

BMJ Open Association between health service utilisation of internal migrant children and parents' acculturation in Guangdong, China: a cross-sectional study

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ABSTRACT

Objectives To assess the health service utilisation of internal migrant children in Guangdong, China, and to explore the association between children's health service utilisation and their parents' acculturation.

Design Cross-sectional survey between April and May 2016.

Setting Six society-run schools of Tianhe and Baiyun districts in Guangzhou City of China.

Participants We recruited all students at grade 7 or 8 and one of their parents who resided in Guangzhou over 6 months without permanent registered residence (*hukou*) in Guangzhou (1161 pairs completed this survey). 258 children were ill within the past 2 weeks or during the last year.

Main outcome measures The main outcome was self-reported health service utilisation. Logistic regression analysis was conducted to explore the association between children's unmet needs for outpatient or inpatient service and their parents' acculturation (categorised into high, middle and low groups).

Results In total, 216 children, or 18.6% of the total subjects, were ill within the past 2 weeks and were in need of outpatient service; 94 children, or 8.1% of the total subjects, were in need of inpatient service. Among them, 17.6% and 46.8% of the migrant children had unmet needs for outpatient and inpatient services, respectively. After controlling for enabling resources and predisposing characteristics, migrant children with parents in the middle-acculturation group (adjusted OR=3.17, 95% CIs 1.2 to 8.3, P<0.05) were more likely to have an unmet outpatient need than high-acculturation or low-acculturation groups, although only statistically significant when comparing with the high-acculturation group. Stratified analysis suggested that this association could be moderated by their family economic status.

Conclusions Our study suggested that the association between migrant children's health service utilisation and their parents' acculturation was complex and could be moderated by family economic status. Increasing the service utilisation among migrant children requires improving the acculturation and economic status of the parents of internal migrants.

Strengths and limitations of this study

- This is the first of its kind study on the association between internal migrant children's health service utilisation and their parents' acculturation.
- This study measured parents' acculturation more comprehensively by using a synthetic variable calculated from a multidimensional questionnaire, and parents' acculturation in this study was evaluated by a categorical variable.
- This study explored the moderation of family economic status on the association between internal migrant children's health service utilisation and parents' acculturation.
- This cross-sectional study cannot explore the causal relationship between children's health service utilisation and their parent's acculturation.
- The health service utilisation was measured by self-reported questions that might have reported bias of health conditions and utilisation.

INTRODUCTION

With rapid economic development in China, internal migrants (IMs), a population that has been living in a place other than their officially registered residence (*hukou*) for at least 6 months,¹ has become increasingly popular in some developed cities. This population was up to 221 million in 2010 in China, among whom there were 35.8 million (16.2%) IM children under 18 years old,² and its number has continued to rise since then. The *hukou* system in China divided resident status into rural and urban residency. Since the social welfare system is tied to (administered and funded by) the local governments, the *hukou* in China is associated with the local social welfare, such as housing, children's education, stable working, health insurance and public health services.³

IMs in China tend to have poorer economic status with overtime working⁴; they are

underinsured and have to return to permanent registered residence for medical care so as to receive reimbursement⁵; and they have limited access to a range of public services⁶ provided by the government, including the health services,^{7–10} due to their lack of local household registration. The utilisation of prenatal examinations and postnatal visit among IMs was about twice and six times as low as that of the local residents, respectively.⁹ The IMs were about two times less likely to use hospitalisation service than the local residents.¹¹

Similarly, studies found that international immigrant children tended to be in poorer access to health service utilisation (HSU) compared with their native counterparts.^{12–14} A study in the USA showed that 6% of the local family's children had *no usual source* of healthcare, compared with a percentage of as high as 26% among the international immigrant children.¹⁵ Previous studies on HSU among international immigrant children have reported that parents' acculturation, conceptualised as the international immigrants' ability of adaption to the attitudes, beliefs, values, customs and behaviours of a new or different culture,^{16 17} was an important factor for the HSU of their immigrant children.

However, results on the association between international immigrant children's HSU and their parents' acculturation did not allow drawing the final conclusion. Most of these studies have demonstrated positive associations between these two variables.^{18–23} This was because international immigrant children in more acculturated families tended to be more insured and have better access to native healthcare system.¹⁹ In addition, more acculturated parents usually acquired better English proficiency, which enabled fluent communications with local health providers and thus better HSU.²³ However, some studies did not find any association between HSU and certain indicators of acculturation, such as mothers' language proficiency and length of residence.^{18 21} This was because parents' limited English proficiency was not associated with insurance coverage, which was however positively associated with international immigrant children's HSU.¹⁸ To measure the acculturation, the majority of studies employed indicators including local born, mothers' language preference and length of residence^{20 21}; among them, the language proficiency was most frequently mentioned. Few studies have measured acculturation by multidimensional scales, for example, using the Marin's Short Acculturation Scale for Hispanics^{19 24} (which evaluated language competence, cultural identity and cultural competence) and the acculturation scale²² (which comprised questions about language, ethnic identification and nativity).

