Published in final edited form as:
J Appl Dev Psychol. 2013 ; 34(4): 185–193. doi:10.1016/j.appdev.2013.04.001.

Social Problem-Solving in Early Childhood: Developmental Change and the Influence of Shyness

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Abstract

The purpose of this study was to examine developmental change and the influence of shyness on social problem-solving (SPS). At 24, 36, and 48 months, children (N=570) were observed while interacting with an unfamiliar peer during an SPS task and at 24 months, maternal report of shyness was collected. Results showed that across the full sample, children displayed low but stable levels of withdrawn SPS and increasing levels of SPS competence over development. In addition, results showed that 24-month shyness was associated with high-increasing and high-decreasing withdrawn SPS trajectories compared to the low-increasing withdrawn SPS trajectory. Shyness was also associated with the low-increasing compared to the high-increasing SPS competence trajectory. Findings demonstrate the development of SPS competence over early childhood, as well as the influence of early shyness on this developmental course, with some shy children showing improvement in SPS skills and others continuing to show SPS difficulties over time.

Keywords

Shyness; social interaction; early childhood; social problem solving

Social problem-solving (SPS) skills are important for children's everyday social functioning, as well as their academic achievement in school (Dubow & Tisak, 1989; Dubow, Tisak, Causey, Hryshko, & Reid, 1991; Walker and Henderson, 2012). There are, however, a wide range of individual differences in the ways children approach socially challenging situations. These individual differences in SPS skills may be attributed in part to a child's shyness. Shyness refers to wariness and anxiety in response to novel social situations (Coplan & Armer, 2007). Shy children approach socially challenging situations more passively than their peers and experience less success in attaining their social goals during elementary school (Stewart & Rubin, 1995). Furthermore, shy children are at risk for social and emotional adjustment problems including poor peer relations, depression, and anxiety (Chronis-Tuscano et al., 2009; Hirshfeld et al., 1992; Rubin, Stewart, & Coplan, 1995). Given that individual differences in shyness are evident in early childhood and that poor social interactions may lead to a number of poor outcomes including a cycle of peer rejection, reinforcement of poor social skills, and/or fewer opportunities to learn the scripts that guide social play, research on the origins of difficulties in peer interactions at young

ages may significantly add to our understanding of these predictive links. The current study extends previous research with older children by examining developmental changes in SPS abilities and the influence of shyness on individual differences in patterns of change in SPS abilities between 24 and 48 months of age. Findings of the current study increase our understanding of the development of SPS behaviors and affect across early childhood, identify some temperamental origins of peer difficulty, and may help inform intervention efforts aimed at improving shy children's SPS abilities.

In the current study, we focused specifically on the influence of shyness, a form of social withdrawal (Rubin & Asendorf, 1993; Rubin Coplan, & Bowker, 2009) that is moderately stable over the toddler and preschool years (Lemery, Goldsmith, Klinnert & Mrazek, 1999). Social withdrawal is defined as behavioral solitude that originates from factors internal to a child such as strong physiological reactions to novelty (i.e., shyness) and social disinterest, as opposed to solitude that results from being actively rejected by one's peers (Rubin, Coplan, & Bowker, 2009). Shy children appear motivated to interact with others, however, the fear and distress associated with novelty leads to avoidance of the social situation (Crozier, 2000), making peer interaction during problem situations particularly difficult. In addition, maternal reports of shyness are relatively stable across development, especially between 24 and 48 months (Lemery et al., 1999). This stability is also evidenced by the fact that children rarely change from one extreme of observed social withdrawal versus sociability to the other (Fox et al., 2001; Pfeifer, Goldsmith, Davidson, & Rickman, 2002), and when assessed in toddlerhood, they are likely to respond similarly within a few years of assessment and even into adulthood (Caspi & Silva, 1995; Caspi et al., 2003; Rothbart, Ahadi, & Evans, 2000). Therefore, it is important to identify the associations between shyness and social difficulties early on.

Developmental Change in SPS

The development of competent SPS skills is important for children's everyday social functioning and may influence the quality of their social experiences. SPS skills likely develop from various within-child characteristics (e.g., temperamental reactivity) and environmental factors (e.g., socialization with parents and peers; see Rubin & Rose-Krasnor, 1992 for review). In a cross-sectional study, Rubin and Krasnor (1983) found that both preschoolers and kindergarteners were more likely to suggest using prosocial strategies than aggressive strategies as a means of resolving hypothetical social problems. Another cross-sectional study using a hypothetical-reflective measure of SPS found that children in first and second grade suggest fewer aggressive and more cooperative strategies compared to preschool age children (McGillicuddy-Delisi, 1980). Taken together, these studies suggest that children may use competent SPS strategies as early as preschool and that the frequency of these strategies increase while the frequency of poor SPS behaviors decrease over early elementary school. While these studies examined age-related differences in SPS, longitudinal studies are needed to track individual differences in developmental trajectories of SPS behaviors and affect and predictors of these individual differences. In one longitudinal study of SPS abilities from preschool to first grade, Youngstrom et al. (2000) found that, on average, children reported fewer forceful and more prosocial solutions to hypothetical problems from preschool to first grade. Interestingly, they also found little to no stability of SPS from preschool to first grade, which was attributed to rapid gains in SPS abilities that allowed children who reported relatively poorer SPS skills in preschool to report similar SPS to their peers by first grade.

Based on findings showing that children report using more prosocial competent strategies with age, we hypothesized that children would display more competent SPS (i.e., verbal

strategies, success, positive affect, prosocial initiations) and less withdrawn SPS (i.e., passive strategies, time unengaged, and neutral affect) over time.

