

One size doesn't fit all: Profiles of isolated children in early childhood

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ABSTRACT

Peer isolation poses risks to children's social-emotional and academic development, contributing to internalizing and externalizing problems and school adjustment difficulties. To deepen scholarly understandings of peer isolation in early classroom settings, the current study examined the co-occurrence of child characteristics associated with isolation, including children's language ability, executive function, social skills, aggression, and peer victimization. The sample included 1275 children in 94 classrooms from preschool to grade three. Using a peer-nomination task, 254 children were identified as isolates who were at the bottom quartile on the "play most" peer nominations. Among the isolates, a multilevel latent profile analysis identified four heterogeneous profiles: *low executive function, victimized and low social skills, aggressive and victimized*, and *average*. These profiles were compared regarding children's language and social skills from the fall to the spring of the academic year. The findings caution against using a one-size-fits-all strategy to support the development of isolated children.

Introduction

As young children often spend many hours each week in classrooms alongside their classmates, researchers have long recognized the importance of examining peer influences on children's learning and development (e.g., Alexander Jr & Campbell, 1964; Hartup, 1970). Bronfenbrenner and Morris' (2006) bioecological model of human development suggests that complex interactions with people with whom they have established enduring relationships serve as a proximal environment, which transacts with children's biological and psychological characteristics and shapes their learning and development. Thus, researchers have also been concerned about children who have limited peer exposure as a result of being isolated by peers, which tends to place children at risk for internalizing and externalizing problems, school adjustment difficulties, and enduring negative effects even into adulthood (Danese et al., 2009; Rubin & Coplan, 2004).

Researchers have identified several factors that can explain peer isolation, including having relatively poor language abilities, poor executive function, limited social skills, aggression, and victimization (e.g., Berry & O'Connor, 2010; Cacioppo & Hawkey, 2009; Dodge et al., 2003; Rubin, Coplan, Chen, Bowker, & McDonald, 2013). However, factors associated with peer isolation may not occur in isolation. Instead,

different co-occurrences of factors across domains demonstrate the heterogeneity among isolated children. For instance, we speculate that some children's isolation is related to the occurrence of low language and low social skills, while others' isolation is related to their problem behaviors such as aggression. Identifying profiles of isolated children and understanding differences across profiles in terms of their characteristics and developmental challenges can help researchers and practitioners to develop personalized strategies when facilitating the growth of diverse groups of children. Thus, the current study aims to identify subgroups of isolated children via a person-centered approach, to compare the subgroups in terms of children's language and social skills from the fall to the spring over an academic year.

Peer isolation as proximal processes for development during childhood

Peer isolation refers to situations where children are isolated by their peers, which presents risks to children's social and academic development. It inhibits children from accessing resources and support from peers. Bronfenbrenner and Morris' (2006) bioecological model of human development suggests that peers provide the most proximal environment for child development in classrooms. In such proximal processes, children experience progressively more complex reciprocal interactions

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with peers as well as with their constantly evolving biopsychological human organism. Empirical studies have shown that peer interactions are associated with various aspects of development since early childhood, such as social knowledge and skills, self-regulation, language and literacy skills, and divergent thinking (e.g., Bulotsky-Shearer et al., 2012; Chen et al., 2020; Chen, Justice, Tambyraja, & Sawyer, 2020; Coplan & Arbeau, 2009; Lin, Justice, Paul, & Mashburn, 2016). Of concern to developmental researchers and practitioners are those children who do not have positive peer social interactions and, in return, may lose out on the positive contributions of these interactions to far-ranging aspects of development.

Compared to socially active children, isolated children are more likely to display internalizing problems (e.g., anxiety, loneliness, and low self-worth) and to experience school adjustment difficulties (e.g., peer rejection, academic difficulties, and school refusal), which can happen as early as the preschool and kindergarten period (Rubin & Coplan, 2004). Moreover, experiencing peer isolation during early childhood could have negative long-term consequences into adulthood. Danese et al. (2009) identified peer isolation as a significant adverse childhood experience alongside socioeconomic disadvantage and maternal maltreatment. They found that experiencing peer isolation during the first decade of life showed unique influences on individuals' depression and the clustering of metabolic risk markers at the age of 32, after controlling for family history of disease and depression and individuals' childhood physical and health characteristics, such as birth weight and body mass index.

Personal factors associated with peer isolation

Bronfenbrenner and Morris' (2006) bioecological model emphasizes the role of personal characteristics in children's proximal processes, or the engines of development. Many factors have been found to explain why certain children are more likely to be isolated by peers (the proximal process in this study), including language abilities, executive function, social skills, aggressive behaviors, and recurrent experience of peer victimization. First, language ability is essential for children to engage in conversations with peers. Although young children (4- and 5-year-olds) tend to use egocentric speech, they are generally communicatively competent and are able to make themselves understood by others (Rubin et al., 2013). It has been suggested that, by kindergarten entry, children have an adult-like grammatical system in place and have an expressive repertoire of 1000 s of words (Turnbull & Justice, 2016). Rubin and Coplan (2004) noted that children who fail to understand others or to communicate effectively themselves tend to have difficulties in forming and maintaining positive interactions with peers. To this point, Chen et al. (2020) showed that preschool-aged children with language impairment are ten times more likely to be isolated in inclusive classrooms than children with typically developing language skills. They further reported that children's lack of social-pragmatic skills partially mediates the effect of language impairment on the probability of peer isolation.

Second, problems with executive function may lead to peer isolation. Researchers suggest that executive function, comprising working memory, inhibitory control, and attentional flexibility (e.g., Best & Miller, 2010; Willoughby, Wirth, & Blair, 2012), is required to manage one's emotions and behaviors, which allows children to meet social standards and personal goals (Cacioppo & Hawley, 2009; Hawley & Capitanio, 2015). Park and Lee (2015) further suggested that executive function is closely related to children's competency in engaging in peer interactions, which is essential for prosocial behaviors and positive peer relations. Consequently, children with relatively poor executive function are more likely to enact problem behaviors, to have difficulties in social understandings, and, therefore, to experience peer isolation and rejection (Holmes, Kim-Spoon, & Deater-Deckard, 2016).

Third, social skills play critical roles in peer isolation. Studies have shown that children with advanced social skills tend to be more accepted

by peers and more sociometrically popular. This is likely because they are more capable of understanding and appreciating others' thoughts, intentions, and emotions (e.g., Gottman, Gonso, & Schuler, 1976; Rubin & Ross, 2012). More specifically, assertiveness, or social-cognitive prowess, may serve as a protective factor against isolation. Wichmann, Coplan, and Daniels (2004) suggested that children with higher efficacy for assertive goals are less likely to be socially withdrawn even when faced with hypothetical conflict situations. On the contrary, children with poor social skills tend to be rejected by peers and to develop internalizing behavior problems, such as anxiety and depression; this may be because these youngsters tend to think poorly about their own social competencies and display a pattern of self-defeating attribution, such as attributing their social failure to stable and internal reasons and attributing their social success to unstable and external reasons (Berry & O'Connor, 2010; Rubin et al., 2013).

Fourth, peer aggression and victimization are consistently associated with peer isolation and peer rejection (e.g., Cappella & Neal, 2012; Crick et al., 2006; Khatri, Kupersmidt, & Patterson, 2000; Ladd, 2006). Wood, Cowan, and Baker (2002) found that, as early as the preschool period, children with a higher level of aggression based on teacher reports and researcher observations were more likely to be rated by classmates as someone with whom they never play. Similarly, Godleski, Kamper, Ostrov, Hart, and Blakely-McClure (2015) reported that children with higher levels of aggression at a time point were more likely to be rejected by peers at the following time point. Regarding victimization, Barchia and Bussey (2010) discussed that experiencing peer victimization can lead to helplessness and depression and that chronically experiencing peer victimization would decrease individuals' efficacy beliefs about receiving support from teachers and peers to stop peer aggression. As a result, individuals become less likely to seek help from others and become more isolated. From peers' perspectives, researchers have suggested that peers tend to hold attribution and memory biases against victimized or socially rejected children, blaming rejected children's inappropriate behaviors for their negative peer experiences, and therefore, denying them from entering group activities (e.g., Dodge et al., 2003; Waas & Honer, 1990). Such unpleasant experiences may alter victimized children's perceptions of others and, therefore, worsen the extent of their peer isolation.