Like international immigrants, the IM parents also experience acculturation, since most of them have migrated from rural to urban areas of China where the economic development, culture and social environment are very diverse. For instance, compared with urban areas in China, rural areas are less developed, with fewer working opportunities, education resources, limited

access to health facilities and poor quality in health service.³ Previous research in China measured the IMs' acculturation by language/dialect use (separation state), friendship development (integration state), self-identity (marginalisation state) and lifestyle (assimilation state)²⁵ based on Berry's acculturation theory.²⁶ Yang²⁷ and Zhou²⁸ divided the acculturation into four dimensions (relating to culture, social, structure and identity) and built an index system of IMs' acculturation.

Most of the previous studies on HSU among IMs have focused on adults. IM children are currently under research, while limited access to health service would affect their health and school performance.²⁹ Little is also known about HSU of IM children in China, as well as the association between IM children's HSU and their parents' acculturation. This study adopts the Anderson's Behaviour Model of Health Services Utilization, a popular model to analyse factors associated with the HSU. The model divided these factors associated with HSU into three dimensions, namely, predisposing characteristics, enabling resources and needs.^{30 31} The predisposing characteristics included demographic factors, social structure and health belief. The enabling resources included financial and social resources. Among these factors, enabling resources, such as income, health insurance and time, was mutable and profoundly associated with the HSU.³¹ Acculturation is somehow similar to the social structure in the dimension of predisposing characteristics.³² The Anderson's behaviours model has been widely used in studies on factors associated with HSU,^{30–32} including IMs' HSU.^{33–36}

Drawing from the studies on international immigrants, we hypothesise that the IM children would also have poor health access, and their service utilisation is positively associated with their parents' acculturation.

This paper measures the HSU of the IM children and explores the association between IM children's HSU and parents' acculturation in Guangzhou, China. Through this study, we hope to identify the barriers of the HSU of the IM children and the strategies to meet their demands, thus improving the health equity between IMs and the local residents.

METHODS

Setting and sampling

This was a cross-sectional survey conducted in Tianhe and Baiyun Districts in Guangzhou City, Guangdong province of China, between April and May in 2016. Guangzhou is one of the top three metropolises and one of the main destinations of IMs in China. With 54.2 million IMs,³⁷ Guangzhou ranked the fifth in terms of the number of IMs among all cities in China.¹ Tianhe and Baiyun Districts were selected for this study because they had the most IM in Guangzhou.³⁸

Participants

Since most of the IM children are often excluded from studying in the public schools due to their *hukou* status,



we decided to recruit study participants from three society-run secondary schools in each district. Society-run schools were similar to the private secondary schools but somewhat different because they provided education to IM children who were excluded from the public schools in Guangzhou. We recruited all the seventh and eighth grade students in the study schools that met the following inclusion criteria: (1) holding a permanent household registration (*hukou*) other than Guangzhou but having lived in Guangzhou for at least 6 months, (2) at least one of their parents/caregivers did not have Guangzhou *hukou*, (3) living with at least one parent/caregiver and (4) having provided a signed informed consent form by their parent/caregivers.

Data collection

A self-administered questionnaire was completed by both the student and his/her caregiver. Investigators (post-graduate and undergraduate students) from Sun Yat-sen University were trained to conduct the questionnaire survey. The trained investigators guided the students in the society-run schools to complete their section of the questionnaire and trained the students who received the survey to guide their caregiver to complete caregiver's section. The investigators also conducted quality control such as checking logic mistakes and corrected any errors as soon as possible.

The questionnaire section completed by caregiver included information of students' HSU, caregivers' acculturation and potential influencing factors drawn from the Anderson's Behaviour Model of Health Services Utilization, comprising predisposing characteristics, enabling resources and needs.^{30 31} The predisposing characteristics included demographic factors (age and marital status), social structure (education level) and health belief (measured by a proxy index of physical check-up during the past year, since better health belief predicted better preventative health behaviours,^{39 40} including more physical check-up,³² according to the health belief model). The enabling resources included information about families' economic status, whether parents had to work during the opening hours of health facilities and children's health insurance status. Regarding the children's needs for outpatient and inpatient services, we collected self-reported illnesses in the last 2 weeks (for outpatients) and last year (for inpatients). In the questionnaire section for children, we collected demographic factors (children's age and gender) and social structure (whether living with children's grandparents), which were also part of the predisposing characteristics.

Measurements

The dependent and independent variables were based on the Anderson's Behaviour Model of Health Services Utilization.

Dependent variables

The outcome variable was IM children's HSU, which was measured by the self-reported questions for caregivers,

including the children's outpatient service utilisation within the past 2 weeks and hospitalisation during the last year.

Independent variables

Needs

IM children's *health service needs* were measured by questions about whether your children fell ill within the past 2 weeks ('outpatient need') or whether they were asked to be hospitalised by a doctor during the last year ('inpatient need'), which included both hospitalised and non-hospitalised ones. The unmet need for outpatient service referred to the proportion of children who got ill within the past 2 weeks but did not visit a doctor, while the unmet need of inpatient service was defined as the proportion of children who were asked to be hospitalised but did not use it during the past year. We only chose the children who were in need (including those who used or had an unmet HSU need) for analysis.

