

**A Prospective Longitudinal Study of Shyness from Infancy to Adolescence:
Stability, Age-Related Changes, and Prediction of Socio-Emotional Functioning**

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Abstract

This longitudinal, population-based and prospective study investigated the stability, age-related changes, and socio-emotional outcomes of shyness from infancy to early adolescence. A sample of 921 children was followed from ages 1.5 to 12.5 years. Parent-reported shyness was assessed at five time points and maternal- and self-reported social skills and symptoms of anxiety and depression were assessed at age 12.5 years. Piecewise latent growth curve analysis was applied, with outcomes regressed on latent shyness intercept and slope factors. Results showed moderate stability and increasing levels of shyness across time, with more variance and a steeper increase in early as compared to mid-to-late childhood. Both stable shyness and increased shyness in mid-to-later (but not early) childhood predicted poorer social skills and higher levels of anxiety and depression symptoms in early adolescence. The implications of the evidence for two developmental periods in shyness trajectories with differential impact on later socio-emotional functioning are discussed.

Keywords: Shyness, trajectories, anxiety, depression, social skills

Shyness is a temperamental trait that refers to wariness and discomfort in the face of social novelty and/or in situations of perceived social evaluation (Rubin, Coplan & Bowker, 2009). Shyness shares considerable conceptual overlap with terms such as behavioral inhibition (BI), anxious-solitude, and social reticence, which are similarly employed to describe children who tend to withdraw from social interactions because they are afraid or anxious (Coplan & Rubin, 2010). Across the lifespan, shyness is associated with a host of socio-emotional difficulties, particularly along the internalizing dimension (e.g., Bosquet & Egeland, 2006; Letcher, Smart, Sanson, & Toumbourou, 2009).

Long-term longitudinal studies of the stability and consequences of shyness are pivotal for a more detailed understanding of the development of this trait and its impact on developmental psychopathology (Asendorpf, 2010; Shiner & Caspi, 2003). For example, the developmental course of shyness may differ across childhood. However, few studies have attempted to identify the nature of these developmental changes or their differential impact on later outcomes. Moreover, there have only been a handful of long term longitudinal studies of shyness, and few of these have included multiple assessments across numerous time points. Accordingly, the primary goals of the present study were: (1) to examine the stability of shyness from infancy to early adolescence (as assessed at multiple time points); and (2) to explore the impact of developmental trajectories of shyness (across different age periods) on socio-emotional functioning in early adolescence.

Shyness in Childhood

Evidence of temporal stability is often taken as an indication that a trait qualifies as a temperamental characteristic (Rothbart & Bates, 2006). Overall, shyness displays moderate stability over time, but with variations across age, sample characteristics, and time intervals between assessments (Degnan & Fox, 2007; Rapee & Coplan, 2010). In an extensive meta-analysis of the rank-order stability of personality and temperament, Roberts and DelVecchio (2000) found moderate stability (.41) for the temperament dimension of approach/withdrawal

(including shyness), based mainly on estimates before age 12 years.

Shyness appears to be less stable during infancy/toddlerhood but increasingly so from early to middle childhood (e.g., Asendorpf, 1990; Degnan, Henderson, Fox, Rubin, & Nichols, 2008; Pedlow, Sanson, Prior & Oberklaid, 1993). However, several factors may account for differential estimates of the stability of shyness. Rapee and Coplan (2010) speculated that the lower stability in infancy/toddlerhood may reflect difficulties in defining or measuring the construct at this early life stage. As well, the use of different questionnaires to assess shyness at different ages may confound estimates of stability with instrument effects. Further, stability may be affected by the time between assessments. For example, Prior, Smart, Sanson and Oberklaid (2000) reported stability correlations ranging from .16 (between infancy and 12-13 years) and .75 (between 11-12 and 12-13 years).

There are also reasons to expect significant developmental shifts in shyness across time. For example, young children's expressions of feelings tend to be more undifferentiated and less clustered into patterns as compared to older children (Mathiesen & Sanson, 2000). Moreover, as children enter into more former childcare and educational contexts, they are increasingly exposed to a larger and more diverse set of peers and adults. As a result, children gradually develop reaction "blueprints" to new social situations (i.e., a core component of shyness) and their behavioral patterns become more stable across people and situations (Rubin, Bukowski & Parker, 2006). This may contribute to a developmental shift in trajectories of expressed shyness at around 4-5 years of age. However, no past studies have sought evidence of such a developmental *change* in shyness trajectories.

Consequences of shyness. There is a growing literature linking childhood shyness with a wide range of negative adjustment outcomes across the lifespan (Rubin et al., 2009). Shy children tend to withdraw from social interactions and spend less time socially engaged with peers (Coplan, et al., 2009), thus "missing out" on important opportunities related to the acquisition of a host of social, social-cognitive, and socio-communicative skills (Rubin et. al,

2006). Perhaps as a result, shy children are also prone to peer rejection and victimization, which in turn may contribute to poorer social skills later in development (Gazelle & Ladd, 2003; Oh et al., 2008; Perren & Alsaker, 2006).