Individual Differences in SPS

Crick and Dodge (1994) developed an information-processing model that describes the steps involved in SPS. Effective problem solving, according to their model, involves noticing and interpreting social cues, formulating social goals, generating possible strategies to solve the problem, evaluating the possible effectiveness of the strategy, and enacting a response. Emotion, in addition to cognition, influences social information-processing at all steps of the model (Lemerise & Arsenio, 2000), emphasizing the importance of incorporating measures of affect into SPS coding. For shy children, the experience of uncertainty in unfamiliar or challenging social situations may lead to distress, which results in emotional flooding (Ekman, 1984; Thompson & Calkins, 1996), or hypervigilance, which may result in blunted affect. Both distress and hypervigilance may interfere with shy children's ability to enact socially competent responses during challenging situations with peers (Fox et al., 2005). Indeed, withdrawn children are able to generate competent social goals comparable to comparison children, however, they report that they would be less likely to use assertive strategies and more likely to use avoidant strategies compared to comparison and aggressive children (Wichmann, Coplan, & Daniels, 2004). Thus, it is important to observe children's SPS during actual social situations with peers.

Shy children, specifically, react to challenging social situations with sadness, fear, and lessened positive affect (Derryberry & Rothbart, 1997; Eisenberg, Shepard, Fabes, Murphy & Guthrie, 1998; Eisenberg, Fabes, Guthrie, & Rieser, 2002; Rothbart & Bates, 2006), possibly disrupting the enactment of competent SPS behaviors. A recent study found that during a structured task requiring friendly competition and negotiation between target children and their friend, socially withdrawn, anxious 10- to 12-year-old children displayed relatively more neutral affect in comparison to control children (Schneider, 2009). The expression of neutral affect in withdrawn children reflects a somber expression, which may lead to increased hypervigilance and limit others' desire to interact with them. That is, anxious expressions may serve both functional and social purposes, where functionally they may lead to increased scanning and processing of the environment to identify ambiguous threat, while socially these expressions may serve to convey messages about emotion to social partners (Perkins, Inchley-Mort, Pickering, Corr, & Burgess, 2012). In contrast, uninhibited or highly sociable children approach unfamiliar people or objects with minimal avoidance and with positive affect (Rimm-Kaufman et al., 2002; Kagan, Snidman, & Arcus, 1998), which may facilitate the translation of strategy ideas into actions during SPS and function to initiate and maintain social interactions with peers. Thus, while positive affect may facilitate social interaction and competent problem solving, neutral and negative affect may limit these social skills.

Because behavior and emotion may both influence the course and outcomes of peer social interactions, it was important to examine the combination of both SPS behavior and affect. Thus, in the current study, we included both SPS behaviors and displayed affect during the SPS task in composites and expected neutral or negative affect to be associated with withdrawn behaviors (i.e., time unengaged and passive SPS) while positive affect would be associated with competent SPS behaviors (i.e., verbal SPS, prosocial interactions, success). In addition, we expected these composites of behavior and affect would be associated with early report of shyness. Socially withdrawn children display more passive SPS during elementary school (Rubin, Daniels-Beirness, & Bream, 1984; Stewart & Rubin, 1995). Therefore, whereas some children with poor SPS may report similar SPS compared to their peers by first grade (Youngstrom et al., 2000), shy children may not follow the same

developmental trajectory. Since shyness and social withdrawal are associated with avoidant SPS at later ages, we hypothesized that shyness would be associated with more withdrawn SPS over time. Furthermore, previous findings suggested growth in SPS competence across all children. Therefore, we hypothesized that shyness would be associated with increased SPS competence over time, such that children rated higher in shyness will show a typical increase over development. However, we expected that the trajectory associated with shyness would remain lower in SPS relative to the other trajectory at all ages.

The Current Study

In summary, the first goal of the current study was to examine patterns of developmental change in behavior and affect during SPS (i.e., withdrawn SPS and SPS competence). The second goal was to examine whether there was significant variability in these patterns of change and to examine the role of early shyness in predicting these patterns of change. Overall, given normative increases in language, social cognition, and self-regulation, we hypothesized that all children would develop better SPS skills over the period of study (i.e., less SPS withdrawal and more SPS competence), however, superimposed on these developmental changes, we hypothesized that shyness would be associated with individual differences in SPS trajectories over time (i.e., greater withdrawn SPS and less SPS competence).

The current study extended previous research in two ways. First, it is a downward extension of Stewart and Rubin (1995) as it is of interest to understand the origins of peer difficulty at the earliest age possible to intervene or prevent poor peer interactions. Specifically, it extended previous findings by prospectively following the same sample of children from 24 to 48 months, younger ages than have previously been examined. Second, the current study employed direct observations to assess children's SPS behavior and displayed affect during challenging social situations. In contrast to hypothetical-reflective measures of SPS that ask children to reflect on how they would solve a social problem during hypothetical situations, direct observations allow for the assessment of the actual enactment of social goals and strategies used by children and the evaluation of the outcomes (i.e., success vs. failure) of SPS behavior (Rubin & Rose-Krasnor, 1992). The key difference between these types of measures is that hypothetical-reflective interviews measure how children think and reason about social situations while behavioral observations measure how children actually behave when in those situations (Rubin & Rose-Krasnor, 1992). Moreover, while behavior coding captures what children do in challenging situations, affect coding indexes how they express their emotion to their social partners, providing a more complete picture of the motivations and outcomes of differences in SPS. Therefore, in contrast to previous studies using hypothetical scenarios or behavioral observations, we examined both children's behavior and affect to better understand children's reactions to challenging social situations.