Acculturation

As to parents' acculturation, we referred to the existing acculturation scales of Berry, Birman and Trickett, Szapocznik *et al* and Zhang^{26 41-43} and the index system raised by Yan²⁷ and Zhou.²⁸ The questionnaire comprised 27 questions and could be divided into four dimensions,²⁵ namely, language proficiency, lifestyle integration (including dressing, dietary habits and entertainment and social customs integration), social interaction and self-identity. We have conducted a preliminary investigation before (n=136), which showed an acceptable reliability (the Cronbach's alpha was 0.678). The main survey's reliability test of questions relating to the four dimensions suggested the Cronbach's alpha being 0.628, 0.635, 0.773 and 0.393, respectively, and Cronbach's Alpha of the total acculturation was 0.783. **Table 1** illustrated the questions in relation to the four dimensions.

In order to evaluate parents' acculturation status, we conducted a factor analysis to calculate a synthetic score of acculturation first and then employed the min-max normalisation and percentage method to make sure that the synthetic score was between 0 and 100, with an average score of 50 points. Then we trisected parents' acculturation status: low-acculturation group, middle-acculturation group and high-acculturation group, according to the trisectional quantile of all 1161 IM parents' acculturation scores (cut by 46.62 and 61.41).

Predisposing characteristics

Information on predisposing characteristics collected was described in the section of data collection.

Enabling resources

Information of enabling resources collected was also described in the section of data collection. Besides, children's families' economic status was also a synthetic score, which was calculated from variables of family monthly income, occupation and residence type by the same

**Table 1** Questions of measurement for parents' acculturation (1–5 points)

Dimensions	Questions	Means±SD
Language proficiency	Which kind of language do you speak most?	2.21±1.48
	Can you understand Cantonese?	4.01±1.34
	Can you speak Cantonese?	2.93±1.61
	Can you understand Mandarin?	4.83±0.53
	Can you speak Mandarin?	3.66±1.27
	Which language do you speak most in your current residence?	3.18±1.46
Lifestyle integration		
Social customs	Are you familiar with the local customs of wedding and funeral?	1.98±0.97
	Will you follow the local customs of wedding and funeral?	2.68±1.20
	Do you return during the spring festival?	2.15±1.23
	If you can choose, will you return during the spring festival?	1.50±1.00
	If you can choose, would you like to celebrate the spring festival following the customs of Guangzhou?	2.20±1.05
Dressing	Do you think natives' dressing in Guangzhou is more beautiful?	3.35±0.92
	Which style will you choose when you dress yourself up?	3.29±0.82
Dietary habits	Will you choose Guangdong food when you cook?	2.52±0.96
	Which kind of food do you like most in your daily life?	2.61±1.00
Life pressure	Do you think life in Guangzhou was more stressful?	2.59±1.83
	Do you like the life pace in Guangzhou?	2.79±1.35
Entertainment	Do you like to watch TV programme in Cantonese?	3.36±1.46
	Do you like to listen songs in Cantonese?	3.16±1.46
	Did you focus on news of Guangzhou instead of your hometown?	4.08±0.95
	Do you prefer entertainment of Guangzhou in your spare time?	3.16±0.97
Social interaction	Where does your closest friend come from?	2.41±1.18
	Where does the friend who can make you feel most comfortable come from?	2.34±1.23
Self-identity	Where do you think you belong to?	1.88±1.14
	Do you feel depressed when someone calls you outlander?	2.98±0.48
	Are you satisfied with your life in Guangzhou?	3.80±0.79
	Do you want to stay in Guangzhou the rest of your life?	3.62±0.84

methods of parents' acculturation and divided into two levels (cut by 50 points).

Data analysis

First, we described the demographic and migration characteristics of the children and their parents, health services utilisation of IM children and their parents' acculturation using descriptive statistics by means, SD, frequency and proportion. Second, we applied correlation and bivariate logistic regression to check the relationship between children's HSU and their parents' acculturation. Finally, we assessed the association between IM children's HSU and parents' acculturation by performing a multivariable logistic regression model. In addition, family economic status was an important factor of enabling factors and proved to be associated with HSU, while IMs commonly had economic difficulties; we thus checked the moderation effect of family economic status on the association between IM children's HSU and their

parents' acculturation by stratified analysis using the multivariable logistic regression model. The independent variables were chosen if they had a P value below the threshold of 0.1 shown in correlation analysis or were proved to have critical association with children's HSU in the majority of studies,^{13 44 45} and then the multivariable logistic regression was conducted using an enter method, including all selected confounding variables and parents' acculturation level. In addition, we explored the moderation effects of family economic status on the association between IM children's HSU and their parents' acculturation by multivariable logistic regression using the method of enter as well.

Each correlation analysis and logistic regression analyses included a chi-statistic and Wald test with a two-side significance of 0.05. We assessed the association and moderation effect by unadjusted OR and adjusted OR (AOR) and their 95% CIs. We excluded participants with



missing data on HSU and participants with more than 1/3 items missing on parent's acculturation; otherwise, we completed the missing data by a combined method of hot-deck imputation and conditional mean completer. The sensitivity analyses were conducted to compare results using the combined imputation method with those using the multiple imputation. All analyses were performed using IBM SPSS statistics, V.20.0.

Ethics and consent

We introduced the purpose of this survey to the students face to face, while the trained students further explained the purposes of the study to their caregivers with help of the introduction as appearing at the beginning of the questionnaires. Small gifts were given to the participants who completed this survey. Written consents were sought from all the participants. All the participants completed this survey on the voluntary basis. All the questionnaires

were anonymous and stored in a secured room only open to the research members and data administrators.