Longitudinal links between shyness and later internalizing problems have also been reported (e.g., Essex et al., 2010; Letcher, et al., 2009; Karevold, Røysamb, Ystrom, & Mathiesen, 2010). For example, Schwartz, Snidman, and Kagan (1999) reported that 61% of adolescents who had been extremely inhibited (shy) toddlers displayed social anxiety symptoms as compared to only 27% of uninhibited toddlers. Bohlin and Hagekull (2009) found that shyness in infancy predicted symptoms of social anxiety and depression at age 21 years. However, when controlling for social anxiety, relations between shyness and depression were attenuated. Indeed, few studies have reported a unique relation between shyness and depressive symptoms when anxiety is controlled for (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004).

Despite this previous research linking early shyness and socio-emotional functioning, there remains uncertainty about timing effects. Different age periods may introduce different expressions and challenges for a shy child (Rubin et al., 2009), thereby making the consequences of shyness dependent on the age period that is examined. Thus, in addition to the impact of stability in shyness in general, it is important to separately assess the consequences of changes in shyness over different developmental periods. Our review of the literature did not uncover any studies examining the differential impact of age-specific changes in shyness on later outcomes.

Gender differences in shyness. Results from several studies indicate no significant gender differences in overall shyness, either from observational data or parent ratings (e.g., Bishop, Spence, & McDonald, 2003; Coplan, Debow, Schneider, & Graham, 2009). Similarly, no evidence of gender differences in the *stability* of shyness have been reported

(Rubin et al., 2009). However, it has been postulated that shyness is less socially acceptable for boys than for girls because it violates gender norms related to male social assertion and dominance (Rubin & Coplan, 2004). In support of this notion, there is some evidence to suggest that shyness is more strongly associated with peer exclusion and rejection among boys than girls (e.g., Coplan, Prakash, O'Neil, & Armer, 2004; Gazelle & Ladd, 2003). Results are less consistent with regards to associations with internalizing problems. Although some researchers have reported stronger links between shyness and indices of internalizing problems for boys than girls (e.g., Coplan, Closson, & Arbeau, 2007; Gest, 1997), some conflicting results have also emerged. For example, Letcher and colleagues (2009) found that temperamental reactivity and shyness were more prominent predictors among girl than boys of a trajectory of increasing internalizing problems from ages 3 to 15 years.

The Present Study

To summarize, there have only been a handful of previous longitudinal studies of shyness extending from early childhood into adolescence. Few studies have obtained multiple assessments of shyness over time or used modelling techniques to partial out measurement error. Moreover, all previous studies have assumed (and analysed for) *linear* change in shyness. Accordingly, the first aim of the present study was to examine both the stability and age-related change of shyness (as rated by mothers using the same instrument) over 5 time points from age 18 months to 13 years in a community sample. Given the proposition that there may be important changes in the manifestation and stability of shyness at around 4-5 years of age, change in shyness was divided into two age periods, toddlerhood (age 1.5 to under 4 years) and childhood (age 4 to 12.5 years). We expected that shyness would show significant individual differences in both the mean level and change over time. Because measures of child temperament have been found to vary more in toddlers and very young children as compared to older children (Prior, 1992) it was expected that shyness in the early

developmental period (age 1.5 to 4 years) would display more variation than shyness in the later developmental period (age 4 to 12.5 years).

A second aim of the present study was to examine longitudinal associations between shyness (including mean levels and patterns of change over time) and indices of socio-emotional functioning (e.g., internalizing symptoms, social skills) at age 12-13 years (as reported by both children and mothers to minimize source effects). Overall, it was hypothesized that both higher mean levels of shyness and an increase in shyness across time would predict higher levels of anxiety and depression and lower levels of social skills at age 12.5 years. More specifically, we also sought to examine whether shyness at different *developmental periods* might have differential consequences. In this regard, we speculated that as compared to changes in shyness in the earlier developmental period (age 1.5 to 4 years), change in the later developmental period (age 4 to 12.5 years) would demonstrate stronger associations with anxiety, depression and social skills at age 12.5 years.

Finally, we explored gender differences in shyness over time, as well as in the relations between shyness and outcomes in early adolescence. Given limited previous indications of gender differences in the stability/change of shyness and somewhat mixed results for gender differences in the links between shyness and internalizing problems, no hypotheses were formulated.

Method

Participants

The study used data from the Tracking Opportunities and Problems (TOPP) study, a prospective population-based longitudinal study focusing on the mental health of Norwegian children and their families. Participants were recruited from 19 health care areas that were selected to be representative of the diversity of social environments in Norway. Of the 1081 eligible families, 939 participated (87%) at t1. Data from child health clinics indicated that

non-respondents at t1 did not differ from respondents with respect to maternal age, education, employment status, number of children or marital status. At t1, 28% of the families lived in large cities, 55% in densely populated areas and 17% in rural areas. Maternal age ranged from 19 to 46 years at t1 ($M=30$, $SD = 4.7$ yrs). The sample consisted predominantly of middle class ethnically Norwegian families (reflective of population trends for Norway in 1993, when only 2.3% of the population came from non-western societies, Statistics Norway, 2006).

The sample at t5 (see description of the time points below) included 46% boys. About 24% of mothers had 11 years schooling or less, whereas 27% had a college/university education of four years or more. Fifty-three percent of mothers worked full-time outside the home and 75% reported that they were doing well financially. Finally, 81% of mothers lived with a spouse or partner.