Researchers differentiate two formats of aggression and victimization: physical and relational (e.g., Crick et al., 2006; Wood et al., 2002). The former is associated with physical damage (e.g., hit, push, and fight) and the latter is related to threats of damage to relationships (e.g., prohibit someone from joining a group or threaten to end the friendship with someone). Crick et al. discussed that although relational aggression and physical aggression are significantly correlated with each other, overlooking relational aggression would fail to identify over 80% of aggressive girls. Additionally, they found that relational aggression showed a unique effect above and beyond physical aggression in predicting peer rejection. Hence, the current study chose to focus on the role of relational aggression and victimization in peer isolation.

The current study

The current study focuses on peer isolation during early childhood from preschool to grade three. Early childhood is a critical period for developing language skills, executive function, and social skills that are essential to children's social interaction and relationships (e.g., Chen, Justice, et al., 2020; Chen, Lin, et al., 2020; Park & Lee, 2015; Rubin et al., 2013). As young children transition from home to school environments, their interactions become more social, changing from solitary or parallel play to social play (Rubin et al., 2013; Rubin, Watson, & Jambor, 1978). During this time, a sizable portion of children begins to experience peer isolation, with children who have disabilities being particularly susceptible (Chen et al., 2020). However, limited studies have examined peer isolation across early grade levels, although a handful of research has indicated that young children who experience

peer isolation tend to replicate or crystallize their isolation status in the successive grade or the later developmental stage (Laine, Neitola, Aurnmaa, & Laakkonen, 2010; Waas & Honer, 1990). This is an important research question, since children may increasingly experience challenges in peer social interactions as they transition from early childhood education classrooms to formal education classrooms due to the increasing demands of academic learning, more structured classroom learning activities, and more complex peer interactions (e.g., Ladd, Herald, & Kochel, 2006; Rimm-Kaufman & Pianta, 2000). Thus, regarding the grade-level differences, we had two competitive hypotheses: young children were more likely to experience peer isolation than older children, as young children are still developing social skills. Alternatively, older children might be more likely to become isolates due to the increasing demands and challenges that they faced in formal education.

Most existing studies on peer isolation in the classroom setting tend to treat isolated children monolithically as a single group. However, according to Bronfenbrenner and Morris (2006), every individual possesses various personal characteristics that can jointly influence their proximal processes in the ecological contexts. It stands to reason that multiple personal factors, as reviewed in the prior sections (e.g., language difficulties, poor social skills), may have a confluence influence on peer isolation. We expect to find the following subgroup of isolated children. The first subgroup includes children who are aggressors and victims at the same time during peer interactions, since victims can learn to be aggressive as they observe and experience peer victimizations (e.g., Iloa, Lempinen, Huttunen, Ristkari, & Sourander, 2016; Ostrov, 2010). The second subgroup includes children who have low skills and tend to be aggressive to peers. This is because aggressive children tend to be associated with low social skills or language skills, which may be related to their fewer opportunities for positive peer interactions to observe and to practice skills of perspective-taking, communicating needs, and interpreting peers' intent (Ray, Blanco, Sullivan, & Holliman, 2009; Wood et al., 2002). The third subgroup refers to children with low skills and tend to be victimized. It is because victimized children tend to have low competence in social situations, which might hinder the intensity and quality of their peer interactions (Barchia & Bussey, 2010; Dodge et al., 2003), and therefore could be associated with fewer peer resources and support for their social or language development (Chen, Justice, et al., 2020; Chen, Lin, et al., 2020). And the fourth subgroup may include children with low skills across domains. Low skills in either language or social domains have been found associated with peer isolation as reviewed above, and therefore, the occurrence of having low skills across domains may further put children in a disadvantaged situation.

Regarding the development of isolated children, this study focuses on the development of language and social domains, which are the major developmental tasks for young children. The difference across subgroups of isolated children in their development is exploratory. Two competitive hypotheses are presented here: children who have low skills in certain aspects of development may gain these skills as they increase their experiences of interacting with peers through mechanisms such as peer modeling and observational learning (Bandura, 1971). Alternatively, the disadvantages of isolated children observed in the fall could be further exaggerated in the spring, and the Matthew effect (Walberg & Tsai, 1983) could be particularly salient and reinforced when multiple disadvantages co-occur.

In all, the overarching goal of this study is to provide guidance for researchers and practitioners to better provide individualized developmental support to children with various isolate profiles. The specific goals are twofold. First, we aimed to identify reliable subgroups of isolated children (i.e., isolate profiles) using a person-centered approach. A sub-aim is to examine grade-level differences across the isolate profiles. Second, we aimed to compare the language and social skills across children with different isolate profiles from fall to spring over an academic year.

Methods

Participants

Data were collected as part of a larger project examining the classroom ecology in preschool to third-grade classrooms. A primary goal of the larger project, among others, was to improve fundamental understanding of the social networks in preschool to third-grade settings, as well as predictors of children's role in these social networks. To address the research questions in the current paper, we rely on data collected from a cohort of students in the 2017–2018 academic year.

Teachers and children were recruited in the fall from two large school districts in a Midwestern state, as well as private and public preschool programs geographically situated in the boundaries of these districts. Teachers who consented to participate were asked to complete questionnaires about their classrooms, their students, and their own background information. A monetary incentive was provided to each teacher for completing all study activities. All children attending classrooms with participating teachers were eligible to enroll, and consent packets were sent to parents via backpack mail. As a token of appreciation, the research staff sent the children age-appropriate storybooks after each assessment and provided a gift card for each parent upon completion of the questionnaire.

In total, 1423 children from 96 classrooms were actively consented (i.e., parents returned the consent form and explicitly allowed children to participate). Among them, children were excluded from the analysis if they were absent in the child assessment or were in the two classrooms where the lead teachers were changed in the spring and the new teachers were not consented to participate in this study. As result, the analytical sample included 1275 children from 94 classrooms, based on which the statistics and analysis reported below were generated. On average, children were 80 months old in the fall ($range = 25\text{--}114$), and distributed across five grade levels (preschool 13%, kindergarten 29%, first grade 19%, second grade 23%, third grade 16%). Forty-nine percent of the sample were boys, 93% were reported to primarily speak English at home, and 9% had an Individualized Education Program (IEP) indicating the presence of a disability. Parent-reported information on race and ethnicity was available for 1264 children, which indicated that the majority were White (76%), with 4% Black or African American, 7% Multiracial, and 12% other races. Five percent of children were Hispanic or Latino. In terms of socioeconomic status (SES), 27% of the families reported an annual income of \$0 to \$80,000, 25% reported \$80,001 to \$130,000, 23% reported \$130,001 to \$180,000, and 25% reported an annual income greater than \$180,000. Of the 1265 children whose mothers reported their highest level of education, 18% had obtained a high school diploma or GED, 10% had received an associate degree, 36% had a bachelor's degree, and 32% had attained a graduate or professional degree.

At the classroom-level, the average class size was 22.08 ($SD = 3.86$, $range = 12\text{--}29$). There were 15 (16%) preschool classrooms, 33 (35%) kindergarten classrooms, 15 (16%) first grade classrooms, 18 (19%) grade two classrooms, and 13 (14%) grade three classrooms. The lead teachers were mostly female (99%), White (97%), and well-educated (95% with a bachelor's degree or above). They reported 14.11 years of teaching experience on average ($SD = 7.94$, $range = 2\text{--}35$).

Measures

The key variables were assessed in the fall and the spring including children's: (1) isolate status; (2) language skills; (3) executive function; (4) social skills; and (5) relational aggression and victimization. We also collected the background information of children and classrooms using questionnaires administered to parents and teachers in the fall.