RESULTS

Participants' characteristics

In total, we surveyed 1199 children and one of their main caregivers (ratio 1:1) who matched the selection criteria. Of them, 1161 pairs (96.8%) completed the questionnaires (the main caregivers were parents), and 258 children were in need of outpatient or inpatient health service. The missing data of all variables interested was between 0.3% and 9.6%. Specifically, 216 children (18.6% of the total IM children) were ill within the past 2 weeks and so defined as being in need of outpatient service; 94 children (8.1% of the total IM children) were in need of inpatient service. Children in need of inpatient service

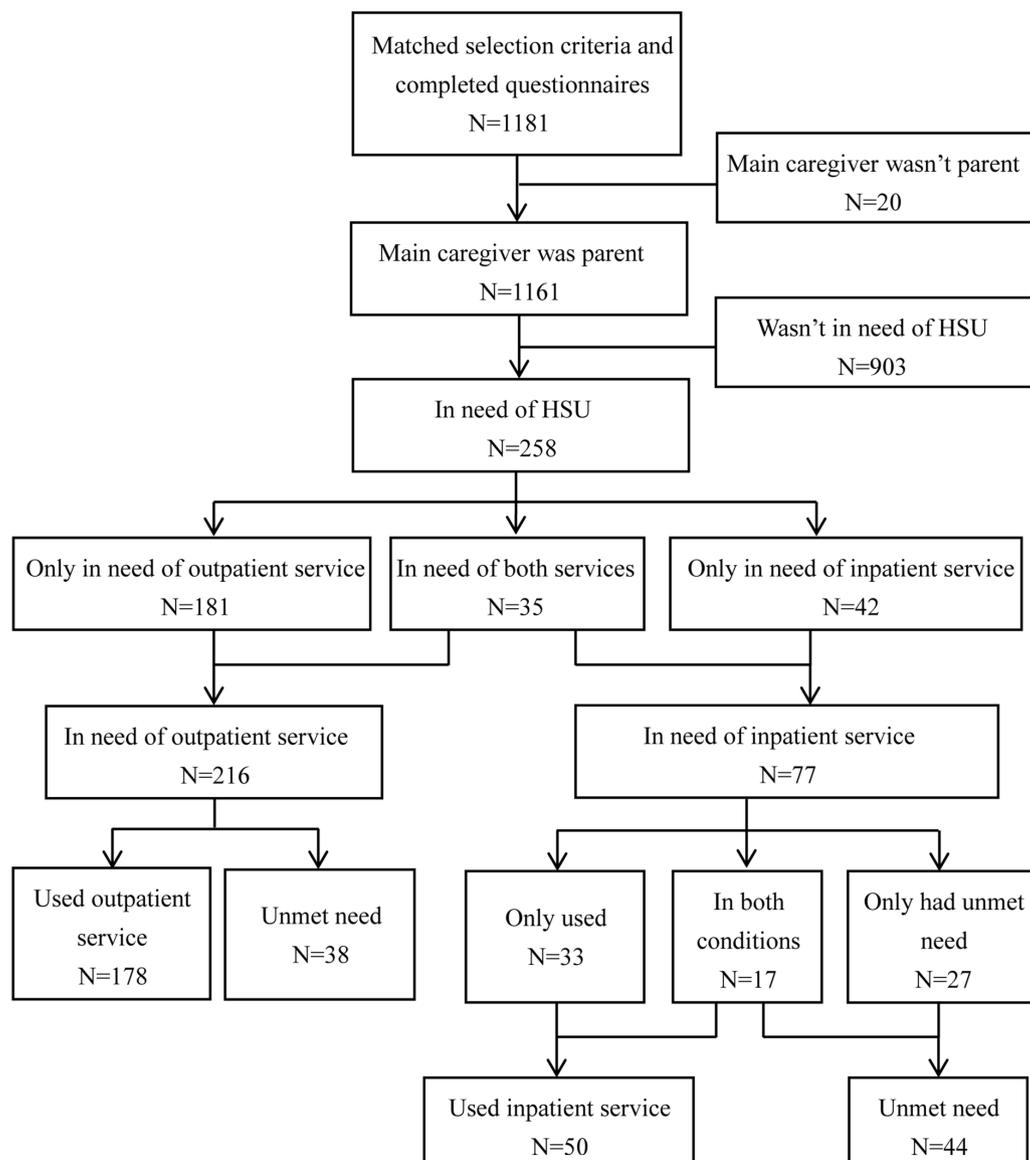


Figure 1 Flow chart of included internal migrant children and their parents for analysis in this study. HSU, health service utilisation.

were defined as those who used inpatient service or who were asked by a doctor to be hospitalised during the past year (figure 1).

Table 2 described the characteristics of IM children and their parents. Most children in need of outpatient service were less than 15 years old (78.2%), boys (56.5%), not living with their grandparents (89.8%), in poorer family economic status that scored less than 50 (73.6%) and not enrolled in the public health insurance schemes in Guangzhou (63.9%). Most parents of children who were in need of outpatient service were older than 40 years (72.2%), married (95.4%), at lower level of education (75.9% parents did not finish senior high school), staying in Guangzhou between 10 and 20 years (54.2%) and did not have to work during the opening hours of health facilities (67.1%). About half of them (50.5%) had a physical check-up during the past year.