Measures

Shyness. Parents rated children's shyness at all time points using the shyness subscale of the *Emotionality, Activity and Sociability Temperament Survey* (EAS, (Buss & Plomin, 1984).

The shyness subscale includes five items rated on a 5-point scale ranging from 1 "not typical" to 5 "very typical" (e.g., "Tends to be shy", "Takes a long time to warm up to strangers"). The reliability and validity of the EAS in this dataset have been well established (Mathiesen & Tambs, 1999). Cronbach's α for shyness in girls/boys were .74/.70 (t1), .76/.71 (t2), .78/.79 (t3), .77/.75 (t4), and .76/.73 (t5).

Socio-emotional functioning. Indices of socio-emotional functioning were collected at t5 (age 12-13 years). Parent-rated and child self-reported symptoms of *depression* were assessed with the *Short Mood and Feelings Questionnaire* (SMFQ, Angold et al., 1995). The SMFQ consists of items from the full Mood and Feeling Questionnaire, which has been translated, back translated and validated in an independent Norwegian sample of adolescents (13-14 years) (Sund, Larsson, & Wichstrøm, 2001). The SMFQ was designed for use in

epidemiological studies of depression in children and adolescents and includes 13 items (e.g., ‘I feel miserable or unhappy’) rated on a 3-point scale (ranging from 1=‘not true’ to 3=‘true’). In the present study, two items (pertaining to restlessness and poor concentration) were omitted due to space limitations. The remaining 11 items address the affective and cognitive components of depression found to be the best predictors of depressive status (Angold et al., 1995). In the present sample, Cronbach’s α for girls/boys was .84/.80 for parent reports and .85/.86 for child self-reports.

Parent ratings of child *anxiety* were measured with the Generalized Anxiety Disorder scale (GAD) of the *Coolidge Personality and Neuropsychological Inventory for Children* (CPNI, Coolidge, Thede, Stewart, & Segal, 2002). The CPNI has been translated and back-translated in another Norwegian study (Kristensen & Torgersen, 2007). The GAD scale includes 12 items derived from criteria from 3 anxiety disorders in the DSM-IV (generalized anxiety disorder, separation anxiety disorder and social phobia). Because of the lack of a suitable anxiety scale with both parent- and child-report versions, we constructed a self-report questionnaire based on the GAD parent-report. The child-reported items were constructed by changing the wording of the parent-reported items (e.g., ‘My child worries too much’ into ‘I worry too much’). Parental and child self-reports of child anxiety symptoms (occurring within the last two months) were rated on a 4-point scale (ranging from 1= ‘not true’ to 4=‘always true’). In the present sample, Cronbach’s α for girls/boys was .79/.75 for parent reports and .85/.86 for child self-reports.

Children’s *social skills* were assessed by both parent-ratings and child self-report with a shortened version of the *Social Skills Rating System* (SSRS; Gresham & Elliot, 1990). The 24-item version used here (e.g., “Ends disagreements with you calmly”, rated on a 5-point scale ranging from 1=‘never’ to 5=‘very often’) was developed on the basis of factor analysis of a Norwegian translation of the full form on the same sample at t4. In the present sample,

Cronbach's α for girls/boys was .86/.80 for parent reports and .88/.88 for child self-reports.

Procedure

More than 95% of Norwegian families with children regularly attend a public child health clinic during the first four years of the child's life. All families from the 19 health-care areas that visited a child health clinic in 1993 for the scheduled 18 month (t1) vaccination visit were invited to complete a questionnaire. Parents who participated at t1 received a similar questionnaire when the children were 2.5 years (t2: n=781), 4.5 years (t3: n=750), 8-9 years (t4: n=535) and 12-13 years old (t5: n=613). Adolescents (n=566) also completed their own questionnaires at t5. Questionnaires were administered by the health-care workers at t1 to t3. In subsequent waves, questionnaires for parents (t4) and parents and children (t5) were sent by mail. Parents could choose if the mother or father completed the questionnaire at t1-t4, and at t5 mothers were encouraged to respond. Less than 25 fathers participated at each wave. Accordingly, paternal questionnaires have not been analysed in the current paper.

Attrition analyses. Analyses of sample attrition from t1 to t5 indicated that participating families did not differ significantly from those who discontinued participation in terms of maternal distress, family adversities, social support and child temperament. In addition, Cox proportional hazard regression was used to provide an estimate of the hazard ratio (HR) for participant dropout of the study. After testing demographic variables, family stress (e.g., maternal distress, family adversities, social support), and child temperament (e.g., emotionality, shyness) only a significant effect of maternal education was observed (HR= 0.88; 95% CI 0.83-0.93), with more educated mothers at lower risk for dropout throughout the study.

Results

Preliminary Analyses

Statistical modelling using missing data estimation techniques was carried out using the MLR

estimator in Mplus (Muthén & Muthén, 2007), applying full information maximum likelihood (FIML). This method takes advantage of subjects with partial data and is the recommended approach to handling missing data (Graham, 2009).