Isolate status

We identified isolated children via a "play most" peer-nomination

task. During one-on-one interviews, we asked children to nominate classmates they liked to play with the most (i.e., “who do you like to play with the most?”), which is a typical way of assessing peer-liking relationships (e.g., Parkhurst & Asher, 1992; Shin, Kim, Goetz, & Vaughn, 2014; Wu, Hart, Draper, & Olsen, 2001), even in preschool classrooms (Daniel, Santos, Antunes, Fernandes, & Vaughn, 2016). To facilitate young children completing the nomination task, preschoolers and kindergarteners were presented with pictures of all of their classmates, whereas children in the primary grades were provided with a list of classmates' names. Children could nominate as many classmates as they wanted, or no one, although researchers encouraged children not to nominate every classmate. Note, we administered the peer nomination task not only among actively consented children but also among passively consented children ($n = 313$), whose parents did not return the consent form. No other information or assessment was collected from passively consented children. This passive-consent practice was approved by the governing IRB board. It allowed the maximum available children to be presented in the classroom roster and, therefore, enhance the representativeness and validity of the peer nomination data.

For each actively consented child, we first calculated the raw number of nominations a child received from classmates. We then calculated the standardized score by dividing the raw number of nominations by the maximum possible nominations the child could receive in the classroom (i.e., the total number of children receiving the peer nomination task minus one) to allow comparisons across classrooms. The standardized score in the fall and that in the spring were moderately but significantly correlated ($r = .41, p < .01$). Though children may change their nominations over time, this task is valid and reliable for assessing peer acceptance (Cillessen, 2009), which provides congruent information with alternative assessment approaches targeting children as young as three years old, such as teaching ratings and researcher observations (Chen, Justice, et al., 2020; Chen, Lin, et al., 2020). In the current study, the validity of this nomination task could be further supported by the correlation between the number of nominations individual children received and their social skills, which was statistically significant for all the five grades and was comparable whether the raw or the standardized score of received nominations was used ($r_s = .23-.40, ps < .01$ when the raw score was used; $r_s = .24-.37, ps < .01$ when the standardized score was applied). The assessment of social skills is detailed below.

Children were labeled as isolates, if their standardized number of nominations received in the fall were at the lowest quartile (25%) among all children, while the others were labeled as non-isolates. The fall assessment was used in identifying isolates since a part of the goal of this study was to examine the association between isolate profiles and children's growth over an academic year.

Language ability

Children's language ability was measured by the Picture Vocabulary task of *Woodcock-Johnson III Tests of Achievement* (WJ; Woodcock, McGrew, & Mather, 2007). This task tests children's expressive vocabulary at the single-word level. Children are asked to point to a picture that matches a word spoken by the examiner, and are then asked to name the pictures as the test progresses, until the ceiling was reached (i.e., six consecutive incorrect items). The test contained 44 items, with the raw score ranging from zero to 44. Raw scores were transformed to standard scores to adjust for age differences and to facilitate the interpretation of the results. The internal consistency based on the current sample was high (Cronbach's $\alpha = .83$ and $.85$ in the fall and the spring respectively). The fall and the spring assessments were highly correlated ($r = .72, p < .01$).

Executive function

Executive function was assessed using a direct assessment, *Head Toes Knees Shoulders* (HTKS), which is described by Ponitz et al. (2008) as a measure of inhibitory control, working memory, and attention focusing. During the task, children are asked to play a game in which they must do

the opposite of what the experimenter says. For example, if the experimenter instructs the children to touch their heads, they are supposed to touch their toes. The final score is the sum of the first six practice items and 20 test items, each of which is scored 0 (incorrect), 1 (self-correct without prompting), or 2 (correct), for a total of 52 points. Cronbach's α was $.95$ and $.93$ in the fall and the spring respectively based on the current sample. The fall-to-spring correlation was moderate ($r = .67, p < .01$).

Social skills

Teachers reported individual children's social skills using two subscales of the *Teacher-Child Rating Scale* (Perkins & Hightower, 2002): peer skills and assertiveness. The peer skills and assertiveness subscales each included eight items (e.g., “makes friends easily” for peer skill; “defends own view under group pressure” for assertiveness), using a five-point Likert scale from zero (*Strongly disagree*) to four (*Strongly agree*). The average score on each subscale was used in the analysis. The Cronbach's α was high for peer skills ($.94$ in both fall and spring) and assertiveness ($.87$ in fall and $.86$ in spring). Fall and spring scores were highly correlated for both subscales ($r = .80$ and $.76$ for peer skills and assertiveness respectively, $ps < .01$).

Relational aggression and victimization

Teachers reported the extent to which each child was relational aggressive in peer interactions (Crick, Casas, & Mosher, 1997; six items, e.g., “tells others not to play with or be a peer's friend”) and the extent to which each child was relationally victimized by peers (Crick, Casas, & Ku, 1999; two items, e.g., “gets ignored by playmates when they are mad at him/her”). Each item was rated on a five-point scale of zero (*Never or almost never true*) to four (*Always or almost always true*). The average score was computed for the two subscales and used in further analyses. Internal consistencies for the relational aggression subscale was $.95$ to $.96$ based on the fall and the spring assessments respectively, and was $.93$ for the relational victimization subscale in both assessment time points. The fall and spring ratings were moderately correlated for the relational aggression ($r = .61, p < .01$) and the relational victimization subscale ($r = .47, p < .01$).

Child and classroom characteristics

Parents reported children's demographic characteristics (e.g., child sex, birth date, race, and ethnicity), as well as family income, maternal education, and primary languages spoken at home. Children's IEP status was attained from the teacher report. The classroom's lead teachers also reported classroom characteristics such as class size, classroom composition (i.e., percentage of girls and percentage of children with IEP), along with teacher demographics and qualifications.

Analytical approach

As a preliminary analysis, we compared the characteristics of isolates and non-isolates via independent t -tests for continuous variables and Chi-squared tests for categorical variables. The effect size was measured by Cohen's d for continuous variables and Cohen's w for categorical variables (Cohen, 1988). Following the rule of thumb proposed by Cohen, $d = 0.2$ indicates a small effect, 0.5 a medium effect, and 0.8 a large effect; $w = 0.1$ is considered a small effect, 0.3 a medium effect, and 0.5 a large effect.

To address the first research goal, namely, to identify profiles of isolates, we employed Multilevel Latent Profile Analysis (MLPA) based on the subset of sample labeled as isolates together with their fall assessments, including language ability, executive function, social skills, assertiveness, relational aggression, and relational victimization. Latent Profile Analysis (LPA) is a statistical method for identifying subgroups (i.e., the profiles) of cases based on their characteristics in the format of multivariate continuous data (Clogg, 1995; Lazarsfeld, Henry, & Anderson, 1968). For a specific profile solution, each case was estimated

in terms of the probability of falls into each profile and then was grouped into the “most likely” profile. Though different numbers of profiles can be explored, the final profile solution is determined by theoretical expectations as well as model fit statistics. Given the hierarchical nature of our data, with children nested within classrooms and grade levels, we applied MLPA in Mplus (Muthen & Muthen, 2012), which accounts for the nested effect using the finite mixture modeling framework (McLachlan & Peel, 2004; Vermunt, 2003).

We ran MLPA models with different numbers of profiles (i.e., 2–6

profiles). Eventually, we chose the four-profile solution as the optional MLPA model based on conceptual interpretability and multiple statistical indices. Conceptually, compared to the three-profile solution, the four-profile solution additionally yielded a profile including children with low skills; compared with the four-profile solution, the five-profile solution yielded an additional profile with close-to-average scores in all variables. Statistically, fit statistics (AIC, BIC, SSABIC, best log-likelihood; lower is better), adjusted LMR (a significant *p*-value rejects the k-1 profile model in favor of the k profile model; Lo et al., 2001;

Table 1
Comparing child-level and classroom-level characteristics of isolates and non-isolates.

