < .002$) and trajectories of separation anxiety ($n = 1,614$)

Variables	Trajectories of separation anxiety								
	High-I ^a ($n = 97$) ^d			High-D ^b ($n = 163$) ^d			Low-I ^c ($n = 346$) ^d		
	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>	OR	95% CI	<i>p</i>
Maternal depression [†]	1.35	1.16–1.55	<.001	1.05	0.92–1.21	.46	1.10	1.00–1.22	.07
Maternal overprotection [†]	1.36	1.22–1.51	<.001	1.26	1.17–1.37	<.001	1.19	1.13–1.26	<.001
Maternal impact perception [†]	0.78	0.70–0.87	<.001	0.90	0.81–0.99	.03	0.89	0.83–0.96	.002
Parental unemployment	3.66	1.47–9.10	.005	0.55	0.19–1.59	.27	1.16	0.53–2.54	.71
Apgar, 5 min [†]	0.69	0.54–0.89	.004	0.83	0.70–0.97	.02	0.83	0.70–0.97	.02
Sleep arrangement, parents' bedroom or siblings'	1.84	1.10–3.05	.02	2.24	1.53–3.28	<.001	1.04	0.76–1.42	.83
Maternal smoking during pregnancy	1.68	1.00–2.74	<.05	1.01	0.67–1.53	.95	1.17	0.87–1.58	.30
Child nighttime sleep, <6 consecutive hours	2.04	0.90–4.62	.09	3.05	1.69–5.52	<.001	1.86	1.08–3.11	.03
Maternal education, no high school diploma	1.64	0.93–2.90	.09	1.78	1.13–2.83	.01	1.15	0.78–1.69	.47
Low socioeconomic status	1.50	0.80–2.82	.20	1.56	0.96–2.55	.08	1.60	1.08–2.37	.02
Child externalised problems [†]	1.09	0.95–1.25	.22	1.17	1.05–1.30	.004	1.12	1.03–1.21	.006
Parental divorce	1.29	0.62–2.69	.49	1.62	0.89–2.97	.12	1.66	1.06–2.59	.03
Maternal age	1.00	0.96–1.05	.89	.97	0.93–1.01	.09	0.99	0.97–1.02	.68

OR, odds ratio, 95% CI, confidence intervals, and [†], continuous variables.

^aHigh-I refers to a trajectory of High-Increasing separation anxiety.

^bHigh-D refers to a trajectory of High-Decreasing separation anxiety.

^cLow-I refers to a trajectory of Low-Increasing separation anxiety.

^dcompared to the Low-Persistent separation anxiety trajectory.

Data are courtesy of the Quebec Institute of Statistics.

Bold values indicate statistically significant values.

was already prominent at age 1.5 years, and a steady incremental course throughout the preschool years, it was the only group membership that predicted teacher-assessed SA in kindergarten. Such a high profile of continuity from infancy to primary school is probably of predictive clinical significance. The proportion of children in our High-Increasing trajectory falls between the documented prevalence of SAD in population-based samples of older children (Copeland et al., 2014) and that found in paediatric clinical samples (Ginsburg et al., 2014). Longitudinal assessments extending beyond age 6 years will be necessary to discriminate between those High-Increasing children who go on to develop SAD, from those who do not develop the disorder.

This study differentiated the High-Increasing group from another, relatively common, high SA trajectory group, the High-Decreasing (10.8%), on the basis of their longitudinal evolution. Like the High-Increasing, children in the High-Decreasing trajectory displayed high SA at age 1.5; however, they successively abated quickly, with 30% symptom reduction already observable at age 2.5, and over 60% reduction by age 3.5. By age 5–6, the High-Decreasing trajectory approximated the ‘benchmark’ Low-Persistent profile. The Low-Increasing SA profile (22.1%) followed a similar fate by age 5–6 by displaying a curvilinear evolution over time.

A host of distinct, child, parent, and family-contextual risk factors discriminated among the different trajectories. The associations between these risk factors and the various SA trajectories were broadly consistent with reported links between family-wide factors and parent–child interactions among anxious/internalising children (Côté et al., 2009; Ginsburg et al., 2014; Scaini et al., 2012; Weeks et al., 2014). On such account, it is paramount to distinguish the High-Increasing and the High-Decreasing groups. Both of these groups diverged from the normative Low-Persistent by showing lower Apgar at birth, worse sleep quality indicators, and suboptimal parenting practices (lower parental impact and parental overprotection). However, the High-Increasing group was uniquely characterised by higher maternal depression, unemployment, and maternal smoking during pregnancy. The higher maternal depression associated with the High-Increasing profile could indicate increased familial-genetic risk underlying chronic SA and SAD (Weissman, 1990), and a relational context that reinforces SA over time (Herren, In-Albon, & Schneider, 2013). The association with parental unemployment is consistent with previous longitudinal investigations of internalisation/anxiety (Ginsburg et al., 2014; Weeks et al., 2014), and could reflect the interplay of intrafamilial and extrafamilial contexts (e.g. day-care) in accounting for a persistently high trajectory of preschool SA. Out of two perinatal indices initially associated with high SA – low Apgar scores and maternal smoking in pregnancy – only the latter

distinguished the High-Increasing group from the Low-Increasing group. While associations with distal indices of physical health deserve deeper investigation, they are consonant with previous findings indicating that childhood SAD predicts physical health problems in early adulthood (Copeland et al., 2014), and further support a psychobiological connection between early adversities and SAD.