Shyness mean scores for each wave and their inter-correlations and associations with outcome variables are shown in Table 1. As expected for a community sample, mean scores for shyness were below the mid-point (range: 1-5), and increased slightly over time. Rank-order correlations across waves showed significant stability even across long extended time periods (i.e., greater than 10 years from t1 to t5) and moderate to strong stability over shorter periods. Shyness was also significantly associated across time with measures of anxiety, depression, and social skills. Overall, stronger associations were noted among parent reports, but self-reported anxiety and social skills were also significantly associated with parent-reported shyness at later waves. Regarding the outcomes, the intercorrelations between social skills and depression were -.38 for maternal-report and -.22 for self-report, -.29 and -.19 between maternal- and self-reported social skills and anxiety respectively, and .58 and .49 between maternal- and self-reported anxiety and depression.

- insert Table 1 about here -

Piecewise Growth Curve Model

Overview. To model individual variability in mean levels and change in shyness throughout the childhood years (i.e., 1.5 yrs to 12.5 yrs), we constructed a piecewise latent growth curve model (LGC) using Mplus statistical software version 5.2 (Muthén & Muthén, 2007). The piecewise technique is relevant for capturing different growth patterns across different developmental periods (Duncan, Duncan, & Strycker, 2006). The piecewise growth model was set to produce three latent factors: an intercept factor and two growth (or slope) factors representing linear growth during toddlerhood (t1, t2, and t3) and childhood (t3, t4, and t5). The intercept factor is a constant for any given individual across time and represents

information about the overall mean and variance of the individual intercepts across the five time points in the sample. The intercept was set to t3, representing the end of the first growth curve and the initial status of the second growth curve (see Figure 1).

Each growth factor (or slope) extracts individual variability in linear change over time. The mean of the slope factor is the average change in shyness per time interval (years), and the standard deviation of the slope factor represents individual differences in linear change in shyness (i.e., some children change more than others). The last steps included models with additional outcomes at t5, where the intercept and slope factors of shyness were set to predict maternal and self-reported outcomes of anxiety, depression and social skills. To explore unique effects on anxiety and depression, we performed additional analyses where anxiety was adjusted for depression, and vice versa.

Stability and change of shyness. The piecewise growth curve model on shyness displayed an excellent fit to the observed data ($S-B\chi^2$ 12.34; df 12; CFI 1.000; $RMSEA$.008 (95%CI 0.000-0.047); $SRMR$ 0.027) (see Figure 1). Both growth factors showed a sample-mean *increase* in shyness across time. This model fitted better to the data than a more parsimonious linear model ($\Delta\chi^2$ 108.82; Δdf 8; $p < .000$).

- insert Figure 1 about here -

Gender and age differences in shyness. We next tested for possible gender and age differences in shyness development. First, we found that for *latent means* of shyness, a significantly better model fit was evident when these values were not constrained to be equal across gender, with boys displaying a significantly steeper increase in shyness during toddlerhood than girls ($\Delta\chi^2$ 20.40; Δdf 3; $p = .000$). In contrast, a model with *variances* and *covariances* for the latent growth factors set as equal across gender did not display a significantly inferior fit ($\Delta\chi^2$ 10.01; Δdf 6; $p = .124$). Thereafter, a more parsimonious model where the residual variances in the shyness measures were equal across gender was retained

($\Delta\chi^2$ 4, 64; Δdf 5; $p = .462$). The final piecewise growth curve model, with all parameters but latent means equal across gender, had an excellent fit to the data ($S-B\chi^2$ 25.15; df 23; CFI 0.998; $RMSEA$ 0.014 (95%CI 0.000-0.041).

With the exception for boys during late childhood, all of the *slope* factors had positive and significant means, indicating that shyness increased over time. Moreover, the mean level increase in shyness was higher in toddlerhood (i.e., slope 1) as compared to later childhood (i.e., slope 2) (see Table 2). For boys: (1) change was 0.12 in shyness scores per year from 1.5 to 4 years (slope 1); (2) average shyness level was 2.39 at age 4 years (intercept); (3) and there was not significant change in average shyness level from age 4 to 12.5 years. For girls: (1) change was 0.05 in shyness from age 1.5 to 4 years (slope 1); (2) average shyness was 2.22 at age 4 years; (3) and the change in average shyness was 0.01 per year from age 4 to 12.5 years. In terms of effect size (Cohen's d), the rate of change in shyness per year for boys was 0.38 SD larger than for girls. The increase in shyness was also larger in toddlerhood than in childhood for both boys and girls. As well, the first slope had a significantly larger variance (CI 95%=0.019-0.042) than the second slope (CI95%=0.002-0.005), indicating that children's rate of change in shyness differed substantially more when they were younger than older.

- insert Table 2 about here -

The first slope factor was positively related to the shyness intercept factor, indicating that a stronger increase in shyness during toddlerhood predicted a higher intercept level at age 4.5 years. As well, the intercept was negatively correlated with the second slope factor, indicating that lower levels of shyness at the intercept level were related to increasing levels in shyness during late childhood. Finally, change in shyness levels during toddlerhood was *not* significantly related to change during later childhood (see Table 2).