Variables	Isolates (N = 254)		Non-isolates (N = 1021)		Differences	
	Mean	SD	Mean	SD	E.S. ¹	<i>p</i> ²
Child demographics						
Sex: female	47%		52%		0.04	.141
Race: White	71%		78%		0.09	.015
African American	5%		4%			
Other	18%		11%			
Multiracial	6%		8%			
Ethnicity: Hispanic	6%		5%		0.02	.411
Primary home language: English	89%		94%		0.07	.019
Individualized Education Program (IEP)	12%		8%		0.06	.020
Mother's education: no high school diploma	7%		2%		0.13	<.001
high school or GED	21%		18%			
Associate degree	13%		9%			
Bachelor's degree	29%		38%			
advanced degree	31%		33%			
Age in months	76.97	16.02	80.66	16.34	0.23	.001
Annual household income (in \$10,000)	10.03	6.38	12.37	6.16	0.37	<.001
Child measures						
Language ability						
Fall score	99.09	10.68	100.60	9.31	0.15	.040
Spring score	99.40	10.20	100.67	9.06	0.13	.076
Executive function						
Fall score	35.01	17.42	40.93	13.42	0.38	<.001
Spring score	41.90	13.55	46.11	8.96	0.37	<.001
Peer skills						
Fall score	2.71	0.91	3.12	0.75	0.49	<.001
Spring score	2.65	0.94	3.04	0.79	0.44	<.001
Assertiveness						
Fall score	2.56	0.75	2.82	0.73	0.35	<.001
Spring score	2.55	0.76	2.79	0.72	0.33	<.001
Relational aggression						
Fall score	0.39	0.76	0.32	0.66	0.10	.166
Spring score	0.47	0.80	0.42	0.73	0.07	.334
Relational victimization						
Fall score	0.53	0.83	0.32	0.68	0.28	<.001
Spring score	0.52	0.78	0.45	0.78	0.08	.246
Teacher demographics						
Sex: female	100%		99%		0.05	.061
Race: White	95%		98%		0.09	.007
African American	3%		2%			
Other or Multiracial	2%		0%			
Ethnicity: Hispanic	2%		0%		0.08	.005
Education: High school diploma or Associate degree	2%		3%		0.04	.401
Bachelor's degree	24%		27%			
Advanced degree	74%		70%			
Age in years	38.04	9.29	38.76	8.84	0.08	.260
Teaching experience in years	13.81	8.31	14.70	7.73	0.11	.136
Classroom-level characteristics						
Grade level: Preschool	12%		14%		0.13	.001
Kindergarten	40%		26%			
First grade	17%		19%			
Second grade	17%		25%			
Third grade	14%		16%			
Class size	23.18	3.49	22.00	3.54	0.34	<.001
Percent of girls in class	48.92	7.59	49.18	7.43	0.03	.623
Percent of children with IEP in class	7.71	7.60	8.38	8.22	0.09	.215

Note.
¹ Effect size is measured by Cohen's *d* for continuous variables (small 0.2, medium 0.5, large 0.8), and Cohen's *w* for categorical variables (small 0.1, medium 0.3, large 0.5; Cohen, 1988).
² For continuous variables, independent *t*-tests were conducted; for categorical variables, Chi-square tests were conducted.

Vuong, 1989), and entropy (values approaching one indicates higher classification accuracy; Celeux & Soromenho, 1996) were presented in Table 3. These statistics showed that the four-profile solution had better fit indices than the three- or the two-profile solutions and that it was the better solution than the five- or the six-profile solution since it had a better entropy and a non-significant adjusted LRT.

To address the second research goal – examining the association between isolate profiles and children's growth on language and social abilities from fall to spring, a set of analyses of covariance (ANCOVA) was applied, controlling for children's age. Post-hoc pairwise comparisons were conducted following any significant omnibus tests, and a Bonferroni correction was applied to adjust the error rate.

Missing data

Within the analytical sample, missing data ranged from 0 to 4% for child demographic variables and 0–6% for classroom-level variables. Data for child direct assessments were fully observed in the fall, whereas in spring the proportion of missing data ranged from 0% to 4% across assessments. To utilize all data available, we employed full information maximum likelihood (FIML) in MLPA to treat missing data in all variables (Arbuckle, Marcoulides, & Schumacker, 1996). Given that the model was correctly specified and the missing-at-random (MAR) assumption is plausible, the estimates derived from FIML should be unbiased (Little, Jorgensen, Lang, & Moore, 2014).

Results

In the analytical sample ($n = 1275$), 254 children were identified as isolates, who were at the bottom quartile regarding the standardized number of the “play most” nominations received from classmates. Reflecting the standardized nomination scores to the raw scores, isolated children receive nearly no play-most nomination from classmates ($M = 0.29$, $SD = 0.45$; $range = 0-1$), whereas non-isolates received 2.86 nominations on average ($SD = 1.60$; $range = 1-12$). Note, as the standardized score accounted for the maximum number of nominations a child could receive, for children who received only one nomination from peers, they might be identified as isolates if they were in a large classroom and could be labeled as non-isolates if they were in a small classroom.

Preliminary analysis: differences between isolates and non-isolates

We compared isolates and non-isolates on a variety of child-level characteristics, including child demographics, language and social abilities, as well as teacher and classroom characteristics (Table 1). In terms of child-level characteristics, results showed that isolates and non-isolates were not significantly different in sex or ethnicity. However, isolated children were less likely to be white ($p = .015$, $w = 0.09$) or come from English-speaking households ($p = .019$, $w = 0.07$) compared to non-isolates. They also tended to be younger in age ($p = .001$, $d = 0.23$) and come from families with lower income levels ($p < .001$, $d = 0.37$) and less-educated mothers ($p < .001$, $w = 0.13$). Notably, IEP status was significantly related to isolate status ($p = .020$, $w = 0.06$). Twelve percent of isolated children had an IEP as compared to 8% among non-isolates. Although isolates and non-isolates did not have sizable difference in language ability or relational aggression, isolates had lower executive function ($p < .001$, $d = 0.37$ and 0.38 in fall and spring respectively), lower peer skills ($p < .001$, $d = 0.49$ and 0.44 in fall and spring respectively) and assertiveness ($p < .001$, $d = 0.35$ and 0.33 in fall and spring respectively), and higher levels of relational victimization ($p < .001$, $d = 0.28$ in the fall).

In terms of classroom characteristics, the grade-level difference was significant ($p = .001$, $w = 0.13$). The post hoc analysis suggested that kindergarten classrooms tended to have higher proportions of isolates (27%) than those in other grades (15%–18%). As presented above, isolates tended to be younger. Hence, we further examined the age effect

Table 2

Pearson correlation between indicators of latent profile analyses (N = 254).

	1	2	3	4	5	6
1. Language ability (WJ-PV standard score, fall)	–	.23***	.19**	.23***	–.08	–.09
2. Executive function (HTKS raw score, fall)		–	.15*	.14*	–.06	–.08
3. Peer skills (teacher rating, fall)			–	.55***	–.34***	–.51***
4. Assertiveness (teacher rating, fall)				–	.04	–.11
5. Relational aggression (teacher rating, fall)					–	.66***
6. Relational victimization (teacher rating, fall)						–

Note. WJ = Woodcock-Johnson III Tests of Achievement (Woodcock et al., 2007); PV = Picture Vocabulary; HTKS = Head Toes Knees Shoulders (Ponitz et al., 2008).

* $p < .05$; ** $p < .01$; *** $p < .001$.

within each grade level. The results showed that the age effect was significant only in kindergarten and second grade, where isolates were slightly younger than non-isolates in terms of age in month ($p = .029$ and $.023$ respectively). Additionally, isolates were more likely to be identified in larger classrooms ($p < .001$, $d = 0.34$).

Identifying latent profiles of isolates

To explore latent profiles among isolated children, we conducted MLPA based on six potential characteristics of isolates assessed in the fall of the academic year, including language ability, executive function, social skills (peer skills and assertiveness), relational aggression, and relational victimization. Pearson correlation coefficients among these six indicators within the sample of isolated children are displayed in Table 2. It shows that all the correlations between the four positive characteristics were generally positive and significant at the .05 alpha level. As expected, the strength of the correlation between the two subscales of social skills - peer skills and assertiveness - was particularly strong ($r = .55$, $p < .001$). Relational aggression and victimization were strongly correlated with each other ($r = .66$, $p < .001$). Unsurprisingly, both of them were negatively correlated with peer skills ($r = -.34$ and $-.51$ respectively, $ps < .001$).

