

BMJ Open Profiles of children's social-emotional health at school entry and associated income, gender and language inequalities: a cross-sectional population-based study in British Columbia, Canada

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ABSTRACT

Objectives Early identification of distinct patterns of child social-emotional strengths and vulnerabilities has the potential to improve our understanding of child mental health and well-being; however, few studies have explored natural groupings of indicators of child vulnerability and strengths at a population level. The purpose of this study was to examine heterogeneity in the patterns of young children's social and emotional health and investigate the extent to which sociodemographic characteristics were associated.

Design Cross-sectional study based on a population-level cohort.

Setting All kindergarten children attending public schools between 2004 and 2007 in British Columbia (BC), Canada.

Participants 35 818 kindergarten children (age of 5 years) with available linked data from the Early Development Instrument (EDI), BC Ministry of Health and BC Ministry of Education.

Outcome measure We used latent profile analysis (LPA) to identify distinct profiles of social-emotional health according to children's mean scores across eight social-emotional subscales on the EDI, a teacher-rated measure of children's early development. Subscales measured children's overall social competence, responsibility and respect, approaches to learning, readiness to explore, prosocial behaviour, anxiety, aggression and hyperactivity.

Results Six social-emotional profiles were identified: (1) overall high social-emotional functioning, (2) inhibited-adaptive (3) uninhibited-adaptive, (4) inhibited-disengaged, (5) uninhibited-aggressive/hyperactive and (6) overall low social-emotional functioning. Boys, children with English as a second language (ESL) status and children with lower household income had higher odds of membership to the lower social-emotional functioning groups; however, this association was less negative among boys with ESL status.

Conclusions Over 40% of children exhibited some vulnerability in early social-emotional health, and profiles were associated with sociodemographic factors. Approximately 9% of children exhibited multiple

Strengths and limitations of this study

- Strengths of this study included the use of a large population-level data set to explore patterns of children's social-emotional health from a unique person-centred perspective.
- Measures of children's relative strengths were included in addition to measures of vulnerability.
- The cross-sectional design and dichotomisation of sociodemographic factors provided a descriptive first look at the data that should be followed up with more nuanced analyses.
- Our analyses distinguished profiles of relative social-emotional health, but do not speak to absolute levels of clinical risk.

co-occurring vulnerabilities. This study adds to our understanding of population-level distributions of children's early social-emotional health and identifies profiles of strengths and vulnerabilities that can inform future intervention efforts.

INTRODUCTION

Social-emotional vulnerabilities in early childhood, including problems with anxiety, depressive symptoms, hyperactivity and aggression, can severely impact children's social and psychological well-being. It has been estimated that 14%–26% of children exhibit diagnosable psychiatric symptoms before school entry¹ and while there is some variation in the continuity of symptoms as children age (some studies suggest behavioural problems decrease whereas emotional problems increase),² early impairments are found to remain relatively stable throughout the life-course and can become

exacerbated as children accumulate experiences with social rejection and academic failure.^{1 3–6} For example, in a 10-year longitudinal study,³ social competence at the age of 4 years uniquely predicted adolescent internalising (depressive symptoms and anxiety) and externalising problems (aggression and hyperactivity) beyond children's initial emotional adjustment levels, emphasising the interconnectedness of social and emotional functioning and importance of early social acceptance and self-regulation.^{7 8} Past studies have also found that early-onset and co-occurring social and emotional problems are more likely to follow a stable or increasing pattern over time, predicting increased odds of psychiatric diagnoses in adulthood as well as decreased occupational opportunities and income, particularly for women.^{5 9 10}

Despite the evidence demonstrating the life-course implications of early social and emotional health, there has been relatively limited research dedicated to early detection of subclinical presentations with the goal of early intervention. As McGorry *et al* argue,¹¹ within the field of psychiatry, there has been an overemphasis on treatment once problems reach a clinical stage, whereas identifying early—potentially modifiable—biomarkers of vulnerability (eg, neurological indicators of stress) is likely to be more successful. We extend this argument to suggest that identifying patterns of early psychosocial functioning from a 'social-emotional health' perspective may inform efforts to reduce risk for later mental health challenges, particularly during school entry when children are transitioning to a new social environment and undergo rapid changes in social and cognitive development.^{12 13}