Method

Participants

Six hundred and fourteen (295 boys, 319 girls) children and their mothers participated in a longitudinal study. Child ethnicity was as follows: 64% Caucasian, 15% African-American, 14% multiracial, 3% Hispanic, 3% Asian, and 1% as other. Mothers participating in this study represented a highly educated sample. Fourteen percent of the mothers graduated from high school, 44% from college, 37% from graduate school, 4% from other educational programs, and 1% did not report. Two hundred and ninety-one children were originally selected to participate at the age of four months as part of a longitudinal study of temperament and social development (see *omitted for peer review*). Three hundred and twenty-three additional children were recruited from the community during toddlerhood to

form same-sex, same-age unfamiliar peer dyads. Of these, 570 children (277 boys, 293 girls) participated at least once across 24 (M = 25.92 months, SD = 2.30), 36 (M = 37.27 months, SD = 1.59), and 48 months of age (M = 49.32 months, SD = 1.41) and therefore were included in the current analyses.

Participants were recruited by mailing letters to parents in the community using commercially available mailing lists. Therefore a non-clinical community sample was recruited for participation in the current study. Interested parents contacted the laboratory to schedule a visit for their child. Children from the two groups were randomly paired at each age in order to ensure that the peer pairs were equally unfamiliar to each other at each age of assessment. The pairing was random rather than based on temperament in order to mirror the natural variation in peer characteristics typical of social settings in early childhood. There were no differences between children recruited in infancy and children recruited as toddlers on sex χ^2 (1, N = 614) = .61, p = .44, ethnicity χ^2 (5, N = 614) = 1.92, p = .86, maternal education χ^2 (3, N = 607) = 5.41, p = .14, or shyness at 24 months t(472) = 1.15, p = .25, suggesting that the two groups were comparable to one another.

The analyses presented below were conducted using maximum likelihood estimation. Maximum likelihood estimation utilizes all cases with complete or partial data on the dependent variables (i.e., SPS composites). The first goal of the study was to examine developmental change in SPS over time. Forty-four children were excluded from analyses for this goal due to missing data on all SPS outcomes, thus, analyses included children with complete or partial SPS data (N = 570). There were no differences between children included in this analysis and children excluded from the analysis on sex, χ^2 (1, N = 614) = .97, p = .33 or ethnicity χ^2 (1, N = 614) = 1.11, p = .29 however, there were differences on maternal education, χ^2 (3, N = 607) = 11.98, p = .007, such that children whose mothers reported completing educational programs other than high school, college, or graduate school were more likely to have missing data. The second goal of the study was to examine the influence of shyness on SPS trajectories. Maximum likelihood utilized all cases with at least some data on the SPS dependent variables as mentioned above, however, it also excludes all cases with missing data on the independent variable (i.e., shyness). Therefore, in addition to the 44 children excluded from the developmental analyses mentioned above, 115 children were excluded from the second set of analyses due to missing data on shyness. Therefore, analyses examining associations between shyness and the development of SPS included data from 455 children. There were no differences between children included in this analysis and those missing shyness data on sex, χ^2 (1, N = 570) = .1.14, p = .29, ethnicity χ^2 (1, N = 570) = 1.98, p = .16, or maternal education, χ^2 (3, N = 563) = 3.93, p = .27, suggesting that the sample included in the first analyses is comparable to the sample included in the second analyses.

Procedure

Informed consent was signed by the children's mothers at each visit. Children were randomly paired with a different same-sex, same-age, unfamiliar peer for each visit to capture their SPS behavior and displayed affect during novel social interactions. At all three dyad visits, children were placed in a room with two one-way mirrors. Cameras were used to record the sessions from behind the mirrors.

Children engaged in several activities together. Of interest to the current study was the participants' behavior during the special toy session, which occurred after approximately 15 minutes of interacting during a freeplay session and a clean-up task. Similar to Stewart and Rubin (1995), the experimenter entered with the special toy and set it down in the middle of the room. Before leaving, the experimenter told the children they only had one toy so they

must share and take turns. The experimenter then informed the children that he or she would return in a few minutes and walked out of the room.

Toys used during the visits were carefully selected at each age to be age-appropriate and comparable in terms of eliciting independent play. A stationary tricycle was used as the special toy introduced to the participants during the 24-month visit. The toy looked like a tricycle in that it had three wheels and pedals but it could only be used to rock back and forth. During the 36 month visit, a stationary car was used as the special toy. The toy had a seat, steering wheel, pedals, and a gear shift. The steering wheel had buttons that played animal noises and a screen to track driving. At the 48-month visit, a movable vehicle was used as the special toy. The child was able to sit in the middle of the toy and use handle bars on the wheels to steer around the room. Participants were given a total of 5 minutes to play with the special toy.

At the 24- and 36-month visit laboratory visits, mothers of the participants sat in separate chairs in two different corners of the room. Mothers were told not to initiate interactions with the children but to respond as they normally would if the child interacted with them. At the 48-month visit, mothers sat in an adjacent room that allowed them to see their children through a one-way mirror. Mothers filled out the Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith 1996; Goldsmith, Rieser-Danner, & Briggs, 1991) at the 24-month visit.