Parents and children who were in need of inpatient service had characteristics that were similar to those needing outpatient service. However, they had better enabling resources: 41 (43.6%) children's family economic status scored over 50 and 51 (54.3%) children were enrolled in health insurances of Guangzhou.

IM children's HSU

Children who visited a doctor within the past 2 weeks accounted for 82.4% (178/216), and the proportion of children who had an unmet need for outpatient service (defined as not using any health service) was 17.6% (38/216). Characteristics between the IM children who used and who had an unmet need of outpatient service within the past 2 weeks were significantly different regarding family economic score ($P=0.015$) and parents' physical check-up in the previous year ($P=0.005$, table 2).

In the last year, 46.8% (44/94) IM children had an unmet inpatient service need (who were asked by a doctor to be hospitalised but did not actually use inpatient service). IM children who used the inpatient service during the last year were significantly younger than those who had an unmet need ($P=0.029$, table 2).

Acculturation situation of the IM parents

Overall, the IM parents whose children were in need of health services had a mean score of 53 (SD=18) in acculturation, while the middle level of acculturation was between 46.62 and 61.40 as mentioned above. Results in table 3 showed the correlation of the four dimensions and parents' acculturation. Parents' language proficiency (63, SD=16) was the most important dimension of acculturation, followed by social interaction (39, SD=24), lifestyle adaptation (43, SD=15) and self-identify (44, SD=14).

As a categorical variable, parents' acculturation status was statistically different between children who used and who had an unmet need for outpatient service ($P=0.040$, table 4).

Association between IM children's HSU and parents' acculturation

After adjusting for the confounding factors of predisposing characteristics (including parents' marital status and physical check-up behaviours in the previous year) and enabling resources factors, the multivariate logistic regression (model 1 of table 5) indicated that IM children whose parents were in the middle-level acculturation group were less likely to use outpatient service compared with children whose parents were in the low-acculturation or high-acculturation group, although it was only significant when compared with the high-acculturation group. IM children with middle-acculturation group parents (AOR=3.17, 95% CI 1.2 to 8.3, $P<0.05$) were more likely to have an unmet need after being sick within the past 2 weeks compared with the children with high-acculturation group's parents. When we changed the imputation method to the multiple imputation, the sensitivity analyses showed similar results.

The stratified analysis showed that association of parents' acculturation level and children's outpatient service utilisation was inconsistent between different subgroups of family economic status. Similar to the total subjects, the association in the subgroup of poorer family economic status (scored less than 50) was a U-shape curve (figure 2). This indicates that IM children whose parents were in the middle-acculturation group were more likely to have an unmet need for outpatient service compared with those whose parents were in the low-acculturation or high-acculturation group. However, it was only significant (AOR=3.82, 95% CI 1.2 to 12.2, $P<0.05$) when compared with children whose parents were in the low-acculturation group (model 2 of table 5). In the subgroup whose family economic status was better (scored more than 50), the association between IM children's outpatient service utilisation and their parents' acculturation was positive, although it was only significant in children whose parents were in the low-acculturation group (AOR=13.51, 95% CI 1.6 to 117.0, $P<0.05$) compared with those in the high-acculturation group (model 3 of table 5). Table 6 indicated that compared with other groups, parents in both low-acculturation and poor economic status were more likely to use private clinics (26.8% vs 13.9%) while less likely to use governmental health facilities (62.5% vs 80.3%).

The multivariate logistic regression of IM children's inpatient service utilisation and their parents' acculturation did not show statistical significance. Results of the bivariate logistic regression between these two variables showed no statistical significance. However, the rates of unmet inpatient service need among children whose parents were in the middle-acculturation group were lower than others, which was inconsistent with the association on outpatient service utilisation and indicated the complementary association between outpatient and inpatient services sometimes (table 7).