Shyness and socio-emotional functioning. To examine associations between shyness trajectories and indices of socio-emotional functioning (i.e., anxiety, depression, social skills)

at t5, we regressed the outcome variables on the intercept and slope factors of the shyness LGC (see Table 3). The beta values in these analyses denote to what extent individual variability in the outcome can be attributed to the mean shyness level (i.e., the intercept) and to change in shyness during toddlerhood and childhood (i.e., slope 1 and slope 2, respectively). A non-overlapping 95% confidence interval between the betas on the intercept and slope respectively indicates that they vary significantly in their predictive effect on the outcome (see confidence intervals in Table 3). None of the regression coefficients between the latent growth curve factors and the six outcomes differed significantly by gender ($\Delta\chi^2$ from 0.99 to 4.53; Δdf 3; p = from .210 to .803).

- insert Table 3 about here -

For *self-reported outcomes* the intercept factors for shyness predicted both social skills and symptoms of anxiety at t5 (even when anxiety and depression were adjusted for each other), with higher levels of shyness at age 4.5 years predicting lower levels of social skills and higher levels of anxiety symptoms (see Table 3). Further, the second slope factor (reflecting *change* in shyness from t3 to t5) also predicted social skills and anxiety symptoms at t5, with increasing levels of shyness from age 4.5 to 12.5 years related to lower levels of social skills and higher levels of anxiety at t5. Shyness was not related to self-report of depressive symptoms and the first slope factor was not related to any of the self-reported outcomes.

For *maternal-reported outcomes* the intercept of shyness predicted social skills, depression, and anxiety symptoms at t5 (see Table 3). Consistent with the self-report findings, higher levels of shyness at t3 predicted lower levels of parent-rated social skills and higher levels of depression and anxiety at t5. The second slope factor also predicted parent-reported social skills and symptoms of anxiety, with a steeper increase in shyness from age 4 to 12.5 years associated with lower levels of social skills and the higher levels of anxiety. The first

slope factor was not related to any of the maternally reported outcomes. The shyness intercept and growth factors in childhood accounted for more explained variance in the maternally reported outcomes than in the self-reported outcomes. Finally, confidence intervals for the regression coefficients were overlapping in all analyses, indicating that the intercept and slope factors did not differ in their importance as predictors of adjustment outcomes (see Table 3).

Discussion

The central aim of the current study was to examine stability and age-related change in shyness from infancy to early adolescence using multi-wave longitudinal data from a large community sample with an identical measure of shyness across time. In addition, we sought to explore the associated consequences of shyness at different time points over the childhood years. Results indicated that even though the mean level of shyness increased somewhat with age, the maternal ratings of shyness were moderately stable across time. There were steeper growth with more individual variation in toddlerhood as compared to childhood, and boys' shyness increased more steeply in toddlerhood as compared to girls. With regards to the prediction of socio-emotional outcomes over time we found that mean shyness levels predicted increased symptoms of anxiety and depression as well as poorer social skills in early adolescence; and that change in shyness in the later developmental period predicted both social skills and anxiety levels in early adolescence. These findings are discussed in more detail below.

Stability and Age-Related Change in Shyness

The rank-order correlations between shyness across childhood were somewhat higher as compared to previous findings (e.g., Sanson, Pedlow, Cann, Prior, & Oberklaid, 1996). It is likely that the level of shyness stability found in the current study was heightened because of the use of the same parent-reported measure of shyness at all time points (Essex et al., 2010).

The use of different measures can attenuate correlations, with difficulty in separating

instrument effects from true stability effects. However, it should be noted that, as is the case when assessing any developmental phenomenon, the same shyness items may have varying interpretations and significance at different ages.

The finding that the stability of shyness *increased* with child age was consistent with previous research results (Degnan et al, 2008; Sanson et al., 1996). However, our findings further suggest that this change may not be linear, but instead appears to vary across developmental periods. We found that a model in which shyness trajectories were separated into two developmental stages (i.e., before and after age 4.5 years) provided an excellent fit to the data. The shyness trajectories in the early period had stronger growth and more variation than at later ages. One possible explanation for this finding may lie in the change across time in the psychological mechanisms that are presumed to underlie shyness. As described earlier, for very young children, shyness is thought to primarily reflect individual differences in reactivity to novelty (e.g., Kagan, 1997). Accordingly, it can be speculated that wider variations and less “predictability” in young children’s social experiences (i.e., before the start of formal schooling) may heighten both the growth and range of shyness during this age period. In contrast, shyness in older children also comes to encompass embarrassment during situations of perceived social evaluation (Crozier, 2001). Thus, once formal schooling has started, the demands for social interaction can be presumed to be more uniform, and perhaps as a result, shy behavior as observed and reported by others also becomes more stable.

Our review of the extant literature did not reveal other empirical findings specifically suggestive of qualitatively different periods in shyness development. Notwithstanding, theoretical propositions about different periods in child development have long been postulated (e.g., Piaget, 1972) with a particular focus on vulnerable periods in development (e.g., transitions from daycare to school or from childhood to adolescence) (e.g., Essex, Klein, Cho, & Kraemer, 2003; O'Connor, 2006). However, the empirical identification and testing

for different developmental patterns across developmental periods has posed a methodological challenge in the field (Biesanz et al, 2003; Caspi, Roberts & Shiner, 2005). In the present study, the use of piecewise growth models allowed us to subdivide a series of measurements into meaningful units, and then to extract relevant aspects of change within each unit (Bryk & Raudenbush, 1992). In addition to the strengths of structural equation modelling in terms of the control of random errors and combined estimation of design and structural models, this statistical method thus provided a means to examine patterns of development across distinct periods (Duncan et al., 2006).