The MLPA model specification and selection process have been detailed in the Method section. The final solution with four isolate profiles is visualized in Fig. 1, where the non-isolate group is presented as a reference. Results showed that Profile 1 included 18% of the isolated children ($n = 46$); we named this profile as “low executive function” since children in this profile had the lowest scores on executive function (2.01 SD below the mean of the analytical sample).

Profile 2 included 7% of the isolated children ($n = 17$), which was named as “victimized and low social skills” since these children had the lowest score on social skills (1.98 SD below the mean on peer skills and 0.82 SD below the mean on assertiveness) and tended to frequently experience relational victimization (2.02 SD above the mean). Children in this profile also had low executive function (1.91 SD below the mean).

Profile 3 included 6% of the isolated children ($n = 15$), which was labeled as “aggressive and victimized” since these children had the highest level of relational aggression (3.62 SD above the mean of the analytical sample) and most frequently experience relational victimization (2.72 SD above the mean). Children in this profile also tended to

Table 3
Fit indices for different profile solutions.

Number of profiles	Number of free parameters	Fit indices			Entropy	Smallest group size	Best Log-likelihood	Δ Log-likelihood	Adjusted LRT <i>p</i> -value
		AIC	BIC	SSABIC					
2	19	4008.80	4076.01	4015.77	0.99	21	-1985.40	174.06	<.001
3	26	3875.09	3967.07	3884.64	0.95	18	-1911.55	73.85	.449
4	33	3786.64	3903.37	3798.76	0.97	15	-1860.32	51.23	.091
5	40	3706.33	3847.82	3721.02	0.94	14	-1812.79	47.16	.406
6	47	3646.96	3813.21	3664.21	0.89	5	-1776.48	36.31	.244

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SSABIC = Sample-Size Adjusted Bayesian Information Criterion; Δ Log-likelihood = change in log-likelihood from *k*-1 profile model to *k* profile model; Adjusted LRT = Lo-Mendell-Rubin Adjusted Likelihood Ratio test.

Table 4
Comparing four profiles of isolates based on language and social development within an academic year (N = 254).

Measures	Isolates Profile 1: Low Executive Function (n = 46, 18%)	Isolates Profile 2: Victimized & Low Social Skill (n = 17, 7%)	Isolates Profile 3: Aggressive & Victimized (n = 15, 6%)	Isolates Profile 4: Average (n = 176, 69%)	<i>p</i> ¹
	% or <i>M</i> (<i>SD</i>)	% or <i>M</i> (<i>SD</i>)	% or <i>M</i> (<i>SD</i>)	% or <i>M</i> (<i>SD</i>)	
Language ability (standard score)					
Fall assessment	95.53 (10.28) ^{IV}	94.63 (9.97) ^{IV}	99.20 (9.85)	100.72 (10.50) ^{I,II}	<.001
Spring assessment	96.73 (9.41) ^{IV}	94.50 (10.24) ^{IV}	100.93 (11.10)	100.44 (10.14) ^{I,II}	.005
Fall-spring difference ²	1.20 (6.34)	-0.12 (7.28)	1.73 (6.87)	-0.28 (7.86)	.132
Executive function					
Fall assessment	7.02 (6.86) ^{III, IV}	9.27 (10.17) ^{III, IV}	43.57 (6.21) ^{I,II}	44.50 (6.74) ^{I,II}	<.001
Spring assessment	26.20 (17.58) ^{III, IV}	25.33 (15.16) ^{III, IV}	47.71 (3.69) ^{I,II}	47.07 (6.58) ^{I,II}	<.001
Fall-spring difference ²	19.18 (18.17) ^{*** III, IV}	16.07 (12.47) ^{*** III, IV}	4.14 (5.23) ^{* I, II}	2.57 (7.20) ^{*** I,II}	<.001
Peer skill					
Fall assessment	2.87 (0.73) ^{II,III}	1.36 (0.68) ^{I,IV}	1.84 (0.98) ^{I,IV}	2.86 (0.81) ^{II,III}	<.001
Spring assessment	2.77 (0.88) ^{II,III}	1.74 (0.89) ^{I,IV}	1.65 (0.95) ^{I,IV}	2.80 (0.86) ^{II,III}	<.001
Fall-spring difference ²	-0.10 (0.70)	0.37 (0.69) [*]	-0.19 (1.04)	-0.06 (0.57)	.051
Assertiveness					
Fall assessment	2.55 (0.70)	2.10 (0.70) ^{III,IV}	2.77 (0.57) ^{II}	2.61 (0.75) ^{II}	.010
Spring assessment	2.56 (0.74)	2.02 (0.71) ^{III,IV}	2.71 (0.72) ^{II}	2.59 (0.75) ^{II}	.007
Fall-spring difference ²	0.01 (0.45)	-0.08 (0.38)	-0.06 (0.49)	-0.03 (0.53)	.933
Relational aggression					
Fall assessment	0.18 (0.34) ^{II,III}	1.27 (0.82) ^{I,III,IV}	2.62 (0.68) ^{I,II,IV}	0.17 (0.34) ^{II,III}	<.001
Spring assessment	0.24 (0.46) ^{II,III}	1.23 (1.12) ^{I,III,IV}	1.94 (1.25) ^{I,II,IV}	0.33 (0.60) ^{II,III}	<.001
Fall-spring difference ²	0.06 (0.31) ^{III}	-0.05 (0.91) ^{III}	-0.68 (0.85) ^{* I, II, IV}	0.16 (0.52) ^{*** III}	<.001
Relational victimization					
Fall assessment	0.23 (0.38) ^{II,III}	1.88 (0.76) ^{I,IV}	2.25 (0.80) ^{I,IV}	0.33 (0.58) ^{II,III}	<.001
Spring assessment	0.34 (0.57) ^{II,III}	1.31 (1.12) ^{I,IV}	1.61 (1.15) ^{I,IV}	0.39 (0.61) ^{II,III}	<.001
Fall-spring difference ²	0.11 (0.52) ^{II, III}	-0.56 (1.06) ^{I, IV}	-0.64 (1.10) ^{* I, IV}	0.07 (0.64) ^{II, III}	<.001

¹ Profile differences were tested using multivariate ANCOVA (controlling for child age) followed by post-hoc pairwise comparisons with the Sidak adjustment method. The significant pairwise differences were marked by superscript letters (e.g., for Profile 1, ^{II, IV} indicates that the score is significantly different from those of Profiles 2 and 4).

² The differences between the fall and the spring scores were tested using dependent-sample *t*-test.

* *p* < .05, ** *p* < .01, *** *p* < .001.

have low social skills (1.55 *SD* below the mean).

Profile 4, labeled as “average”, contained more than one-half of the isolated children (*n* = 176, 69%), whose characteristics were approximately at the average level of the analytical sample, which made them more comparable to non-isolated children on the six characteristics than the other isolate profiles.

To further understand the profiles, we compared the composition of profile membership across grade levels, which varied significantly (*p* < .001, Fig. 2). The percentage of children with the “low executive function” profile was significantly lower in primary grades than those in preschool and kindergarten (preschool = 48%, kindergarten = 27%, grade one = 5%, grade two = 0%, and grade three = 3%), whereas the percentage of children with the “average” profile showed the opposite trend (preschool = 39%, kindergarten = 52%, grade one = 88%, grade

two = 93%, and grade three = 94%). Preschool and kindergarten also had a significantly higher percentage of children classified in the “victimized and low social skill” profile (12%–13%) than higher grade levels (0%–2%). The percentages of children classified as the “aggressive and victimized” profile were highest in kindergarten and second grade (9% and 7%), but relatively low in other grades (0%–5%).

Differences across profiles on language and social development

We compared the four isolate profiles on children's language and social skills in the fall and spring, as well as the change over the academic year, controlling for children's age (Table 4, Fig. 3). Regarding language ability, children with Profile 1 (“low executive function”) and Profile 2 (“victimized and low social skills”) had significantly lower

Table 5
Supplementary analysis: Comparing non-isolates and the “average” isolates profile.