To date, much of the evidence regarding children's social-emotional health has come from non-population-based studies that compare group differences across levels of a particular symptom, such as depressed mood.^{5 14 15} These variable-centred methods can be effective for identifying children with elevated depressive symptoms. However, such approaches also imply a homogeneous distribution of such factors within risk groups. Conversely, many studies have shown that children are more likely to experience clusters of symptoms at various moments in the life-course that may influence subsequent developmental outcomes in less uniform ways, in accordance with a child's unique combination of comorbidities and environmental supports and challenges.^{9 10 16–19} To address this limitation, person-centred methods and statistical approaches (including latent profile analysis (LPA)) have been used to examine heterogeneity within population subgroups (eg, based on shared symptoms, severity of symptom and age of onset).^{18 20 21} Not only can these methods better account for diverse constellations of symptoms experienced by a range of children, they can further identify commonly co-occurring strengths that may be leveraged to inform intervention efforts. For example, meta-analyses have found the

most effective prevention programmes for addressing internalising problems target the reduction of negative cognitions, as well as the promotion of positive thoughts, actions and social skills (eg, Blues Program, Coping with Stress).^{22–24} Similarly, universal school-based programmes that focus on malleable skills, such as self-awareness, self-management, social awareness, relationship skills and responsible decision-making, have been shown to be effective for reducing emotional distress as well as reducing externalising problems such as conduct problems and aggression.^{25 26}

Person-centred approaches may also help to identify sociodemographic characteristics that are associated with particular population subgroups for the purpose of indicating early social disparities that may contribute to the onset of more severe outcomes among subgroups of equally vulnerable children.^{19 27–29} For example, several studies have reported boys exhibit higher externalising behaviour than girls, although this evidence is mixed.^{29–31} Socioeconomic hardship generally predicts lower social-emotional functioning in children, for example, through strained primary caregiver relationships, but again this finding is inconsistent.^{9 27 28 31 32} Finally, children who are newcomers to Canada may face language barriers (ie, limited English/French proficiency) associated with lower perceived social skills,³³ and may also experience distress from navigating different cultures at home and at school, potentially increasing children's anxiety and depression.^{34 35} Few studies have examined this combination of multiple sociodemographic factors. However, the existing evidence suggests the presence of theoretically and practically important interaction effects—for example, some stressors within children's home environments seem to increase the risk of internalising for girls, but not for boys.³⁶

Objectives and hypotheses

Although there is burgeoning evidence that distinct social-emotional patterns emerge in early childhood, there are still significant knowledge gaps including how positive indicators combine with problem behaviours to form different constellations or 'profiles', how the prevalence of such profiles may be distributed in the population and how profiles may be jointly associated with multiple sociodemographic characteristics. The current study sought to investigate: (1) whether distinct profiles of early social-emotional health could be identified among children at school entry and (2) whether household income level (measured as receiving a government subsidy), child gender and child English as a second language (ESL) status would be associated with profile membership singularly and in combination. Based on the existing literature, we hypothesised (1) distinct profiles of social-emotional health would be observable at this age, and (2) children from lower income families, boys and children with ESL status would be over-represented in the lowest social-emotional health profile groups.