Mean levels of maternal ratings of boys' shyness were lower than girls during infancy but increased nearly twice as much as girls' shyness levels in toddlerhood. As a result, there was no significant gender difference in shyness by age 4.5 years. As described earlier, previous findings with regard to gender differences in very young children's shyness have been somewhat mixed (e.g., Bishop et al., 2003; Prior et al., 1993). It can be speculated that parents' earliest judgments of their son's shyness may be more influenced by gender-stereotypical societal norms (Rubin & Coplan, 2004). However, in toddlerhood and early childhood, parents may be afforded the opportunity to view their shy boys in social situations that can evoke wariness and unease. When confronted with this behavioral evidence, parents may tend to revisit their earlier perceptions.

Shyness and Socio-Emotional Functioning

Regarding potential consequences of shyness, all three outcomes (i.e., social skills, symptoms of anxiety and depression) were significantly related to stability in shyness. Moreover, nearly a quarter of the explained variance in social skills was accounted for by shyness. The magnitude of the predictive effect of this single temperamental characteristic is particularly striking, although several other factors (e.g., family, socio-economic, peers) have also been demonstrated to be important contributors to the development of children's social skills

(Rubin et al., 2006).

Results from several previous studies have demonstrated links between shyness and indices of poor social competence, including peer rejection, victimization, and school adjustment difficulties (e.g., Chen et al, 2006; Coplan & Evans, 2009; Rimm-Kaufman & Kagan, 2005). It has been suggested that a transactional cycle may exist whereby a shy child experiences peer rejection, which promotes the development of poorer self perceptions and increases the child's withdrawal from social settings, which in turn further exacerbates problems in the peer group (Rubin et al., 2009). Our findings support this notion and extend earlier research by demonstrating that an *increase* in shyness during middle/late childhood further incrementally predicts lower levels of social skills.

This demonstrated link between shyness and social skill difficulties does not bode well for the concurrent and longer term adjustment of shy children in adolescence. To begin with, poor social skills, in and of themselves, are predictive of a host of social, emotional, and academic difficulties (Rubin et al., 2006). Social skills are also thought to be an important developmental factor in the etiology of both anxiety and depression (Rubin et al., 2009). Moreover, social and social-communicative skills appear to be important moderators of the links between shyness and socio-emotional functioning (e.g., Coplan & Weeks, 2009; Gazelle, 2008). As well, peer relations difficulties may heighten the relation between shyness and internalizing symptoms (Gazelle & Ladd, 2003).

In accordance with earlier research, we found that earlier shyness predicted anxiety symptoms in adolescence (Goldsmith & Lemery, 2000; Prior et al, 2000). However, previous literature has mainly demonstrated the relation between parent or teacher reported shyness and anxiety (e.g., Caspi, Moffit, Newman, & Silva, 1996), and mostly in relation to anxiety disorders rather than symptom levels (e.g., Masi, Mucci, Favilla, Brovedani, Millepiedi, & Perugi, 2003). Our study extends these findings by demonstrating a continuous impact of

shyness on both parent- and self-reported symptoms of anxiety, and also by specifying in which developmental period shyness has most impact on anxiety symptoms.

The finding that childhood shyness also predicted young adolescents' symptoms of depression adds to the handful of empirical studies suggesting this link (e.g., Bohlin & Hagekull, 2009; Gazelle & Rudolph, 2004). However, it must be noted that the effect size was somewhat small in magnitude, that only stable levels of shyness predicted depression levels and that shyness accounted for only half the amount of variance in depression as compared to anxiety. Further, shyness was not a significant predictor of child self-reported depression symptoms. Shyness is generally found to be more strongly related to anxiety than depression (Rubin et al., 2009). Moreover, age 12-13 years might be an early stage for the development of depressive symptoms, which is more likely to emerge in later adolescence and young adulthood. Future studies should examine whether this relation gets stronger as symptom levels generally increase from early to later adolescence. Nonetheless, our results show that higher levels of shyness in childhood predicted (albeit modestly) higher levels of depressive symptoms in early adolescence.

Finally, it should be noted that although shyness increased the most in toddlerhood, changes in shyness during this age period did not predict any outcome variables. As discussed earlier, it can be speculated that changes in shyness at this early age are not as predictive because of differences in the degree and quality of very young children's exposure to unfamiliar social settings. Among very young children, shyness typically manifests as hesitancy and unease in novel situations and when meeting new people. However, by the end of the preschool years, shyness is also expressed as self-consciousness and embarrassment in situations where children perceive themselves as being socially evaluated (Buss & Plomin, 1984; Crozier, 2010; Schmidt & Buss, 2010). Moreover, because of age-related increasing norms in the nature and frequency of social interactions, it has been argued that shyness will

become increasingly associated with negative outcomes in later childhood and adolescence (Rubin & Asendorpf, 1993). It may also be that some of the relation between later changes in shyness and the outcomes is an expression of the proximity in time between predictor and outcomes.