Measures	Non-isolates (n = 1021)	Isolates Profile 4: Average (n = 176)	<i>p</i> ¹
	% or <i>M</i> (<i>SD</i>)	% or <i>M</i> (<i>SD</i>)	
Language ability (standard score)			
Fall assessment	100.61 (9.34)	99.28 (10.58)	.021
Spring assessment	100.67 (9.06)	99.40 (10.20)	.035
Fall-spring difference ²	0.06 (6.92)	-0.28 (7.86)	.539
Executive function			
Fall assessment	41.23 (13.14)	35.33 (17.37)	<.001
Spring assessment	46.11 (8.96)	41.90 (13.55)	<.001
Fall-spring difference ²	4.88 (10.15)***	2.57 (7.20)***	.005
Peer skill			
Fall assessment	3.12 (0.75)	2.70 (0.91)	<.001
Spring assessment	3.04 (0.79)	2.65 (0.94)	<.001
Fall-spring difference ²	-0.08 (0.48)***	-0.06 (0.57)	.603
Assertiveness			
Fall assessment	2.83 (0.72)	2.58 (0.74)	<.001
Spring assessment	2.79 (0.72)	2.55 (0.76)	<.001
Fall-spring difference ²	-0.03 (0.51)*	-0.03 (0.53)	.840
Relational aggression			
Fall assessment	0.30 (0.62)	0.39 (0.75)	.139
Spring assessment	0.42 (0.73)	0.47 (0.80)	.497
Fall-spring difference ²	0.12 (0.63)***	0.16 (0.52)***	.393
Relational victimization			
Fall assessment	0.30 (0.66)	0.53 (0.82)	<.001
Spring assessment	0.45 (0.78)	0.52 (0.78)	.310
Fall-spring difference ²	0.15 (0.78)***	0.07 (0.64)	.174

¹ Difference between non-isolates and average isolates were tested using multivariate ANCOVA (controlling for child age).

² The differences between the fall and the spring scores were tested using dependent-sample *t*-tests.

* *p* < .05; *** *p* < .001.

language ability (94.50–96.73 points) than that of Profile 4 (“average”) in both the fall and the spring (100.44–100.72 points). The growth in language ability for none of the isolate profiles was statistically significant.

Regarding executive function, children with Profile 1 (“low executive function”) and Profile 2 (“victimized and low social skills”) again had significantly poorer executive function (7.02–26.20 points) than that of the other two profiles in both the fall and the spring (43.57–47.71 points), although the growth of executive function for Profile 1 and 2 was significantly greater than other children (16.07–19.18 vs. 2.57–4.14 points).

In terms of social skills, children with Profile 2 (“victimized and low social skills”) and Profile 3 (“aggressive and victimized”) had significantly poorer peer skills (1.36–1.84 points) than the other two profiles in the fall and spring (2.77–2.87 points), although children in Profile 2 achieved significant growth on peer skill over the year (0.37 points, *p* < .05). Further, different from Profile 3, children with Profile 2 remained to have a significantly lower level of assertiveness in the fall and the spring (2.02–2.10 vs. 2.71–2.77 points).

Regarding relational aggression, in both fall and spring, children with Profile 3 (“aggressive and victimized”), aggression scores: 1.94–2.62) had higher scores than children with Profile 2 (“victimized and low social skills”, aggression scores: 1.23–1.27). Children with Profile 2 and those with Profile 3 had a significantly higher degree of aggression than children with the other profiles (aggression scores: 0.18–0.33), although children with Profile 3 achieved a significant

decrease in relational aggression over the year (–0.68 point, *p* < .05).

Similarly, about relational victimization, children with Profile 3 (“aggressive and victimized”) and Profile 2 (“victimized and low social skills”) had a significantly higher degree of experiencing peer victimization (1.21–2.25 points) than the other two profiles in the fall and the spring (0.23–0.39 points), although children with Profile 3 had significant decrease on relational victimization over the year (–0.64 points, *p* < .05).

A set of supplementary analyses was conducted to further understand Profile 4 (“average”), which included 69% of the isolates and seemed to be relatively more adaptive than other isolate profiles. As presented in Table 5, we compared Profile 4 (“average”) with non-isolated on their language and social skills in the fall and spring, as well as the growth over the year, controlling for children's age. Results showed that although these two groups of children were comparable in their language abilities and relational aggression, children with the “average” isolate profile had lower scores on executive function and social skills (i.e., peer skills and assertiveness) in both fall and spring and had greater experience in relational victimization in the fall. Moreover, compared to non-isolates, children with the “average” isolate profile had slower growth in executive function (*p* = .005).

Discussion

Being isolated from peers tends to negatively influence children's learning and social development (e.g., Berry & O'Connor, 2010; Cacioppo & Hawkey, 2009; Dodge et al., 2003; Rubin et al., 2013), and has been long associated with long-term internalizing and externalizing problems (Danese et al., 2009; Rubin & Coplan, 2004). A variety of individual factors have been found to predict peer isolation, including language ability, executive function, social skills, aggression, and peer victimization. The current study examined the heterogeneity among isolated children by identifying profiles of the above-mentioned factors and comparing profiles in terms of children's language and social skills from the fall to the spring of an academic year.

Isolate profiles

It is evidenced that there appear to be reliable subgroups among children who are isolated by classmates, which caution practitioners and researchers who may tend to view isolated children as a homogeneous group. In this study, we identified four profiles of isolates based on the associations among children's language ability, executive function, social skills, relational aggression, and relational victimization. Our results showed that 18% of the isolates were characterized by having a low executive function, 7% of the isolates had low social skills and are frequently victimized by peers, 6% of the isolates had high levels of relational aggression and victimization at the same time. For the remaining isolates (69%), their language and social characteristics were at the average level of the sample, including isolates and non-isolates. The co-occurrence of peer victimization and low social skills could be explained that the experience of being victimized could hinder children's competence in social situations, which would reduce the opportunities and resources for them to develop their social skills (Barchia & Bussey, 2010; Dodge et al., 2003). The co-occurrence of aggression and victimization is also in line with the literature (e.g., Iloia et al., 2016; Ostrov, 2010) suggesting that on the one hand, victimized children may respond with aggression to avoid being further victimized; on the other hand, victimized children can learn from aggressors and model them in future peer interactions. Two other profiles were hypothesized but not identified: children who had low social skills and tend to be aggressive and children who had low skills across domains. One possibility is that these two groups were overlapped and included in other isolate profiles. Specifically, children with low social skills and high aggression might have been included in Profile 3 – they were labeled as “aggressive and victimized” due to their highest level of aggression and victimization,