Table 2 Characteristics of migrant children and their parents in Guangzhou

Variable	Children who got sick within the past 2 weeks n=216 (n (%))		Children in need of inpatient service during last year n=94 (n (%))		P value			
	Total n=258 (n (%))	Used outpatient service (n=178)	Unmet (n=38)	Total		Used inpatient service (n=50)	Unmet (n=44)	P value
Children's characteristics								
Child's gender					0.212		0.501	
Boy	148 (57.4)	122 (56.5)	104 (58.4)	18 (47.4)		61 (64.9)	34 (68.0)	27 (61.4)
Girl	110 (42.6)	94 (43.5)	74 (41.6)	20 (52.6)		33 (35.1)	16 (32.0)	17 (38.6)
Child's age	13.92±0.94				0.237			
<15	190 (73.6)	169 (78.2)	142 (79.8)	27 (71.1)		60 (63.8)	37 (74.0)	23 (52.3)
≥15	68 (26.4)	47 (21.8)	36 (20.2)	11 (28.9)		34 (36.2)	13 (26.0)	21 (47.7)
Public health insurance of Guangzhou					0.522			
No	154 (59.7)	138 (63.9)	112 (62.9)	26 (68.4)		43 (45.7)	26 (52.0)	17 (38.6)
Yes	104 (40.3)	78 (36.1)	66 (37.1)	12 (31.6)		51 (54.3)	24 (48.0)	27 (61.4)
Household status								
Family economic score	49.02±12.83				0.015			
<50	182 (70.5)	159 (73.6)	137 (77.0)	22 (57.9)		53 (56.4)	28 (56.0)	25 (56.8)
≥50	76 (29.5)	57 (26.4)	41 (23.0)	16 (42.1)		41 (43.6)	22 (44.0)	19 (43.2)
Stay with grandparents					0.136*			
No	232 (89.9)	194 (89.8)	157 (88.2)	37 (97.4)		82 (87.2)	43 (86.0)	39 (88.6)
Yes	26 (10.1)	22 (10.2)	21 (11.8)	1 (2.6)		12 (12.8)	7 (14.0)	5 (11.4)
Parents' characteristics								
Parent's age (years)	41.69±4.39				0.329			
<40	69 (26.7)	60 (27.8)	47 (26.4)	13 (34.2)		20 (21.3)	12 (24.0)	8 (18.2)
≥40	189 (73.3)	156 (72.2)	131 (73.6)	25 (65.8)		74 (78.7)	38 (76.0)	36 (81.8)
Parents' marital status					0.078*			
Married	246 (95.3)	206 (95.4)	172 (96.6)	34 (89.5)		89 (94.7)	48 (96.0)	41 (93.2)
Divorced	12 (4.7)	10 (4.6)	6 (3.4)	4 (10.5)		5 (5.3)	2 (4.0)	3 (6.8)
Parents' education level					0.951			
Below high school	195 (75.6)	164 (75.9)	135 (75.8)	29 (76.3)		68 (72.3)	34 (68.0)	34 (77.3)
High school or above	63 (24.4)	52 (24.1)	43 (24.2)	9 (23.7)		26 (27.7)	16 (32.0)	10 (22.7)
Working during the opening hours of health facilities					0.566			

Continued

Table 2 Continued

Variable	Children who got sick within the past 2 weeks n=216 (n (%))			Children in need of inpatient service during last year n=94 (n (%))			
	Total n=258 (n (%))	Used outpatient service (n=178)	Unmet (n=38)	Total	Used inpatient service (n=50)	Unmet (n=44)	P value
Yes	88 (34.1)	57 (32.0)	14 (36.8)	34 (36.2)	15 (30.0)	19 (43.2)	
No	170 (65.9)	121 (68.0)	24 (63.2)	60 (63.8)	35 (70.0)	25 (56.8)	
Duration of stay in Guangzhou, year	15.44±6.85						0.824
0-	47 (18.2)	31 (17.4)	6 (15.8)	18 (19.2)	10 (20.0)	8 (18.2)	
10-	139 (53.9)	98 (55.1)	19 (50.0)	49 (52.1)	27 (54.0)	22 (50.0)	
20-	72 (27.9)	49 (27.5)	13 (34.2)	27 (28.7)	13 (26.0)	14 (31.8)	
Parents' physical check-up							0.509
Yes	133 (51.6)	82 (46.1)	27 (71.1)	44 (46.8)	25 (50.0)	19 (43.2)	
No	125 (48.4)	96 (53.9)	11 (28.9)	50 (53.2)	25 (50.0)	25 (56.8)	

*P value of Fisher test.

DISCUSSION

This study is one of the first research to explore the association between IM children's HSU and their parents' acculturation, using comprehensive variables to measure acculturation among IMs. Our study suggested that the association between parents' acculturation and children's HSU was complex and non-linear and could be moderated by family economic status.

Our study suggested that compared with those in the high-acculturation group, parents in the middle-acculturation group were less likely to use outpatient health service while their children were sick, which was consistent with findings from previous research among international immigrant children.^{18 19 21 46} However, language proficiency, as one of the most important dimensions, did not affect the communication between IMs and doctors but acted as a sign of frequent interactions with the local residents, which was inconsistent with the previous studies on international immigrants.^{18 19 21 46} Consequently, the association between IM children's outpatient service utilisation and parents' acculturation can be explained as follows. One possible reason may be that parents' perceived personal and societal discrimination, which was negatively associated with acculturation, would influence their trust on health services.⁴⁷ Hence, parents in the middle-acculturation group perceived more discrimination and medical mistrust compared with those parents in the high-acculturation group, which prevented them from using outpatient service after their children were ill. Additionally, the parents in the high-acculturation group tended to have better health awareness and behaviours,⁴⁸⁻⁵¹ which enabled them to take their children to visit doctors in the beginning of the illness and to use more preventive health services. Parents in the high-acculturation group also had better social interaction, which would enable them to gain necessary information about the health service system and to receive outpatient service more easily.