Measures

Shyness—The Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith 1996; Goldsmith, Rieser-Danner, & Briggs, 1991), a 108-item parent report measure of temperament, was collected at 24 months of age. The TBAQ is a valid and reliable questionnaire for use with 16- to 36-month-old children and measures 5 dimensions of temperament: Activity level, pleasure, social fearfulness, anger proneness, and interest/persistence, using 7-point Likert scales (Goldsmith 1996; Goldsmith et al., 1991). Of particular interest in the current study was the dimension of social fearfulness, which is composed of 10 items that assess children's reactions to unfamiliar adults and contexts (Goldsmith, 1996). Sample items include, "If a stranger came to your house or your apartment, how often did your child 'warm up' to the stranger within 10 minutes?" and "When your child knew her/his parents were about to leave her/him at home, how often did your child cling to her/his parents?" Internal consistency estimates for the social fearfulness scale were .83 and .87 across different samples of toddlers (Goldsmith, 1996). In the current sample, the internal consistency estimate for social fearfulness was .78 at 24 months.

SPS Behavioral coding—Behavioral coding was based on the scheme used by Rubin and Krasnor (1983) and Stewart and Rubin (1995). The *total time* of the task, *latency* to first get the toy, and the amount of *time engaged* with the toy were recorded in seconds.

Children's *neutral*, *positive* and *sad/fearful* affect were assigned a global code for the entire special toy activity. Each affect dimension was coded using a scale of 1–5 (1 = did not display; 5 = displayed the majority of the time or very intensely). *Neutral* affect was coded when the child displayed little to no emotional expression. *Positive* affect was scored based on the frequency and intensity of smiling, laughing, talking in excited tones, excited movements, and overall expressions of joy. *Sad/fearful* affect was scored based on the frequency and intensity of whining, crying, and fearful avoidance when approached by the other child and/or complaining to their mother in a sad or fearful voice that they wanted to play with the toy. Affect codes were not mutually exclusive as each type of affect was coded on a separate 5-point scale based on the frequency and intensity of displays of each affect type.

Event-based codes were used to classify each social initiation made by each child. Each social initiation was classified as (1) an attempt to *get the toy*, or (2) a *prosocial initiation*. An attempt to *get the toy* was defined as an attempt made by the child not in possession of the toy to gain control and/or make it clear to the child on the toy, that he or she wanted a turn. *Prosocial initiations* were defined as any initiation made to the peer about topics unrelated to getting the toy (e.g., "What school do you go to?"), initiations made by the child playing with the toy to offer the peer a turn (e.g., "Your turn to play"), and initiations made by the child playing with the toy to share with their peer (e.g., "Let's play with this toy together"). Initiations to share the toy were only coded as *prosocial initiations* if the initiation was made by the child in possession of the toy. Therefore, *prosocial initiations* were always positive initiations that were not in regard to getting the toy from the peer.

Each attempt to *get the toy* was then further classified by the type of strategy used: *Passive* (i.e., pointing or hovering), *active* (i.e., touching, shoving, hitting, grabbing, or taking), or *verbal* (i.e., asking or telling). Strategies were not mutually exclusive, thus if a child used more than one strategy at a time (e.g., asking while pointing), all strategies were recorded. Each attempt to *get the toy* was also coded in terms of the outcome, such that an attempt to get the toy was coded as *unsuccessful* when a child made an initiation and did not get the toy.

Teams of two trained research assistants coded the children's behaviors during the special toy episode using the same coding scheme at each time point. Specifically, one team of two coders coded children's behaviors at 24 months. Another team of two coders, composed of one of the 24-month coders and a new coder, coded both the 36- and 48-month behaviors. In order to assess inter-rater reliability, coders overlapped on 17–26% of total coded cases at each of the three time points. Disagreements on these double-codes were resolved through discussion. Intra-class correlations (ICC's) for the codes used in analyses at each age (24, 36, 48 months respectively) were .87, 1.00, and .99 for the *total time* of the task, .97, .99, and .98 for *time engaged*, .99, 1.00, .99 for *latency* to first get the toy, .66 .92, .76 for *neutral* affect, .70, .87, .78 for *positive* affect, 84, .97, .97 for *get toy*, .66, .92, and .86 for *prosocial* initiations, .72, .92, and .82 for *passive* strategies, .71, .91, and .76 for *verbal* strategies, and . 86, .96, and .87 for *unsuccessful* attempts.

A proportion score was created for *time engaged* by dividing children's *time engaged* with the toy in seconds over the total time of the task. Latency and the proportion of time engaged (reverse scored) were standardized and averaged to represent *time unengaged* with the toy. Proportion scores were also created for *passive, verbal,* and *unsuccessful* attempts by dividing the frequency of each variable over the total number of attempts to *get the toy*. The proportion of *unsuccessful* attempts was reverse coded to reflect *success.* Skewed variables were dichotomized at each age as 0 if the behavior was not observed or 1 if the behavior was observed at least once and continuous variables were standardized.

To reduce the number of dependent measures, composite scores were created based on theory and confirmed through principal components analysis to reflect withdrawn and competent SPS behavior and affect. Withdrawn SPS was composed of *passive* strategies based on findings with socially withdrawn elementary school-aged children, which showed that withdrawn children make fewer attempts to obtain toys from unfamiliar peers and when making attempts, they use more indirect strategies compared to their peers (Rubin, Daniels-Beirness, & Bream, 1984; Stewart & Rubin, 1995). Furthermore, because withdrawn children are less successful than their peers (Rubin, Daniels-Beirness, & Bream, 1984; Stewart & Rubin, 1995), we expected that they would take longer to get the toy (latency) and spend less time playing with the toy, which reflected *time unengaged* with the toy. Last, we also expected shy children to display more *neutral* affect since withdrawn/anxious early