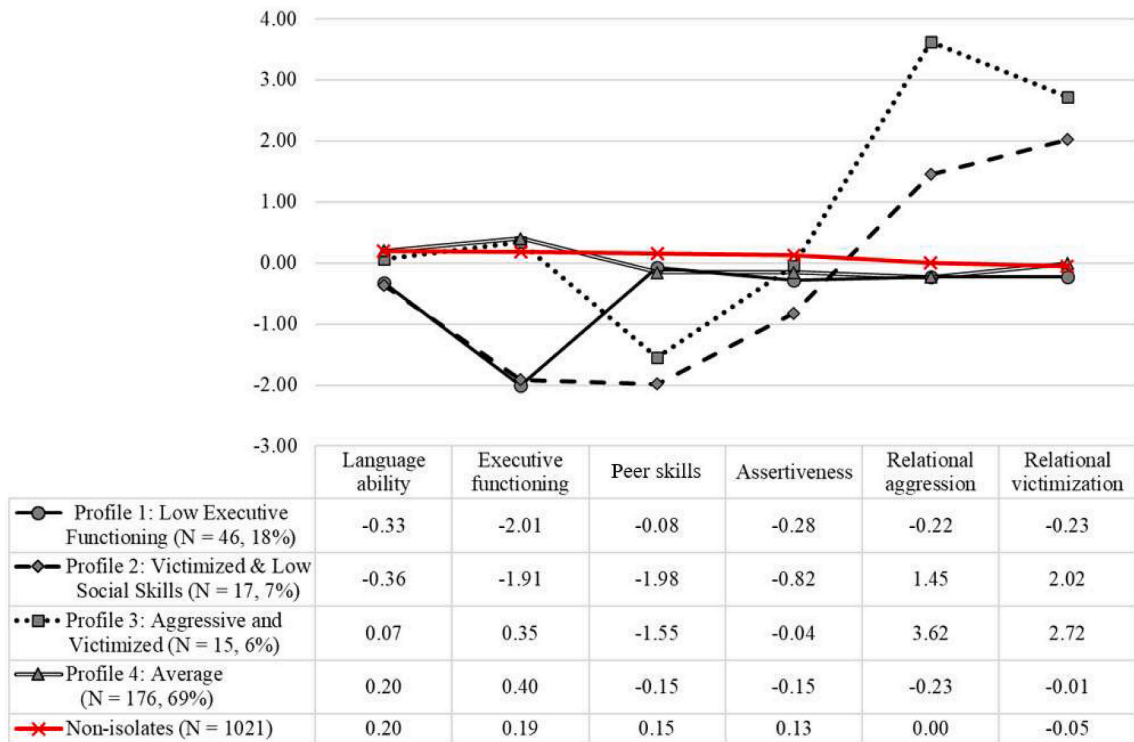


Fig. 1. Four profiles of isolates.

Note. The figure displays the mean score of each indicator for the four profiles and the non-isolates (as the reference group). We standardized all the scores within the analytical sample (N = 2549), so the numbers in the table and the respective location on the y-axis indicate the number of standard deviations different from the sample mean (0), i.e., they indicate the relative standing of each profile within the current sample.

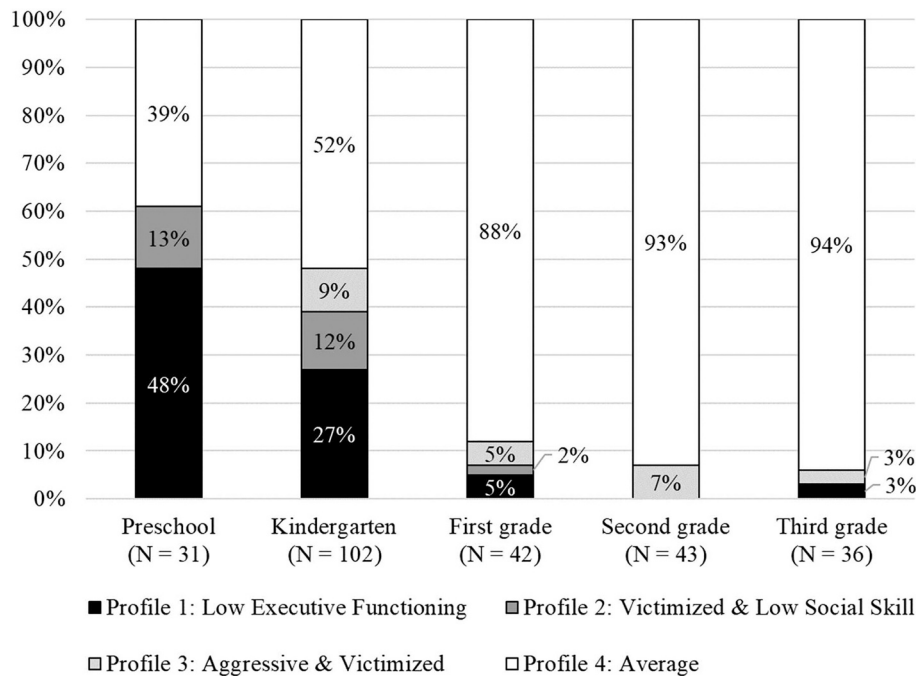


Fig. 2. Profile composition within grade levels.

and at the same time, their peer skill was at a significantly lower level than children with Profile 1 and Profile 4. Children with low skills across domains might have been included in Profile 2 (“victimized and low social skills”), who were distinct from other isolated children by their low social skills and high peer victimization. However, besides these two

social aspects, children with Profile 2 were also at the disadvantage in almost all the other language and social skills (Fig. 1).

It is interesting and unexpectedly, the “average” isolate profile contained a big proportion of isolated children. Children with this profile were relatively more advanced than children with the other isolate

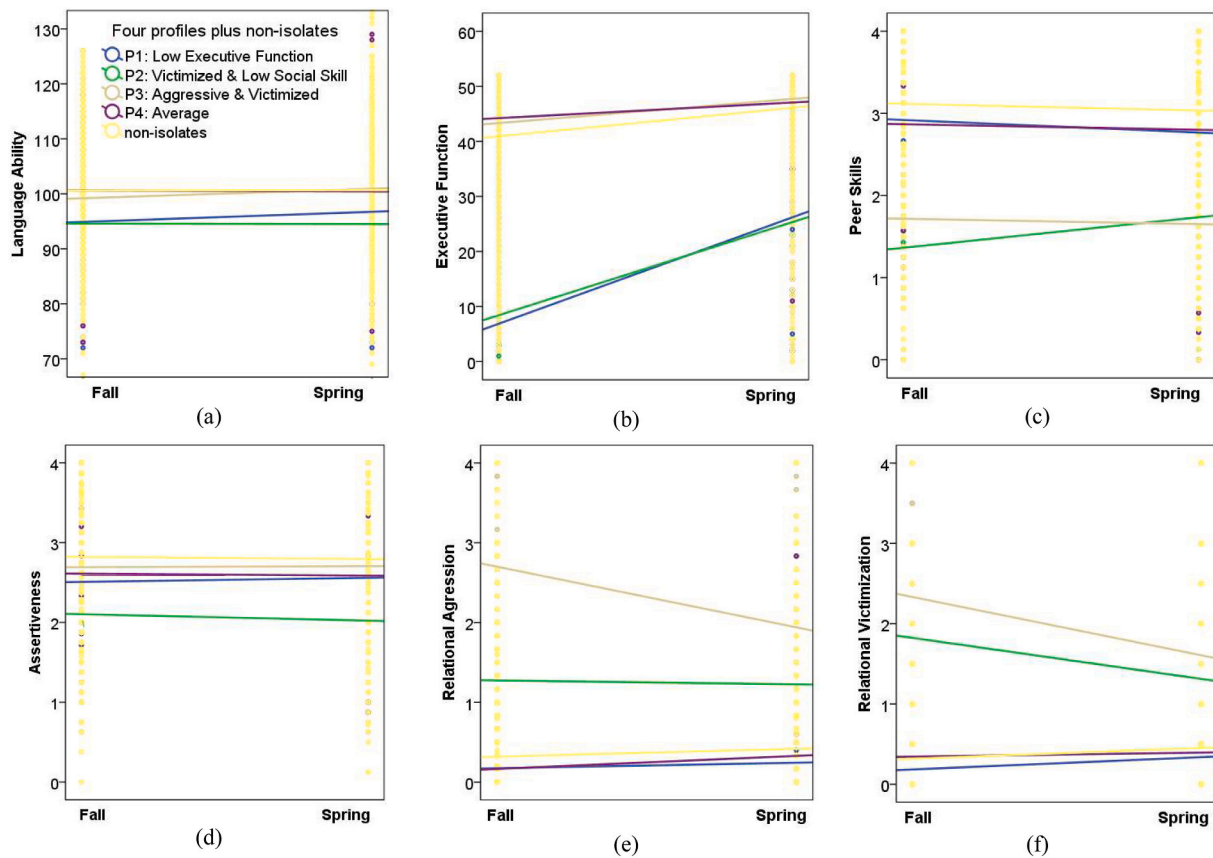


Fig. 3. Comparing profiles regarding changes of language and social skills over an academic year.