METHODS

Data source

Data were obtained from a population sample of children attending kindergarten across all public schools in British Columbia (BC), Canada, between 2004 and 2007.³⁷ Within BC, parents are advised to register their child for school or home schooling in the year their child turns 5 years, although legally parents may choose to defer their child's schooling for one more year.³⁸ During the study period, 87.5% of children attending Kindergarten were enrolled in public schools compared with 12.5% enrolled in independent schools or home schooling.³⁹ Parents who enrol their children in independent schools are often more affluent;⁴⁰ therefore, our public school sample may have under-represented families at higher income levels. Regarding language status, enrolment statistics for that period indicated that 94.5% of Kindergarten students identified as English language learners (16.7% of the BC population) attended public school³⁹ (English is the primary language of instruction in BC). Children's social-emotional health was measured using the Early Development Instrument (EDI), a validated teacher-report measure of children's school readiness routinely administered during the Kindergarten year of schooling.^{41–43} EDI records were linked to children's gender, ESL status and health insurance subsidy status (a proxy for household poverty level) with permission from the British Columbia Ministries of Health and Education. Ethics approval was obtained from the University of British Columbia Research Ethics Board.

Measures

Eight indicators of children's social-emotional health were measured using subscales from the EDI⁴¹: overall social competence (five items), responsibility and respect (eight items), approaches to learning (nine items), readiness to explore (four items), prosocial and helping behaviour (eight items), anxious and fearful behaviour (eight items), aggressive behaviour (seven items), and hyperactive and inattentive behaviour (seven items). Example items, means and standard deviations (SD) are provided in [table 1](#). On the EDI, teachers are asked to select one

of four response options that best describes each of their students' behaviour currently or within the last 6 months. 'Never or not true' is assigned a score of 0, 'Sometimes or somewhat true' is assigned a score of 5 and 'Often or very true' is assigned a score of 10. 'Don't know' is coded as missing. Negatively worded items, such as 'is upset when left by parent/guardian', are reverse-coded so that higher scores indicate better social-emotional health.

Household subsidy status was derived from Medical Services Plan (MSP) records and used as an indicator of relative poverty. Subsidy status was split into two categories: '100% subsidy' and 'no subsidy.' During the data collection period, 100% subsidy was available to a family of any size that earned an annual net income <\$22 000 Canadian dollars. In contrast, no subsidy was available for families who earned an annual net income >\$30 000 Canadian dollars. Ninety percent of households within the sample were included in one of these two categories. The remaining 10% of households had incremental coverage (20%–80% subsidy) or were eligible for temporary subsidy or disability assistance. These categories were excluded due to their low frequency. In instances where the same child had multiple subsidy codes associated with their health record, we used the earliest code based on life-course theory that suggests earlier experiences have greater impact over child development outcomes.⁴⁴ Teachers reported each child's sex as 'male' or 'female'. These categorisations were then cross-validated with children's sex from BC Ministry of Education records. ESL status was also reported by teachers and cross-validated with Ministry records. ESL status is a designation which schools use to apply for additional resources to support children's learning needs. We selected these three sociodemographic factors based on their theoretical and applied relevance in developmental and epidemiological research and representativeness of the diversity of children in the population under study.

Analyses

Identifying latent profiles

LPA using MPLus V.7⁴⁵ was used to identify unique patterns (ie, profiles) of social-emotional health in the

Table 1 EDI social-emotional health subscales: means and distributions*

EDI subscale	Example items	Unstandardised mean (SD)
Overall social competence	Gets along with peers	7.45 (2.48)
Responsibility and respect	Follows rules, respects others	8.43 (2.13)
Approaches to learning	Completes work on time	7.91 (2.28)
Readiness to explore	Eager to play a new game	8.86 (1.99)
Prosocial and helping behaviour	Offers to help others	5.53 (3.02)
Anxious and fearful	Nervous, cries a lot	8.78 (1.63)
Aggressive behaviour	Temper tantrums, fights	9.22 (1.52)
Hyperactive and inattentive	Distractible, impulsive	8.09 (2.52)

*Scales range from 0 to 10 with higher scores indicating better social-emotional health. EDI, Early Development Instrument.