adolescents are more likely to display neutral affect compared to control early adolescents (Schneider, 2009). Due to low frequency, *sad/fearful* affect was not included in the composite scores. Thus, the withdrawn SPS composite scores at each age consisted of *passive* strategies, *time unengaged*, and *neutral* affect, and was confirmed through principal components analyses at 24 (eigenvalue = 1.56; avg loading = .72), 36 (eigenvalue = 1.21; avg loading = .61), and 48 months of age (eigenvalue = 1.22; avg loading = .63). A composite of SPS Competence was created based on displays of *verbal* strategies, *positive* affect, *prosocial initiations*, and *success*. Social competence was formed to reflect positive social behavior, as seen in the displays of *prosocial initiations* and displayed *positive* affect. Furthermore, the use of *verbal* strategies reflects competence (Eisenberg et al., 1994). *Success* was also included as it was expected that the use of competent and positive behavior and affect would also result in greater peer compliance. The competent SPS composite scores were confirmed through principal components analyses at 24 (eigenvalue = 1.23; avg loading = .49), 36 (eigenvalue = 1.88; avg loading = .68), and 48 months of age (eigenvalue = 1.66; avg loading = .62). Composite variables were all normally distributed. *Active* strategies were not thought to be theoretically associated with the constructs of interest in the current study, thus a*ctive* was not included in the composite scores.

Data Analyses

The first goal of the current study was to identify patterns of developmental growth of withdrawn and competent SPS for all children from 24 to 48 months of age. To examine developmental growth patterns, latent growth analyses (LGA; Raudenbush & Bryk, 2002), also called hierarchical linear modeling, were conducted. LGA estimates individual trajectories across repeated measures. Overall model fit was examined by reviewing the following fit indices: model χ^2, RMSEA with 90% confidence intervals, SRMR, and CFI. The second goal of the current study was to examine whether there were individual differences in these patterns of change in withdrawn and competent SPS and to examine whether early shyness predicted these patterns of change. Latent Class Growth Analyses (LCGA; Jones, Nagin, & Roeder, 2001) were conducted to identify multiple trajectories of withdrawn and competent SPS from 24 to 48 months of age. LCGA is a type of growth mixture model which combines LGA with latent class analysis (LCA; Muthén, 2001), providing multiple growth trajectories associated with unmeasured class membership. Shyness was included as a predictor of membership in the trajectories. The Baysian Information Criteria (BIC) and the Bootstrap Likelihood Ratio Test (BLRT) fit indices were examined (Nylund, Asparouhov, & Muthén, 2007) along with interpretability in order to determine the number of trajectories to retain from each series of models (Muthén, 2004). Specifically, each model examined one more trajectory than the previous model. Once it was determined that the addition of another trajectory was not a better fit than the previous model, the previous model (i.e., one less trajectory) was selected as the final model. All analyses were conducted in M*plus* 6.12 (Muthén & Muthén, 1998–2011).

Results

Development of SPS

For the first goal of the study, LGA was used to examine average patterns of development in displayed SPS behavior and affect from 24 to 48 months of age. The first LGA model examined the development of withdrawn SPS over time and found evidence for good model fit: $\chi^2(1) = .36$, $p = .55$, CFI = 1.00, RMSEA = .00 with $CI_{90\%}$ from .00 to .09, and SRMR = .01. Results showed that children displayed consistent levels of withdrawn SPS at all ages (i.e., non-significant slope, p=.19). The second latent growth model examined the development of SPS competence over time and found evidence for poor model fit: $\chi^2(3) = 13.08$, $p = .005$, CFI = .34, RMSEA = .08 with $CI_{90\%}$ from .04 to .12, and SRMR = .06.

Thus, the growth model was reexamined while freeing the time score for the 48-month data to be estimated using a latent basis model (McArdle, 2004). This model resulted in good model fit, $\chi^2(2) = 2.23$, $p = .33$, CFI = .99, RMSEA = .01 with $CI_{90\%}$ from .00 to .09, and SRMR = .03. Results showed that children displayed greater SPS competence over time (i.e., positive slope, $p < .001$), with more growth between 36 and 48 months than between 24 and 36 months of age. Taken together, findings show that, on average, children display stable levels of withdrawn SPS and increasing SPS competence over time.

Individual Differences in SPS

Superimposed on these average developmental changes, we expected that shyness would be associated with displayed SPS behavior and affect over time. Therefore, for the second goal, LCGA models were conducted to examine the relation between early shyness and trajectories of withdrawn and competent SPS. First, LCGA models were conducted with shyness at 24 months as the predictor of the probability of membership in 1 through 4 classes of withdrawn SPS over time. The BIC was 3203.91 for one withdrawn SPS trajectory, 1639.45 for two withdrawn SPS trajectories, 1637.29 for three withdrawn SPS trajectories, and 1648.76 for four withdrawn SPS trajectories. The BLRT showed that the two trajectory model was better than the one trajectory model ($p < .001$), and the three trajectory model was better than the two trajectory model ($p < .001$), but the four trajectory model was not better than the three trajectory model ($p = .09$). Based on the lowest BIC, significant BLRT and interpretability, the three trajectory model was retained. See Figure 1 for the estimated means of displayed withdrawn SPS at each age for the 3-trajectories.