profiles in language and social skills (Table 4) and were comparable with non-isolates in language and certain aspects of social development (Table 5). It is possible that, first, although children with the “average” isolate profile received few peer nominations from their classmates (i.e., objective isolation), they might not feel lonely nor perceive themselves as being isolated. Some researchers have suggested that objective isolation is less severe than perceived isolation and that it is perceived isolation that tends to trigger individuals’ confirmatory and memorial bias and to lead to negative interpretations of peers’ social moves (Cacioppo & Hawley, 2009; Danese et al., 2009). A second potential explanation is that children in the “average” profile might be less interested in social interactions with peers. Indeed, we found that isolates with the “average” profile nominated fewer playmates than non-isolates ($F_{(1,1183)} = 5.61, p = .018$). According to Rubin and Coplan (2004), socially disinterested children may experience little inner anxiety when they have few peer interactions, which, might explain why children with the “average” isolate profile seemed to be comparable with non-isolates in certain types of language and social outcomes. However, compared to non-isolates, isolates with the “average” profile had lower peer skills and assertiveness, which might be because these isolates had limited opportunities for social interactions, which restricted resources and context for their social development. A third explanation for the big proportion of children being identified as the “average” isolate profile might be associated with the isolation assessment approach in this study. As explained in the method section, a peer nomination task was applied to identify isolates. To encourage children to nominate peers cautiously, we instructed children to nominate peers they liked to play with the MOST, which is a common practice in the field (e.g., Daniel et al., 2016; Parkhurst & Asher, 1992). However, conservative nominations of “play most” peers may lead to a more lenient inclusion criterion for isolate status.

Isolate profiles and children’s language and social skills over the academic year

Our findings showed that children with isolate profiles that were characterized by challenges in aspects of language and social skills tended to narrow the gap with peers during an academic year. For instance, children with Profile 3 (“aggressive and victimized”) showed a significant decrease in relational aggression and relational victimization and this change was stronger than children with other isolate profiles (Fig. 3 – e & f). It is possible that as children with Profile 3 increase their experiences of interacting with peers (though they might still not be recognized by peers as someone they like to play with the most), children with Profile 3 may be able to internalize social rules and norms and gain competence in social interactions (Barchia & Bussey, 2010; Nipeldal, Nesdale, & Killen, 2010), and therefore reduce their degree of aggression and victimization. Moreover, we found that children with Profile 1 (“low executive function”) and Profile 2 (“victimized and low social skill”) demonstrated significant increases in their executive function, and the strength of their increase was significantly stronger than children with other isolate profiles (Fig. 3 - b). As elaborated below, one explanation may be that this is driven by the fact that these two profiles were comprised primarily of preschool and kindergarten children, who are most likely to be experiencing rapid development in executive function skills (see Best & Miller, 2010).

However, overall, isolated children who had lower skills in the fall tended to remain at the relatively lower level of skills in the spring compared to others, although they might have achieved a greater growth over the academic year. As such, despite the narrowing of the gap across the year, external support may still be needed from educators to ensure that isolated children have the opportunities to develop at the same level as their classroom peers. Such support should be individualized based on the unique co-occurrence of characteristics and

challenges faced with children with each type of isolate profile. For instance, as discussed above, children with Profile 3 (“aggressive and victimized”) achieved significant decreases in both relational aggression and relational victimization over the year, but their peer skills remained at a significantly lower level than peers. Thus, peer skills might be a key target that educators and other adults can help these children develop besides supporting them in reducing aggression and victimization.

There are a few additional findings that are worth discussing. Regarding grade-level differences, our preliminary results suggested that preschool and kindergarten classrooms tended to have higher proportions of isolates than primary school classrooms. Further, findings of our profile analysis showed that Profile 1 (“low executive function”) mainly contained children in preschool and kindergarten grades. It is likely that the age effect might be confounded with executive function, although the between-grade differences had been accounted for when using the multilevel approach of the latent profile analysis. It is possible that the preschool and the kindergarten years are periods when children rapidly develop their executive function, which also witnesses a process that the nature of children's play gradually become more social as they age (Coplan & Arbeau, 2009; Parten, 1932; Rubin et al., 1978). In preschool, young children leave the home environment and gradually start to transform from solitary or parallel play, where children are apart from peers in distance, to social play where children learn to engage in social interactions with each other.

In terms of disability status, our preliminary findings showed that children with disabilities were more likely to be identified as isolates than typically developing peers, although they were not more likely to be classified into any specific isolate profile. Their higher risk of being identified as isolates is in line with the literature that children with disabilities might have difficulties in forming and maintaining peer interactions, such as lack of skills or abilities to interpret and to respond appropriately in social interactions (Chen et al., 2018; Craig & Washington, 1993; Marton, Abramoff, & Rosenzweig, 2005). However, children with disabilities should not be interpreted as a homogeneous group. Instead, the future endeavor is needed to explore the heterogeneities and to identify personalized facilitation to support social interactions associated with children with disabilities.

Regarding children with diverse linguistic backgrounds, our descriptive findings showed that children whose primary language speaking at home was non-English were more likely to be identified as isolates than their peers. Studies have suggested that language ability allows children to communicate effectively with peers, which plays an essential role in forming positive peer interactions and is associated with a lower probability of being isolated by peers (e.g., Chen et al., 2018; Rubin & Coplan, 2004). Thus, it is possible that children who primarily speak a different language at home tend to have lower English language ability. In the current sample, this difference was significant ($t = -11.44, p < .001$). This gap could cause them to experience more difficulties in expressing themselves and higher risks of being misunderstood in the early childhood classrooms, where teachers and peers mainly speak English, and therefore contributes to their peer isolation. Unsurprisingly, we also found that children who come from families with lower incomes were more likely to be identified as isolates. The literature on child development in low-income families offer various potential explanations, such as lower language skills associated with lower-quality parental language exposure (e.g., Hirsh-Pasek et al., 2015) and lower social competence related to stressful life events including moving, illness, parental depression, and so on (e.g., Mackler et al., 2015). Collectively, these findings highlight the importance of taking into account children's individual characteristics and family backgrounds when supporting their peer social interactions.

There are a few limitations of this study. First, isolate status and child characteristics used in the MLPA were based on assessments at a single time point. However, isolate status and profiles could change within an academic year and may vary as children entering higher grades. Hence, the findings of the current study should be interpreted as associations.

Future longitudinal studies are necessary to understand the stability of children's isolate status and profiles as they develop from early childhood to adolescence and to examine potential factors related to the mobility of isolation status. Second, the current study focused on relational aggression and victimization and was lack of indicators for physical aggression and victimization. We made this decision since Crick et al. (2006) documented that although these two formats are highly associated with each other, relational aggression has a stronger predictive power than physical aggression on peer rejection. In addition, ignoring relational aggression would fail to identify the majority of aggressive girls. Still, future research may consider including both relational and physical aggression and victimization for a more comprehensive understanding regarding their unique roles in peer isolation. Third, we identified isolates based on the number of nominations children received from classmates, which is considered as objective isolation and may be different from perceived isolation (i.e., feel lonely; Danese et al., 2009; Cacioppo & Hawley, 2009). Further, as explained above, this conservative peer nomination approach might overly identify isolated children, which could be a reason for the big proportion of children being labeled as the “average” isolate profile. Future research may consider multiple approaches when assessing peer isolation. Particularly, it would be valuable to take into account the first-person perspective to understand isolated children's perceptions on their peer social relationships and to unpack peers reasoning behind their decisions in avoiding interactions with those isolated children.

Regardless of these limitations, the current study contributes to the field by unpacking the heterogeneity among isolated children and examining the co-occurrence of various factors that are associated with isolation, including language ability, executive function, social skills, aggression, and victimization during early childhood. With four distinctive isolate profiles identified, namely “low executive function”, “victimized and low social skill”, “aggressive and victimized”, and “average”, the current study provides a foundation for future interventional studies to differentiate subcategories of peer isolation and therefore to intervene more strategically.

CRediT authorship contribution statement

Jing Chen: Conceptualization, Writing – original draft, Writing – review & editing. **Hui Jiang:** Methodology, Formal analysis, Data curation. **Laura M. Justice:** Conceptualization, Writing – review & editing, Project administration, Funding acquisition. **Tzu-Jung Lin:** Writing – review & editing, Project administration, Funding acquisition. **Kelly M. Purtell:** Writing – review & editing, Project administration, Funding acquisition.

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