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Bilingual Language Experience and Children's Social-Emotional and Behavioral Skills: A Cross-Sectional Study of Singapore Preschoolers

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Abstract

The current study examines the relationship between bilingual children's dual language experience (i.e., language input, language output and vocabulary proficiency), and their social-emotional and behavioral skills. Data were analysed from 805 Singaporean bilingual preschoolers (ages 4;1 - 5;8 years), who are learning English and either Mandarin ($n = 551$), Malay ($n = 105$), or Tamil, ($n = 149$). A parent questionnaire and standardized vocabulary tests were used to assess children's bilingual language environment and vocabulary knowledge. Children's social-emotional and behavioral skills were evaluated by teachers using the Strengths and Difficulties Questionnaire. A series of variables which might influence social-emotional and behavioral skills (e.g., gender, non-verbal IQ, SES, and emotion recognition) were controlled and mixed-effects models were used to conduct data analysis. Results demonstrated that children who had larger bilingual receptive vocabulary and had frequently spoken both languages for a longer time had better social-emotional and behavioral skills. Gender and emotion recognition ability were also found to be significantly related to children's social-emotional and behavioral skills. Such findings held true for children across different Mother Tongue language backgrounds. This suggests that a good language environment for bilingual children should be promoted not only for the sake of their early language development, but also because of the potential benefits to their social-emotional and behavioral skills.

Key words: bilingual, receptive vocabulary, language output, social-emotional and behavioral skills, SDQ

Introduction

Research in recent years has witnessed increasing attention to factors impacting social-emotional and behavioral skills in early childhood due to its long-term effects on mental health, social relationships and academic performance (e.g. Arnold et al. 2012; Denham et al. 2003; Denham et al. 2012). For monolingual and bilingual school-aged children and adolescents, well-developed language abilities have been identified to be associated with better social-emotional and behavioral skills (Liu et al. 2009; Oh and Fuligni 2010; Toppelberg and Shapiro 2000). Such a bi-directional relationship has also been found in studies with bilingual preschoolers. Some studies discuss how bilingual language competence is a good predictor of social-emotional and behavioral skills (Collins et al. 2011; Han 2010) and others reflect how social-emotional and behavioral skills are good predictors of second language competence (Winsler, Kim and Richard 2014). If the relationship between bilingualism and social-emotional and behavioral skills could be confirmed in preschoolers, language intervention could be introduced to potentially benefit at-risk bilingual children, as early childhood is a crucial period for language development (Marchman and Fernald 2008).

The current study focuses on bilingual preschoolers in the context of Singapore, where bilingualism is institutionalized as early as preschool, and taken as a cornerstone of Singapore's education system (Rajah 2013; Sun et al. 2017). There are four official languages (English, Mandarin, Malay and Tamil) and three major ethnic groups (Chinese 74.3%, Malays 13.3%, and Indians 9.1%) (Singapore Department of Statistics, 2016). Children are expected to acquire both English and their ethnic language (Mother Tongue). English is taken as the language of instruction and administration for public communication, and a "Mother Tongue" (MT), either Mandarin, Malay or Tamil, is learnt to maintain cultural heritage and socio-economic advantages

in the region. Another area of interest in Singapore's early childhood education is children's social and emotional skills. It is considered one of the six primary learning areas in the preschool curriculum framework (Ministry of Education 2013). Therefore, findings from this study may not only extend our understanding of the association between early bilingualism and social-emotional and behavioral skills outside a Western context, but also provide insight into the education policy of the local government.

Literature Review

The Constructs of Social-Emotional and Behavioral Skills and Bilingual Experience

Social-emotional and behavioral skills refer to one's social competence that manifests via behaviors that allow one to successfully participate in a variety of social settings (Greene and Burleson 2003; Vahedi, Farrokhi and Farajian 2012). Social competence is generally related to peer relationships, emotional wellbeing, and capability to adjust to different environments. This general description is encapsulated in the National Institute of Clinical Excellence's (2013) definition of social emotional wellbeing, which includes emotional wellbeing (e.g. being confident and not anxious or depressed), psychological wellbeing (e.g. being autonomous, resilient and attentive) and social wellbeing (e.g. maintaining good relations with others). The development of social-emotional and behavioral skills in children is crucial as it helps them adapt to new environments (e.g. entering school), and scaffolds the coping skills needed when dealing with daily challenges. For example, social competence has been associated with better school performance and healthier well-being, while the lack of social-emotional and behavioral competence has been linked with personal, social and academic difficulties (Eisenberg, 2006; Guerra and Bradshaw 2008).

A bilingual could be generally defined as an individual who speaks two languages. However, not all bilinguals are equally proficient in both languages or have similar language exposure. It is important to focus on both proficiency and exposure when estimating a person's bilingual experience. Luk and Bialystok (2013) found that it was the daily bilingual usage and proficiency in one of the bilinguals' languages that best described their bilingual experience. Treffers-Daller and Korybski (2015) also highlighted input quality and quantity of both languages as key factors in the development of language dominance. Treffers-Daller (2015) called for a comprehensive approach to measure bilingualism, which included both bilinguals' language competence and various aspects of language exposure (e.g. language output, input quality and input quantity).