The high-increasing trajectory was composed of children (17% of the sample, n = 77) who displayed high withdrawn SPS at 24 months and continued to increase in withdrawn SPS across time (i.e., had a significant positive slope, $p = .001$). The high-decreasing trajectory was composed of children (25% of the sample, n =113) who displayed high withdrawn SPS at 24 months and decreased in withdrawn SPS across time (i.e., negative slope, $p < .001$). The low-increasing trajectory was composed of the majority of children (58% of the sample, n = 265) who showed a slight increase over time (i.e., positive slope, $p = .049$). Children in this trajectory displayed lower levels of withdrawn SPS at 24 months than children in the high-increasing and high-decreasing trajectories, and maintained these low levels of withdrawn SPS over time (see Figure 1). Shyness significantly predicted the probability of membership in the withdrawn SPS trajectories such that children in the high-increasing (B=.81, z=3.44, p=.001) and high-decreasing trajectories (B=.88, z=4.24, p<.001) were more likely to be rated high on shyness at 24 months than children in the low-increasing withdrawn SPS trajectory. That is, for every one unit increase in shyness, the odds of being in the high-increasing withdrawn trajectory were 5.06 and the odds of being in the high-decreasing withdrawn trajectory were 5.81 times the odds of being in the low-increasing withdrawn trajectory.

Second, LCGA models were conducted with shyness at 24 months as the predictor of probability of membership in 1 through 3 classes of SPS competence over time. The BIC was 2237.87 for one SPS competence trajectory, 795.28 for two SPS competence trajectories, and 804.70 for three SPS competence trajectories. In addition, the BLRT showed that two trajectories were significantly better than one trajectory ($p < .001$), but three trajectories were not significantly better than two trajectories ($p = .07$). Thus, the two trajectory model was retained based on a combination of the lowest BIC, significant BLRT and interpretability. See Figure 2 for the estimated means of displayed SPS competence trajectories at each age.

The high-increasing trajectory was composed of children (47% of the sample, n =214) who displayed high SPS competence at 24 months and continued to increase in SPS competence

across time (i.e., significant positive slope, $p < .001$). The low-increasing trajectory was composed of children (53% of the sample, n =241) who displayed low SPS competence at 24 months and increasing SPS competence across time (i.e., significant positive slope, $p < .001$). Shyness significantly predicted the probability of membership in the trajectories, such that children in the low-increasing trajectory were more likely to be rated high on shyness at 24 months than children in the high-increasing trajectory (B=1.02, z=4.33, p<.001). That is, for every one unit increase in shyness, the odds of being in the low-increasing SPS competence trajectory were 7.67 times the odds of being in the high-increasing competence trajectory.

Discussion

This is one of the first studies to use a longitudinal design to document developmental changes and individual differences in children's SPS behaviors and emotion in the early childhood years. The goals of this study were to document developmental growth and examine the longitudinal associations between shyness and the types of SPS behaviors and emotions displayed when a child encounters a challenging social situation with an unfamiliar peer, using a non-clinical community sample of children. Results of the current study extend the literature by examining these questions longitudinally during early childhood and by using observational measures of SPS behavior and affect expression to capture children's actual behaviors during challenging social situations. Results revealed that, on average, children displayed low stable levels of withdrawn SPS, while competent SPS increased over the toddler and preschool years. In addition to these general developmental findings, there was evidence suggesting that early shyness affects children's SPS style and their trajectories of change in SPS in response to challenging social situations. Specifically, shyness was associated with a greater likelihood to display more withdrawn SPS and less SPS competence at age 2. However, there were individual differences in developmental patterns stemming from these initial levels. That is, some shy children displayed improvement in SPS skills over time (i.e., decreased withdrawn SPS and increased SPS competence), and some shy children continued to display poor SPS skills (i.e., increased withdrawn SPS over time). These findings highlight the predictive influence of early reports of shyness on initial SPS behaviors and affect and suggest multiple potential outcomes for early shyness, including both continuity and discontinuity in withdrawn SPS over the early childhood years.

Developmental Change in SPS

Contrary to hypotheses, children, on average, expressed consistent levels of withdrawn SPS across ages (i.e., neutral affect, passive SPS, and time unengaged with the toy). Consistent with this, individual trajectories showed that the majority of children displayed consistently low levels of withdrawn SPS over time. These results show that withdrawn SPS is not a predominant style of interaction for most children, even during the early childhood years. Consistent with the hypotheses, children displayed higher levels of SPS competence over time, showing that children were increasingly likely to use verbal strategies, display positive affect, initiate prosocial interactions, and were more successful in their attempts to get the toy. The increased use of verbal strategies reflects increasing competence as verbal initiations are considered the foundation for social play and competent peer interactions (Eisenberg et al., 1994). Displays of positive affect may help keep children and their peers engaged in social interaction longer, which may support persistence and flexibility in approaching the problem situation. Increased use of verbal SPS strategies and approaching the challenging social situations with positive affect likely accounts for more success over time, showing that the use of competent strategies may result in more compliance from peers. Furthermore, the increased use of prosocial initiations and verbal strategies in general

likely reflects a combination of children's gains in social motivation, understanding of others, expressive vocabulary, and pragmatic language during early childhood (Bloom, 1998; Ganger & Brent, 2004; Pan & Snow, 1999; Rubin & Rose-Krasnor, 1992). Interestingly, findings from the SPS competence growth model showed that there was particularly rapid growth in the display of competent SPS between 36 and 48 months than during 24 and 36 months of age. These greater increases may also reflect the development of language skills, social motivation, and understanding of others at these later preschool ages. Taken together, results suggest that both the quantity and quality of children's competent SPS skills increase from 24 to 48 months of age.

Individual Differences in Shyness and SPS

Results of the LCGA showed individual differences in SPS trajectories over time. Consistent with developmental findings, the majority of children displayed consistently low levels of withdrawn SPS over time; however, there were two additional trajectories defined by high levels of withdrawn SPS at 2 years of age. Further, maternal ratings of shyness predicted membership in these two trajectories compared to the consistently low trajectory. These findings are consistent with hypotheses and previous research on older children that shy children displayed neutral affect, were less likely to use socially assertive strategies and more likely to use subtle, indirect strategies compared to children of average sociability (Schneider, 2009; Stewart & Rubin, 1995). Shyness is associated with an approach-avoidance conflict (Asendorpf, 1990; Coplan et al., 2004). That is, shy children would like to join in play with others (approach), but fear and anxiety interfere with their ability to easily initiate and engage peers in play, resulting in social withdrawal.