Besides, the association of IM children's outpatient service utilisation and parents' acculturation between different family economic subgroups was inconsistent. In the subgroup of poorer family economic status (scored less than 50 for average family monthly income, occupation and residence), IM children whose parents were in the middle-acculturation group had a higher proportion of unmet need for outpatient service compared with those in the low-acculturation and high-acculturation groups (shown in [figure 2](#)). This pattern was similar to that of the results of the main study, although only the comparison with children whose parents were in the low-acculturation group had reached statistical significance. Another study also found IM workers in lower socioeconomic group used more health service.⁵² The reason may be that parents in both low-acculturation group and poor economic status may have poor awareness towards their children's health status, which may cause the under-detection of any illnesses.⁵³ In addition, children in seventh and eighth grade were more likely to have cold

**Table 3** Mean score of four dimensions between different groups of acculturation

Acculturation group	n	Average score (means±SD)				
		Acculturation	Social interaction	Lifestyle adaptation	Self-identity	Language proficiency
Low	89	33.04±11.03	22.23±19.39	33.97±12.95	36.04±9.84	47.38±13.24
Middle	81	54.34±4.27	42.08±21.63	42.78±12.19	43.89±12.53	64.45±8.55
High	88	71.23±8.07	54.48±18.98	51.32±15.34	51.84±14.92	77.71±8.44
Total	258	52.76±17.93	39.46±24.05	42.65±15.34	43.89±14.15	63.08±16.32
Pearson correlation coefficient			0.578	0.562	0.479	0.892

Low acculturation included parents who scored 0–46.61; middle acculturation included parents who scored 46.62–61.40; high-acculturation included parents who scored 61.41–100.

or diarrhoea instead of some serious illnesses, which may often be managed through self-medication.^{54–56} However, parents in the low-acculturation group were more likely to have limited knowledge to implement successful self-medication, thereby choosing to use outpatient service after their children got ill.⁵⁷ Although parents in the low-acculturation group and poor economic status had a higher rate of outpatient service utilisation, the health facilities they chose were more likely to be society-run clinics (26.8%, the so-called private clinics), which generally have poorer service quality and lower medical expenditure without a licence,⁵⁸ instead of governmental health facilities, compared with other groups. This proportion was even higher than that among the IM workers in one study, which found that 20% IM workers selected the society-run clinic to see a doctor.⁵⁸ This suggested that although children in poorer family economic and low acculturation status had better utilisation, the quality of services they received was worse.

However, in the subgroup of better family economic status (scored 50 or more), the association between children's outpatient service utilisation and their parents' acculturation was positive, which was generally consistent with other studies.^{18 19 21 46} Results on the association of outpatient service utilisation and acculturation recommend the government to improve both IMs' acculturation and economic status, to prolong the opening time of outpatient department or provide evening clinics and to focus on outpatient service utilisation of

the IM children whose parents have little interaction with the native population. Measures to promote the IMs' acculturation may include weakening the barrier of household registration, eliminating discrimination against IMs and promoting the coverage of local public health insurance.

However, we did not find any statistical association between parents' acculturation level and their children's inpatient service utilisation, which was consistent with previous research.⁵⁹ This might suggest that enabling resources played a more important role in explaining the inpatient service utilisation than the parents' acculturation. Hence, in order to decrease the unmet need for inpatient service, we should mainly focus on enabling resources and should take measures to improve the economic status of IMs and to reduce their work pressure.

Although the association between IM children's inpatient service and their parents' acculturation was non-significant, our study suggested that IM children whose parents were in the middle-acculturation group had a lower level of unmet needs, in other words, they had better utilisation of inpatient service compared with the other groups, which was in contrast with the associations between acculturation and outpatient service utilisation. This may also suggest the complementary association between outpatient and inpatient service utilisation.^{60 61}

Table 4 Correlation of IM parents' acculturation and their children's HSU

Variable	Total n=258 (n (%))	Children who got sick within the past 2 weeks n=216 (n (%))		P value	Children in need of inpatient service during last year n=94 (n (%))		P value
		Used outpatient service (n=178)	Unmet (n=38)		Used inpatient service (n=50)	Unmet (n=44)	
Acculturation	52.76±17.93	52.96±18.31	52.80±15.26	0.961	53.21±16.38	53.67±18.44	0.898
Acculturation level				0.040			0.460
Low	89 (34.5)	63 (35.4)	12 (31.6)		12 (24.0)	14 (31.8)	
Middle	81 (31.4)	49 (27.5)	18 (47.4)		22 (44.0)	14 (31.8)	
High	88 (34.1)	66 (37.1)	8 (21.0)		16 (32.0)	16 (36.4)	

IM, internal migrant; HSU, health service utilisation.

Table 5 Factors related to the unmet outpatient service need within the past 2 weeks