population sample. LPA is a type of finite mixture modelling that assesses the ability of grouped underlying latent classes to explain the variance among a set of observed dependent variables (ie, children's scores on each of the eight social-emotional subscales from the EDI).^{46 47} For ease of interpretation, we first standardised all eight social-emotional subscale scores within the population sample so that every indicator had a mean of 0 and SD of 1. We then entered the standardised scores into MPlus to conduct the LPA, using all available data points (ie, all cases were included unless they had missing data on all eight social-emotional subscales). Because we tested several models with a large number of class solutions (>3 classes), we set random starting values to 500 (50 iterations) in order to avoid increasing statistical inaccuracy or biasing parameter estimates.⁴⁸ Starting with a one-class model, we ran multiple class solutions to determine the best fitting solution. Relative model fit was assessed according to four standard criteria provided by Geiser⁴⁸ and Nylund *et al*⁴⁹: (1) entropy score closest to 1, indicating good classification accuracy; (2) high discrimination between classification probabilities (probability of being assigned to any particular class ≥ 0.8); (3) lowest adjusted Bayesian Information Criterion (aBIC), indicating relatively better fit among nested models and (4) statistically significant Bootstrap Likelihood Ratio Test (BLRT), testing whether a model with k latent classes fits better than a model with k-1 classes. As recommended, we also considered parsimony, interpretability and theoretical meaningfulness in our selection of the overall best model.^{4 8 49}

Predicting profile membership

Once the best fitting model was determined from the LPA, a latent profile membership value was assigned to each child based on their most likely predicted profile membership. We then linked this file (using a unique identifier associated with each child) to a data set containing children's linked EDI-MSP records (ie, household subsidy

status, gender and ESL status). Multinomial logistic regression analysis was then used to determine how these sociodemographic characteristics were associated with each profile. All covariates were entered simultaneously to assess the magnitude of association of each sociodemographic factor in the context of all others. Two and three-way interactions were also examined.

RESULTS

Study population

Linked MSP records were available for 36 321 (95%) of the children who had EDI data. Within this subset, a further 503 (1.4%) of children were excluded due to missing data on all eight social-emotional subscales comprising the outcome measure. The final analytical sample included 35 818 children (mean age=5.67, SD=0.31). Demographic analysis showed that 18.5% of children were from households that had received a full subsidy at their earliest healthcare visit, 51.5% were identified as boys and 17.3% were identified as ESL status. In comparison, among the 1.4% of children missing from the analysis, 26.8% were from households receiving full subsidies, 56.1% were boys and 27.2% were ESL status. These children also had a higher mean number of days absent from school compared with children included in the analysis (17.4 days vs 4.7 days). Child age did not differ between groups.

Social-emotional health latent profiles

Model fit estimations from the LPA suggested six unique profiles of social-emotional health (table 2). Although aBIC scores kept decreasing and BLRT tests were statistically significant with each additional class, the six-class solution was among three solutions with the best entropy and class probability scores, indicating good distinction between classes and high accuracy of being assigned to each class based on the eight social-emotional scores provided. To further distinguish the best fitting model, we

Table 2 Latent profile analysis model fit comparison

No of latent profiles	Log likelihood value	aBIC	Entropy	BLRT	Lowest class probability	Smallest class size	Smallest class proportion
1	-400 021.73	800 160.40	NA	NA	1	35 818	1.00
2	-341 163.26	682 509.22	0.95	0.00	0.97	8998	0.25
3	-323 736.06	647 720.60	0.94	0.00	0.95	2981	0.08
4	-315 968.54	632 251.32	0.90	0.00	0.88	1940	0.05
5	-308 638.88	617 657.79	0.95	0.00	0.93	1854	0.05
6	-302 360.31	605 166.41	0.95	0.00	0.93	910	0.03
7	-298 087.32	596 686.22	0.93	0.00	0.88	826	0.02
8	-295 023.77	590 624.90	0.94	0.00	0.88	412	0.01
9	-291 992.24	584 627.60	0.92	0.00	0.83	659	0.02
10	-289 428.48	579 565.86	0.92	0.00	0.83	413	0.01

aBIC, adjusted Bayesian Information Criterion; BLRT, Bootstrap Likelihood Ratio Test; NA, not applicable.