Intervention and prevention programs for extremely shy preschoolers are still at their earliest stages. However, there is support for the preliminary effectiveness of both psych-education programs for parents of extremely shy children (Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005) and targeted social skills training for extremely shy preschoolers (Coplan, Schneider, Matheson, & Graham, 2010). Thus, our results point to age 4-5 years being an optimal time to intervene with the children showing high levels of shyness.

Strengths, Limitations and Future Directions

Our findings add to the growing literature establishing childhood shyness as a risk factor for the later development of socio-emotional difficulties. Of particular note, an important strength of these results was the robustness of our findings across both self-reported and parent-reported outcomes. Not surprisingly, the magnitude of the effects was stronger between parent-reported shyness and parent-reported outcomes. However, although the strength of some maternally reported findings (including stability) might have been heightened by single-informant effects and bias, the consistency of findings across child-reported outcomes provides evidence of the validity of these results.

Beyond issues of shared method variance, the sole reliance on maternal reports of shyness across time must also be considered as a limiting factor. A central objection regarding the repeated use of maternal ratings over time is that both perspective and context may influence such reports. This can be partly accounted for (as in the present study) by employing alternative sources of assessments with regards to outcome variables. Our results pertaining to both the increase in and stability of shyness over time may also have been

influenced by changing relevance in the shyness items (i.e., that shyness manifests itself differently in different developmental periods). However, the EAS approach to the assessment of temperament is presented as “age-continuous”, as it relies upon general temperament expressions assumed to be stable across childhood development (Buss & Plomin, 1984).

It has been further suggested that empirical associations between temperamental shyness and internalising problem behaviors are heightened because of conceptual overlap between measures of each domain (e.g., Rapee & Coplan, 2010). Future studies should incorporate both observational assessments and questionnaires with measures of shyness and symptoms of anxiety and depression at the same time, in order to examine the relation between the concepts. As well, this study utilized a predominantly non-clinical sample, where most families had ethnic majority background and were (at the outset) well functioning. Thus, compared to at-risk samples, the results may under-estimate the effects of shyness on the three outcomes. Further research is needed to see whether these findings transcend local conditions and ethnic variation.

Finally, in the present study we assessed the development of shyness in two broadly conceptualized developmental age periods (i.e., 1.5 to 4 years, 4 to 12.5 years). Although this can be viewed as a good starting point, considerable developmental change occurs *within* both of these age periods. We are hopeful that our results will encourage future researchers to further explore developmental differences in the stability, change, and implications of shyness across other age periods (e.g., from middle- to later childhood, from later childhood to adolescence).

In summary, our results contribute to knowledge of stability and change in shyness across childhood and adolescence. Most importantly, this study revealed evidence of different shyness trajectories in two developmental periods. Shyness levels generally increase from infancy throughout childhood, but the levels seem to increase and vary significantly more in

toddlerhood compared to later childhood. Moreover, our results extend the existing the literature by suggesting that the stability and change of shyness within different developmental periods may differentially impact upon socio-emotional functioning in early adolescence. Thus, both when examining the nature and impact of shyness and when planning prevention activities in relation to children showing tendencies of social withdrawal, it is important to include the notion of different periods in shyness development.

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Table 1

Means, standard deviations (SD) and correlations amongst shyness and indices of socio-emotional functioning for girls and boys (results for boys in italics)

	Means (SD)	Shy t1	Shy t2	Shy t3	Shy t4	Shy t5
<i>Shyness at t1 to t5</i>						
<i>(Maternal Report)</i>						
Shyness t1 (1.5 yr)	2.08 (.65)/1.94 (.59)	1.00	.52**	.43**	.27**	.16**
Shyness t2 (2.5 yr)	2.14 (.64)/2.03 (.58)	.59**	1.00	.58**	.41**	.30**
Shyness t3 (4 yr)	2.23 (.62)/2.24 (.66)	.50**	.62**	1.00	.62**	.45**
Shyness t4 (8.5 yr)	2.23 (.68)/2.24 (.67)	.44**	.59**	.65**	1.00	.65**
Shyness t5 (12.5 yr)	2.32 (.67)/2.22 (.66)	.28**	.45**	.53**	.65**	1.00
<i>Socio-Emotional</i>						
<i>Functioning at t5</i>						
<i>(Maternal Report)</i>						
Anxiety t5	1.28 (.27)/1.22 (.23)	.10/-.04	.15*/.02	.30**/.06	.28**/.16*	.40**/.33**
Depression t5	1.19 (.25)/1.18 (.24)	.08/.07	.17**/.04	.21**/.08	.15*/.11	.27**/.22**
Social skills t5	2.71 (.35)/2.67 (.31)	-.15**/-.12	-.28**/-.16*	-.26**/-.27**	-.34**/-.26**	-.43**/-.38**
<i>Socio-Emotional</i>						
<i>Functioning at t5</i>						
<i>(Child Self-Report)</i>						
Anxiety t5	1.61 (.49)/1.53 (.50)	.08/.02	.04/.01	.18**/-.04	.09/.07	.19**/.06
Depression t5	1.31 (.36)/1.23 (.32)	.11/-.02	.06/-.07	.09/.05	.06/.11	.13*/.00
Social skills t5	4.17 (.43)/4.04 (.45)	-.14*/-.04	-.07/-.08	-.16*/-.10	-.14*/-.09	-.20**/-.21**

* $p < .05$, ** $p < .01$.