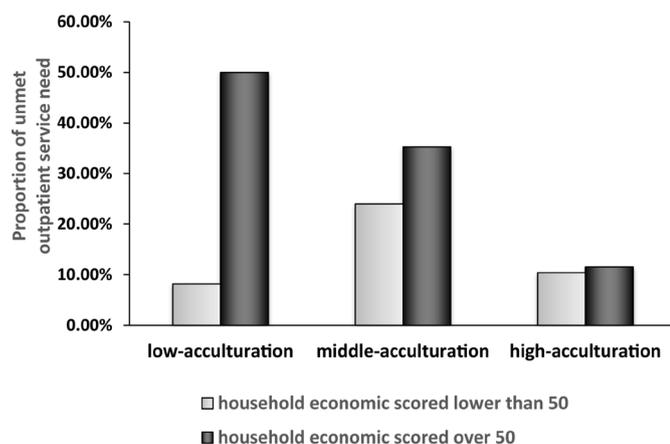
Variable	Unadjusted OR (95% CI)	Model 1 Total sampling Adjusted OR (95% CI)	Model 2 Subgroup of poorer family economic status Adjusted OR† (95% CI)	Model 3 Subgroup of richer family economic status Adjusted OR‡ (95% CI)
Acculturation				
Acculturation level of parent				
Low	1.57 (0.60 to 4.10)	1.40 (0.50 to 3.92)	1	13.51 (1.56 to 116.97)*
Middle	3.03 (1.22 to 7.54)*	3.17 (1.21 to 8.27)*	3.82 (1.20 to 12.18)*	3.56 (0.60 to 21.02)
High	1	1	1.50 (0.39 to 5.68)	1
Enabling resources				
Family economic score				
<50	1	1		
≥50	2.43 (1.17 to 5.06)*	2.57 (1.11 to 5.92)*		
Public health insurance of Guangzhou				
Yes	1	1	1.45 (0.54 to 3.92)	1
No	1.28 (0.60 to 2.70)	1.42 (0.62 to 3.24)	1	7.38 (1.39 to 39.22)*
Working during the opening hours of health facilities				
Yes	1.24 (0.60 to 2.57)	1.37 (0.58 to 3.22)	2.12 (0.73 to 6.23)	1
No	1	1	1	1.80 (0.38 to 8.51)
Predisposing characteristics				
Parent's physical check-up during the past year				
Yes	1	1	1	1
No	2.87 (1.34 to 6.15)**	2.66 (1.16 to 6.12)*	2.42 (0.87 to 6.73)	4.39 (0.79 to 24.36)

*P<0.05; **P<0.01.

†Adjusted OR: subgroup whose family economic status scored less than 50.

‡Adjusted OR: subgroup whose family economic status scored 50 and higher.

There are several limitations in this study. First, the cross-sectional survey did not allow for the exploration of the causal relationship between variables. However, our results may inform the future intervention studies to improve the IM children's health services utilisation. Second, the small sample size had limited the power

**Figure 2** Moderation of family economic status on the association between IM children's outpatient service utilisation and their parents' acculturation.**Table 6** Health facilities that parents visited after their children were ill

Health facilities	Low acculturation and poor economic status n=56 (n (%))	Others n=122 (n (%))
Private clinics	15 (26.8)	17 (13.9)
Governmental health facilities	35 (62.5)	98 (80.3)
Others	1 (1.8)	3 (2.5)
Missing data	5 (8.9)	4 (3.3)

and made it difficult to detect the influence of many other factors, such as children's gender, parents' age and parents' education level, but these variables in this study had no statistical difference between various groups of IM children in need. Third, the Cronbach's alpha of the self-identity dimension of acculturation was low, which would affect the internal consistency of this dimension. However, the Cronbach's alpha of the total acculturation was acceptable, and our study analysed parents' acculturation in whole rather than in its

**Table 7** Determination of the unmet inpatient need during the past year

Variable	Total (n=94)	Rate of unmet need (%)	Unadjusted OR (95% CI)
Acculturation			
Acculturation level of parent			
Low	26	53.8	1.17 (0.41 to 3.29)
Middle	36	38.9	0.64 (0.24 to 1.67)
High	32	50.0	1

individual dimensions, so that the measurement is still considered reliable. Fourth, the generalisation of results may be limited since this study was only conducted in the society-run schools in two districts with high proportions of IMs due to the logistical constraints. Finally, the HSU was measured by parents' self-reported questions, which may have reported bias of health conditions (in need of service) and also utilisation. In addition, since we failed to collect information about health belief, it was proximately measured by physical check-up during the past 12 months. Despite a health behaviour indicator, it still well reflects the health belief according to the health belief model.^{39 40} Despite these limitations, our study explored the non-linear association between IM children's HSU and their parents' acculturation and indicated the moderation effect of family economic status on this association.

In conclusion, the association between IM children's outpatient service utilisation and their parents' acculturation was complex and could be moderated by family economic status. IM children whose parents were in the middle-acculturation group were less likely to use outpatient service compared with those whose parents were in low-acculturation and high-acculturation groups, although only the comparison with the high-acculturation group was statistically significant. This result indicated that research on the association between IMs' acculturation and their children's HSU would be non-linear, and in order to intensively explore the association between these two variables, future research may need to modify their models. Besides, IM children whose parents were in both low-acculturation and poor economic status were more likely to use outpatient service but chose the poorer quality and cheaper service provided by society-run clinics instead of governmental health facilities. This suggested that the main issue was diverse between different acculturated groups, and future research should focus on the access and the quality of health service IMs received. In order to increase IMs' HSU, we should improve both IMs' acculturation and economic status, which also take important roles in increasing their access to the better medical environment in the low-acculturation and poor IMs. However, this study did not find any association between IM children's inpatient service

utilisation and their parents' acculturation, which should be confirmed in a larger sample.

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Contributors BP conceptualised this paper, conducted statistical analyses and drafted the initial manuscript. LL conceptualised this study and the paper and critically revised this paper. GZ was involved in the development of the paper and provided critical comments and revision of the paper. WC was involved in the development of the structure and critically revised this paper. YL was involved in the design of this study and collected the data. All authors contributed to the manuscript and approved the final manuscript.

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