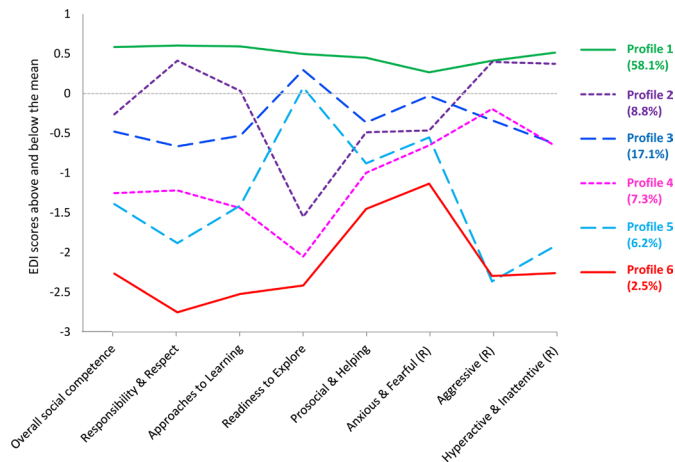


Figure 1 Composition of latent profile groups by EDI social-emotional subscale and prevalence within population sample. Legend: higher scores indicate better social-emotional health. Solid lines represent highest and lowest social-emotional profiles. Long dashes represent higher externalising profiles. Short dashes represent higher internalising profiles. (R) indicates the subscale was reverse-coded. EDI, Early Development Instrument.

then calculated the relative change in log likelihood values between nested models and observed larger improvements between the first six solutions, but diminishing returns thereafter. Similar diminishing improvements were observed comparing relative changes in aBIC scores. Acknowledging that determining LPA model fit requires a certain level of subjectivity, Nylund *et al* recommend that this ‘flattening out’ effect in model improvement scores can be used as an indicator for model selection.⁴⁹

Within the selected six-class model, the majority of children (58.1%; Profile 1, overall high social-emotional functioning) were classified together as having high scores (on average, half a SD above the mean) across all eight social-emotional subscales; 41.9% demonstrated areas of vulnerability on one or more social-emotional subscales. As shown in figure 1, profiles could be observed in parallel patterns. Profile 2 (inhibited-adaptive; 8.8%) also demonstrated high social and emotional functioning, but had markedly lower readiness to explore (eg, did not often show interest in a new toy or game and did not often appear curious about the world). Profile 3 (uninhibited-adaptive; 17.1%) demonstrated the opposite pattern. These children showed high readiness to explore but slightly lower social skills, such as playing and working cooperatively with peers, following rules and instructions or solving problems independently.

Profiles 4–6, while exhibiting similar patterns of relative strengths and weaknesses as the previous groups, were rated well below the population average on all eight subscales of children’s social-emotional health. Profile 4 (inhibited-disengaged; 7.3%) showed a parallel pattern to Profile 2 (inhibited-adaptive), with relative strengths in social competence and relative weakness in readiness to explore. Profile 5 (uninhibited-aggressive/hyperactive; 6.2%) showed a parallel pattern of strengths and

weaknesses to Profile 3 (uninhibited-adaptive); however, Profile 5 showed notably higher vulnerability in aggression and hyperactivity with scores over two SD below the mean. Finally, a small group of children (2.5%; Profile 6, overall low social-emotional functioning) were observed as having low social competence and emotional maturity across all scales and scored the lowest of all children on every measure.

Associations with subsidy status, gender and ESL status

Table 3 provides sociodemographic distributions within each profile group and associated adjusted ORs. Profiles are presented in descending hierarchical order from highest social-emotional health (Profile 1) to lowest (Profile 6). The proportion of children in the subsidy group increased incrementally at each lower level of social-emotional health. Among children in the lowest ranking profile group, 37.1% received subsidies compared with 16.4% in Profile 1. Boys were over-represented in Profiles 5 and 6 that demonstrated high aggression and hyperactivity (>76% boys), and were under-represented in the highest social-emotional health group (43.3%). Children with ESL status were over-represented in Profiles 2 (22.5%) and 4 (24.1%) demonstrating relative strength in social competence, but lower readiness to explore.