Our findings have implications for the early identification of children at risk for SAD and for preventive intervention. First, given its correlates and prevalence (6.9%), the High-Increasing trajectory group most likely encompassed children with/at heightened risk for SAD. Children with high SA symptom profile at age 1.5 years who go on to exhibit high – or even increased – SA profiles at age 2.5 and 3.5, deserve attention as current or prospective possible cases of SAD. Second, an initially high level of SA symptoms does not necessarily evolve harmfully; in fact, the majority of the children (60%) who displayed high SA at age 1.5 years had essentially recovered by age 4–5. Thus, the early identification of children at risk for SAD should not rely solely on early assessment, but rather be based on a trajectory approach, that is repeated assessments over time.

Interestingly, higher externalisation was specific of the High-Decreasing profile: while the nature of co-occurrence between internalised and externalised behaviour in childhood is a matter of debate (Coscgrove et al., 2011), this suggests that long-lasting SA is more likely to evolve as a ‘mostly/purely internalizing’ condition, and that preschool children who are simultaneously high in SA and externalisation are less likely to exhibit long-lasting high SA profiles.

The inconsistency – or lack – of association between SA trajectories and several putative risk factors also provide valuable indications. Consistent with other studies of internalisation before puberty (Kendall et al., 2010; Wang & Zhao, 2015; Weeks et al., 2014), and with the notion that boys and girls do not significantly differ for SAD symptom presentation (American Psychiatric Association, 2013), there were no associations with sex for any of the four SA trajectories, Parental divorce was associated with SA trajectories, but only in the early (i.e. 1.5–2.5 years) window of measurement and in the univariate analyses (Table 1). This suggests that within the pre-school age window of risk, parental separation/divorce may only exert transitory effects on children’s SA trajectories.

The present study should be interpreted in the context of four main limitations. First, the assessment of SA was reduced to only three key features. However, these features have been shown central to the construct and to the identification of children with marked SA and SAD by Item Response Theory analyses (Cooper-Vince et al., 2014). Second, this study did not assess familial risk for panic/agoraphobia, which could have further validated the differentiation among the four SA trajectories. How-

ever, the link between childhood SA and panic/agoraphobia has previously been shown in genetically informed studies (Battaglia et al., 2009) and confirmed by meta-analyses (Kossowsky et al., 2013). Third, our data and conclusions apply to a specific window of observation, covering age 1.5 years to 6 years. The same factors (e.g. parental separation/divorce) may show different associations with SA/SAD trajectories if applied to different ages and windows of risk. This notion is supported by longitudinal studies of adolescents into early adulthood (Patton et al., 2014), and by studies of gene-environment interaction (Nobile et al., 2009; Spatola et al., 2011), showing that the effect of a given risk factor may be detectable –alone or in interaction with other hazardous factors– only within specific windows of risk and development. Fourth, we identified several factors of attrition: although these are largely common to other epidemiological studies, they may limit the representativeness of the sample, and thus the generalisability of results.

Conclusion

Consistent with developmental theory, our empirical data show that the vast majority of children experience little, or moderate time-limited separation anxiety from age 1.5 to 6 years. Children who display high levels of separation anxiety at age 1.5 and show a consistently increasing trend throughout age 4–5–6 years may constitute a specific population at risk

for developing separation anxiety disorder. Maternal depression, maternal smoking during pregnancy and unemployment further characterise this specific subpopulation.

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Key points

- Little is known about the trajectories of separation anxiety, and which factors affect their intensity and persistence from early childhood to kindergarten.
- Longitudinal analyses of multiple parental ratings of separation anxiety items in a population cohort yielded four distinct trajectories, only one of which – the High-Increasing showed consistently high and increasing symptoms from age 1.5 to age 6 years.
- The High-Increasing was the only trajectory linked to teacher-assessed separation anxiety in kindergarten, and was associated with higher rates of maternal depression, maternal smoking during pregnancy, and unemployment.
- Most children with high separation anxiety at age 1.5 years are expected to recover by age 4–5; however, high separation anxiety that persists over time deserves attention, and may predict separation anxiety disorder.

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