The expression of neutral affect by shy children appeared to reflect their wariness and uncertainty about the social situation. Schneider (2009) also found that socially withdrawn/anxious early adolescents displayed relatively more neutral affect, whereas control children displayed relatively more positive affect while interacting with friends. Interestingly, few instances of sad/fearful affect were displayed during the tasks at all ages. Prior work by Perkins et al., (2011) found evidence for the distinguishability of fearful and anxious expressions of emotion. They suggest that fear may be displayed during situations of clear threat while anxious expressions, reflecting scanning and processing of the environment, may be displayed during ambiguous situations. Shy children's expression of neutral affect likely reflects their uncertainty and hypervigilance, consistent with the expression of anxious affect.

Interestingly, one of the two trajectories that showed initially high withdrawn SPS showed decreased withdrawn SPS over time, while the other trajectory showing initially high withdrawn SPS increased in withdrawn SPS over time. These findings indicate that some children rated high on shyness showed improvement in SPS skills, while for other children early shyness has an enduring influence on social development, in part, through effects on SPS skills. An important future direction is to identify the factors that moderate the relations between early shyness and these different trajectories of withdrawn SPS. For example, temperament and specific socialization experiences with parents and peers influence patterns of continuity and discontinuity in behavior over time (Degnan, Almas, & Fox, 2010; Degnan & Fox, 2007) and thus moderate the associations between early shyness and later social functioning (e.g., Almas et al., 2011; Degnan, Henderson, Fox, & Rubin, 2008; Rubin, Burgess, & Hastings, 2002). The quality of social experiences with peers is particularly important for shy children in learning how to competently initiate interactions with peers to join social play. Furthermore, within-child characteristics, such as the development of self-regulation, may also interact with shyness to influence trajectories of SPS behavior and affect over time. It is possible that a well-regulated shy child may display SPS skills similar to less shy peers, while shy children displaying poor self-regulation are the ones in most

need of intervention. For example, the flexible allocation of attention and the ability to shift attention serves as a protective factor for behaviorally inhibited and shy children, decreasing the risk for social adjustment difficulties and anxiety (Henderson, 2010; White, McDermott, Degnan, Henderson, & Fox, 2011). Future studies should examine both within-child and environmental factors that moderate the associations between shyness and SPS trajectories. Identifying the moderators that lead to discontinuity is important for the design of intervention and prevention efforts aimed at improving SPS skills for shy children showing increased withdrawn SPS over time, who may be at most risk for the development of anxiety and poor social interactions with peers.

SPS competence LCGA analyses suggest that shy children's SPS behaviors and affect are developing over the toddler and preschool years in parallel form to their less shy peers. That is, they begin and end with fewer competent SPS interactions than their peers, at least between 24 and 48 months of age. Early shyness continues to relate to less SPS competence as initial differences are maintained over the toddler and preschool years. These results are consistent with findings from other studies showing that inhibited and shy children speak less during unfamiliar situations in school and are less likely to talk or volunteer answers in large group teacher-guided activities (Asendorpf & Meier, 1993; Rimm-Kaufman & Kagan, 2005; Rimm-Kaufman et al., 2002). In addition, it has been shown that pragmatic language influences the association between shyness and adjustment outcomes (Coplan & Weeks, 2009), suggesting the importance of shy children's verbal abilities for social development. Shy children's lack of assertiveness may be due to shy children not knowing how to approach peers and the effect of distress and hypervigilance on their ability to enact a planned behavioral response. As shy children develop, the tendency to initially refrain may be reinforced and strengthened and this, in turn, may lead to a fear of negative evaluation from peers at later ages (Bruch & Cheek, 1995), as well as unfamiliarity with the social scripts guiding cooperative play.

Youngstrom et al (2000) suggest that children with SPS difficulties report similar SPS to their peers by first grade. However, there are multiple origins to difficulties in SPS. Children with poor SPS skills that are not socially withdrawn may learn the skills necessary for effective SPS during the first few years of formal schooling and thus improve their SPS skills. As evidenced by the high decreasing withdrawn SPS trajectory, some shy children also show improvement in their SPS skills. However, other shy children showed increased withdrawn SPS over time. Furthermore, social withdrawal is associated with poor SPS through elementary school (Stewart & Rubin, 1995). Therefore, while many children with poor SPS skills show comparable SPS skills to peers during early elementary school, some shy children in particular may continue to experience limited social interaction during the school years which may interfere with their ability to display competent SPS skills comparable to those of their less shy peers. Additionally, competent SPS behavior mediates the relations between shyness and academic achievement (Walker & Henderson, 2012). Taken together, previous and current findings suggest that some shy children have fewer opportunities to engage with peers and materials in both formal and informal learning environments which results in poor SPS skills and academic achievement.

Identification of characteristics predictive of later SPS skills may aid in the design of interventions for shy children with SPS difficulties to improve later social and academic success. Such programs might focus on identifying early SPS difficulties and reducing the distress felt by some children placed in unfamiliar situations to promote better adaptation and social competence during early childhood. Interventions targeted at increasing shy children's SPS skills might also include less shy peers. Given that shy children usually want to play with others, having less shy peers initiate interactions might help lessen their distress and provide examples of competent ways to initiate peer play. This may also promote

positive social interactions, which are associated with discontinuity in wary behaviors (Almas et al., 2011). Prevention efforts could begin as early as the toddler years given the current study findings showing that shyness is associated with SPS difficulties as early as 24 months of age.