In the multinomial logistic regression analysis, Profile 1 served as the reference to which all other profile groups were compared. In a preliminary model without interactions (results not shown), subsidy status and ESL status were associated with increased odds of membership to each lower social-emotional health group compared with the reference group. Being identified as a boy was also associated with increased odds of membership in the lower social-emotional health profiles, except for Profile 2 (lower readiness to explore). Once interaction terms were included, we observed a statistically significant subadditive interaction between subsidy and language minority status across all five profile comparisons (table 3). ORs smaller than 1.0 indicated that the association between subsidy status and lower social-emotional health was somewhat attenuated for children with ESL status. Three-way interactions were not observed and therefore were excluded from the final model for parsimony.

DISCUSSION

Using a large population sample of kindergarten children, our application of LPA identified six distinct profiles of social-emotional health, each encompassing a distinct pattern of relative strengths and weaknesses. Consistent with past studies,^{6 9 27 32} we found that the majority of children fit into a profile demonstrating overall high-social-emotional competence, but that over 40% of children demonstrated some areas of vulnerability. Profiles 5 and 6 (approximately 9% of children) exhibited considerably higher aggression and hyperactivity than the others, which is consistent with clinical diagnosis rates for behaviour disorders (eg, oppositional defiant

Table 3 Latent profile membership distributions and adjusted ORs

Profile membership (N=35818)	Distribution within profile (%)	Adjusted OR (95% CI)
Profile 1 (58.1%): Overall high social–emotional functioning (n=20819)		
Receiving subsidy	16.4	Ref
Boy	43.3	Ref
ESL	15.3	Ref
Subsidy×boy		Ref
Subsidy×ESL		Ref
Boy×ESL		Ref
Profile 2 (8.8%): inhibited-adaptive (n=3142)		
Receiving subsidy	20.8	1.33 (1.15 to 1.53)***
Boy	43.5	1.00 (0.91 to 1.11)
ESL	22.5	1.80 (1.57 to 2.07)***
Subsidy×boy		1.06 (0.86 to 1.29)
Subsidy×ESL		0.76 (0.61 to 0.96)*
Boy×ESL		0.94 (0.77 to 1.14)
Profile 3 (17.1%): uninhibited-adaptive (n=6120)		
Receiving subsidy	21.4	1.63 (1.44 to 1.85)***
Boy	64.9	2.52 (2.34 to 2.72)***
ESL	18.6	1.39 (1.21 to 1.60)***
Subsidy×boy		0.89 (0.76 to 1.04)
Subsidy×ESL		0.64 (0.53 to 0.78)***
Boy×ESL		1.03 (0.87 to 1.22)
Profile 4 (7.3%): inhibited-disengaged (n=2620)		
Receiving subsidy	27.3	2.13 (1.80 to 2.53)***
Boy	62.4	2.44 (2.17 to 2.75)***
ESL	24.1	2.18 (1.82 to 2.61)***
Subsidy×boy		0.93 (0.76 to 1.15)
Subsidy×ESL		0.67 (0.53 to 0.85)**
Boy×ESL		0.83 (0.67 to 1.03)
Profile 5 (6.2%): uninhibited-aggressive/hyperactive (n=2207)		
Receiving subsidy	28.5	2.68 (2.14 to 3.36)***
Boy	78.9	5.19 (4.47 to 6.03)***
ESL	17.4	1.36 (1.02 to 1.82)*
Subsidy×boy		0.89 (0.69 to 1.15)
Subsidy×ESL		0.42 (0.31 to 0.55)***
Boy×ESL		1.15 (0.84 to 1.57)
Profile 6 (2.5%): overall low social–emotional functioning (n=910)		
Receiving subsidy	37.1	4.54 (3.32 to 6.20)***
Boy	76.9	4.50 (3.53 to 5.74)***
ESL	19.4	1.44 (0.92 to 2.24)
Subsidy×boy		0.79 (0.55 to 1.13)