Table 2

Variations, correlations, means and standard deviations (SD) of the latent variables in the growth curve model

	Intercept	Slope 1	Slope 2
<i>Correlations</i>			
<i>(variances on the diagonal)</i>			
Intercept	0.319**		
Slope 1	.54**	0.031**	
Slope 2	-.38**	-.06	0.003**
Mean (boys/girls)	2.39** / 2.22**	0.12** / 0.05*** ^a	0.00 / 0.01**
SD	0.56	0.17	0.05

** $p < .01$. ^a Significantly different across gender.

Table 3

Self-reported and parent-reported indices of socio-emotional functioning at t5 (age 12.5 yrs) as predicted by intercept and slopes in shyness^a

<i>Shyness</i>	Anxiety (CI)	Depression (CI)	Social skills (CI)
<i>Self-reported outcomes</i>			
Intercept β	.11** (.00-.22)	.03 (-.08-.14)	-.27** (-.41- -.14)
Slope 1 β	-.04 (-.20-.12)	.03 (-.15-.20)	.04 (-.12-.21)
Slope 2 β	.11* (.01-.22)	.02 (.12-.15)	-.25** (-.39- -.12)
R ²	2.7%	1.4%	7.7%
<i>Parent-reported outcomes</i>			
Intercept β	.16* (.03-.29)	.14** (.04-.24)	-.51** (-.65- -.40)
Slope 1 β	.09 (-.04-.22)	-.08 (-.21-.05)	.01 (-.13-.15)
Slope 2 β	.26** (.15-.36)	.07 (-.06-.20)	-.39** (-.50- -.27)
R ²	18.8%	10.2%	25.2%

* $p < .05$, ** $p < .001$. ^a All CFI>0.99, all RMSEA<0.03. CI=confidence interval: 95%.

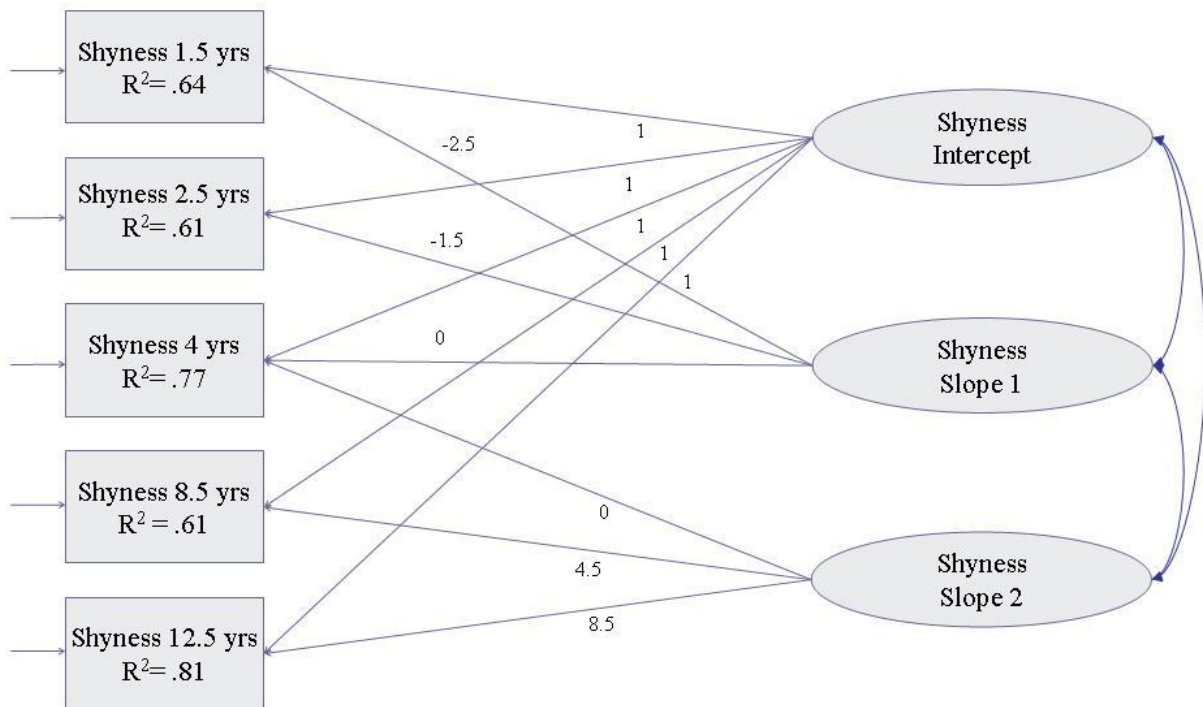


Figure 1. Piecewise growth curve model of parent-reported shyness from ages 1.5 years to 12.5 years (note: error terms are omitted for clarity). Factor loadings from the slopes to the shyness measures represent the timing of the slope variable. Both slopes have factor loadings of zero on the measure at 4 years, and the intercept have factor loadings of unity at all time points. Hence, only the intercept explains all reliable individual differences at time zero (4 years), and stability in shyness previous and after 4 years. The slopes explain individual differences in linear change of shyness before and after 4 years.



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