Limitations & Future Directions

One of the strengths of the current study is that we observed SPS behaviors and affect at 24 months of age and continued to follow the same children until 48 months of age. With this comes the challenges of observing behaviors at this very young age (i.e., 24 months of age), when children have a limited repertoire of behaviors and their verbal skills are just beginning to emerge. As such our inter-rater reliability for some of the coded behaviors and loadings for the SPS competence composite were lower at age 2 than at later ages.

Although we speculate above that changes in SPS trajectories were consistent with other aspects of development (e.g., theory of mind, language development, and social motivation), longitudinal studies should examine how the different aspects of development are related to SPS and the direction of these effects. Future studies should also examine the potential moderators (e.g., self-regulation, maternal behavior, peer interactions) that lead to continuity and discontinuity in SPS trajectories associated with shyness. In addition, future studies should examine the inter-relations between shyness and SPS over time to determine the direction of effects and how temperament and SPS covary over time.

Conclusion

Over the 24 to 48 month period, there were changes in children's SPS competence; however, shy children experienced particular difficulty during social interactions across the toddler and preschool years. One protective factor for shy children may be engaging in positive peer interactions early on. Recent work suggests that early exposure of temperamentally fearful children to same age peers is associated with discontinuity in displays of wariness from infancy through toddlerhood (Almas et al., 2011). Prevention programs might focus on identifying early social deficits to reduce the distress felt by shy children to promote positive peer interactions and SPS skills during challenging social situations.

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Highlights

- Competent social problem solving increased for all children during early childhood.
- There were multiple trajectories of withdrawn and competent social problem solving.
- Some shy children display improvement while others show poor social problem solving.

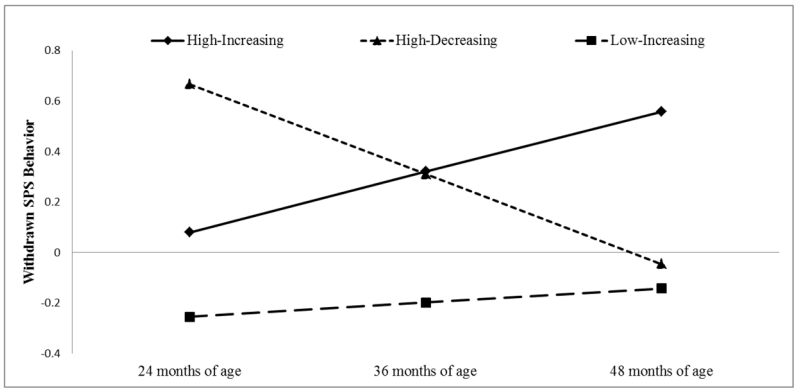

Figure 1.
Longitudinal Trajectories of Withdrawn SPS.

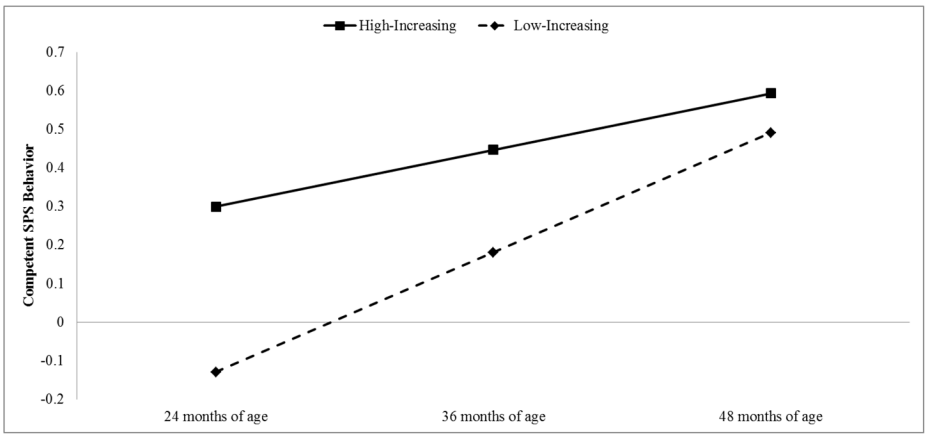

Figure 2.
Longitudinal Trajectories of Competent SPS

Table 1

Correlations and Descriptive Statistics for temperament and SPS variables.

	24-month Shyness	24-month Withdrawn SPS	36-month Withdrawn SPS	48-month Withdrawn SPS	24-month Competent SPS	36-month Competent SPS	48-month Competent SPS
24-month Withdrawn SPS	.24**						
36-month Withdrawn SPS	.18**	.19**					
48-month Withdrawn SPS	.15**	.16**	.21**				
24-month Competent SPS	−.26**	−.63*	−.16**	−.16**			
36-month Competent SPS	−.20**	−.16**	−.53**	−.16**	.19**		
48-month Competent SPS	−.10	−.00	−.09	−.53**	.09	.11*	
Mean	3.85	0.07	0.03	0.02	0.08	0.26	0.57
SD	0.89	0.58	0.50	0.46	0.30	0.40	0.36
Range	1.63 to 6.50	−0.83 to 1.32	−1.25 to 1.16	−0.95 to 1.73	−.36 to 1.09	−.28 to 1.44	−.45 to 1.14
N	474	434	437	426	434	437	426

Note: SPS = Social problem solving; SD = Standard Deviation

* $p < .05$;

** $p < .01$