Continued

Table 3 Continued

Profile membership (N=35818)	Distribution within profile (%)	Adjusted OR (95% CI)
Subsidy×ESL		0.32 (0.22 to 0.48)***
Boy×ESL		1.43 (0.89 to 2.30)

ORs can be interpreted as the odds of membership to each more vulnerable social–emotional profile group compared with a group with overall high social–emotional functioning. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
ESL, English as a second language.

disorder and attention deficit hyperactivity disorder) among preschool-aged children and underscores how commonly these behaviours co-occur.¹ However, our results also identified that approximately 6% of children with these covulnerabilities (Profile 5) also demonstrated considerable strength in their readiness to explore. In contrast, the 3% of children who did not show this relative strength may represent a group that is more susceptible to chronic mental health problems and that may benefit more from personalised and sustained interventions throughout childhood.⁵⁰

Comparing across Profiles 2 through 5, children who scored higher on the social competence, rule-following and respectfulness scales also generally scored lower on the readiness to explore scale. Conversely, children who scored higher on readiness to explore generally scored lower on these social competence scales. These patterns are consistent with previous person-centred research that has found associations between high extroversion, outgoingness and aggressive/acting out behaviours (ie, ‘undercontrollers’) and conversely, associations between prosocial behaviour, conscientiousness and high shyness and uneasiness (ie, ‘overcontrollers’).^{30 51 52} Although both patterns have adaptive elements, neither are considered healthy at high levels. In fact, high levels of these traits (such as those observed in the current study in Profiles 4 and 5) are thought to be differentially predictive of externalising (ie, conduct and hyperactivity problems) and internalising (depressive and anxiety problems) later in life if left unaddressed.^{30 51 52}

Regarding these profiles’ relation to sociodemographic factors, a second objective of this study was to investigate interactions between household income, gender and ESL status. Consistent with past research, we found that boys were over-represented in the profiles demonstrating high aggression and hyperactivity.^{53 54} Particularly in school-based contexts, lower behaviour regulation among boys has been associated with disadvantages in academics and student–teacher relationships.^{55 56} And while symptoms of aggression, impulsiveness and hyperactivity are more often observed among young boys than girls, other research suggests that the same behaviours can be perceived differently by adults, such that teachers and mental health professionals are more likely to refer boys for externalising problems when both boys and girls

present similar symptoms of hyperactivity.^{57 58} Furthermore, although boys are commonly over-represented in lower social-emotional health groups in childhood, many longitudinal studies found that girls exceed boys in social-emotional vulnerability beginning in early adolescence.^{5 59}

Children identified as ESL were over-represented in the profiles demonstrating lower readiness to explore, which may be indicative of general uncertainty in a new school or even a new country. Halle *et al*⁶⁰ note that low verbalism of ESL children may also get mistaken by others as 'shyness' which could potentially be the case in our study, although the measure used this study focused more on observable behaviours than dispositions. The observation of a consistent subsidy status × ESL interaction is another area of interest to investigate with future research. This interaction suggests that poverty was only associated with membership to a more vulnerable social-emotional subgroup for children who spoke English as a *first* language. There is some support for this in the literature, as strong connections with culture and ethnic identity may increase psychological resilience,⁶¹ while learning multiple languages may increase attentiveness to social cues.⁶⁰ However, in the current study, we could not control for some potentially relevant socio-demographic or economic confounders (eg, parental education and cultural background). Future studies are required to assess the replicability of the pattern observed in this study, particularly by exploring potential confounding or mediating factors such as number of years in Canada, region of residence, school context, family composition and measures of acculturation including language and media use as well as cultural identity.^{34 35 62–64}

Finally, similar to Nicholson *et al*,⁶⁵ who found socioeconomic position to be associated with increased odds of social-emotional difficulties, our analyses identified that children from households that qualified for government subsidies had higher odds of membership to each lower social-emotional health group compared with children who did not qualify for subsidies. Although causality cannot be determined from the study design, the observed social gradient is consistent with patterns observed across numerous other studies investigating early childhood socioeconomic status as a risk factor for future health and mental health outcomes.^{66–70} Unique to the current study, our findings further highlight the complexity of social-emotional vulnerabilities (ie, highly inhibited and uninhibited profiles) and related sociodemographic factors, implicating the role of social forces in the construction of social-emotional problems and (potentially) reflecting our failure to intervene in the case of vulnerabilities we might 'expect' from children based on their income, gender or English language status. At the same time, our results emphasise the universalism of social-emotional vulnerabilities. Notably, the majority of children in the lower social-emotional profiles were not from subsidy-receiving households. Rather, early

vulnerabilities appeared to affect children across socioeconomic, gender and ESL status categorisations.

Limitations and future directions

As a cross-sectional study, the current findings provide a descriptive first look at the population profiles of early social-emotional health. Measuring sociodemographic factors dichotomously results in a loss of information that potentially obscures a more nuanced understanding of the relationships under investigation (eg, non-linear relationships); however, our results provide a useful starting point for the development of future studies. Similarly, a general limitation in this research area is the inconsistency in the measurement of social-emotional health. The EDI showed good discrimination and variability; however, there may be other social or emotional indicators not included in this measure that could be explored in future research. For example, future studies may include indicators that have been targeted in successful school-based interventions, such as self-regulation (self-awareness and self-management).²⁵ Although these measures are largely included in the social competence subscales of the EDI (overall social competence, responsibility and respect, and approaches to learning), identifying specific social and emotional skills may facilitate implementation and evaluation of prevention and intervention programmes. Furthermore, our analysis distinguished profiles of relative social-emotional health, but did not speak to absolute levels of clinical risk. Although the EDI has been found have predictive validity in relation to later social and emotional outcomes (eg, the EDI's emotional maturity domain predicts student well-being at 9 years of age),⁷¹ the EDI is not a diagnostic tool. Rather, it is a measure of population health that was used uniquely in this study to assess the variation and prevalence of symptom patterns within the BC population of Kindergarten children. Teachers' ratings on the EDI also do not capture how children behave outside of school, and may therefore be more accurately interpreted as a measure of children's social-emotional health in a school-based context.⁷² Our analysis of missing data indicated that our sample under-represented children from lower income and ESL households; however, this would likely have only reduced the magnitude of observed associations between profile membership and income or ESL status.

Finally, even with access to child health records from government MSP data, there were several variables unavailable to us that could be included in future research to further elucidate how social factors may be related to children's early social-emotional health. For example, parents' educational attainment, occupational status and mental health history would be relevant factors to include in future analyses, given their known association with child mental health outcomes.^{9 27 68} Relatedly, an important question for future research to address is how regional context may influence the number and composition of child social-emotional profiles observed, as well as the strength of association with

sociodemographic factors. For example, BC is a relatively high income province in Canada and is also the most culturally diverse, with almost 30% of residents identifying as a visible minority.⁷³ However, within parts of BC there is also significant child poverty and lack of cultural diversity that may be associated with distinct regional social-emotional outcomes for children.^{74 75} Similarly, the social-emotional health profiles identified in this study represent children's development at school entry and should not be used to extrapolate to children of different ages. Developmentally, one would expect relevant indicators of social-emotional health to change as children mature and face different stressors socially, psychologically and academically.^{76 77}

Conclusions

Our results showed that commonly occurring patterns of early social-emotional problems can be distinguished in children as young as school entry, and that sociodemographic factors such as household income, child gender and ESL status are differentially associated with these patterns. Given the prevalence of social-emotional vulnerabilities within the entire population sample, and their ubiquity across sociodemographic factors, we suggest that interventions should include programming that addresses underlying issues that may be impairing children's social-emotional development at a population level in addition to universal, strengths-based programmes designed to promote young children's social-emotional health.^{25 78}

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Ethics approval Ethics for this study was obtained from the University of British Columbia Research Ethics Board (H09-01962).

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Data sharing statement The data sets analysed in the current study are available in the Population Data BC repository (www.popdata.bc.ca/data).

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