The Association between Bilingual Experience and Social-Emotional and Behavioral Skills

A wholesome bilingual experience, where regular bilingual language usage and proficiency are developed and encouraged in children, has been demonstrated to facilitate children's communication with others at home and in the wider community (Han 2010; Leyendecker et al. 2014), and to impact the consequent development of their social-emotional and behavioral skills. Most of the existing studies focus on the association between children's language competence and their social-emotional and behavioral skills. For instance, Collins and colleagues (2011) found that the bilingual competencies of Spanish-English bilingual children were closely related to their interpersonal, intrapersonal and affective strengths. Similarly, Han (2010) found that Latino children who were either fluent bilinguals or non-English-dominant bilinguals performed better on measures of social-emotional and behavioral skills as compared to their monolingual Caucasian peers, who performed on par with the English-dominant bilingual Latino children. Bilingual competence was inferred to be beneficial as it helped the Latino children understand

and communicate effectively with their peers, teachers and families (Han 2010). Consequently, this may make them feel more secure and self-confident, allowing them to build better relationships (Collins et al. 2011). Nevertheless, the association between bilingualism and social-emotional and behavioral skills is not always positive. For example, Farver, Xu, Eppe and Lonigan (2006) did not find any difference in the social functioning of Hispanic preschool children from bilingual homes (Spanish and English) as compared to those from a monolingual home (English or Spanish only). It should be noted that all the studies had employed different methods of measuring bilingualism and social-emotional and behavioral skills. For example, bilingual competence had been measured using the children's oral competence in both languages in Collins and colleagues' (2011) study, input language quality from home was measured in Farver and colleagues' (2006) study, and both were measured in Han's study (2010). Hence, it is possible that differences in the associations found between bilingualism and social-emotional and behavioral skills could be a result of the different approaches each study had adopted.

Language competence comprises multiple facets, and Toppelberg and colleagues (2006) deconstructed it into specific domains (e.g. semantics versus syntactic) and modalities (receptive versus expressive) using Woodcock's revised language proficiency battery (Woodcock 1991). Amongst the various linguistic facets, receptive semantic tasks (verbal analogies) were found to be most sensitive and were significantly and negatively correlated with different aspects of social-emotional and behavioral problems (e.g. poorer attention, more aggression, and higher delinquency). The authors attributed this strong association to the basic role that receptive semantics plays in communication. In the current paper, we focus on one domain of this specific language aspect and examine the association between bilingual receptive vocabulary knowledge and children's social-emotional and behavioral skills.

Besides language competence, bilingual language exposure has also been considered by some researchers. However, only a limited scope of information has been assessed and the various facets of bilingual language exposure tend to be taken as a whole. For instance, Han (2010) targeted Spanish-English bilingual's family language use and children's English proficiency through teacher's report and school entry tests to categorize these children's language dominance. Balanced and sufficient language use was found to contribute to the development of children's social-emotional and behavioral skills, but it remains unclear whether it is due to input or output factors. Similar issues apply to Toppelberg and colleagues' (2006) study, in which the distinctive effects of language output (identified as 'acculturation' in the paper) and language input (identified as 'immigration') on externalizing symptoms, aggression symptoms and attentional symptoms were undecided. To conclude, previous studies have made great contributions in enhancing our understanding of the relationship between bilingualism and social-emotional and behavioral skills. However, the limited scope of information about bilingual experience utilised in these studies might lead to the exclusion of certain language experience specific to the relationship between bilingualism and social-emotional and behavioral skills. A more comprehensive and specific measure of bilingualism is needed to contribute to our understanding of 1) whether bilingualism indeed benefits social-emotional and behavioral skills, and 2) if such a correlation exists, which aspects of bilingual experience play an important role in social-emotional and behavioral skills.

Other Factors Critical to the Development of Social-Emotional and Behavioral skills

To further understand the relationship between bilingualism and social-emotional and behavioral skills, it is important to be aware of other factors that may impact social-emotional and behavioral skills, or that may interact with language in predicting social-emotional and

behavioral skills. A number of studies have revealed an association between gender and social-emotional and behavioral skills. In an attempt to evaluate the psychometric properties for parent and teacher ratings in the Danish version of the Strengths and Difficulties Questionnaire (SDQ) (Obel et al. 2003), Niclasen and colleagues (2012) found that boys scored higher than girls on the Difficulty subscales while girls were rated higher on the Prosocial scale. Similarly, in a confirmatory factor analysis utilising parent ratings of the SDQ for preschoolers in Singapore, Bull, Lee, Koh, and Poon (2015) found that boys were more likely to be rated as having more difficulties in social-emotional behavior, and girls were more likely to be rated as prosocial. Consistently, other studies have also reported potential significant gender differences (e.g., Shojaei et al. 2009). In contrast, studies with higher item-factor loadings (Hawes and Dadds 2004) and higher reliability estimates of the subscales for boys (Niclasen et al. 2012), argued that gender differences found in SDQ could be mainly due to parents' different interpretations or responses to the survey for boys and girls. Therefore, they suggested that researchers should not over-interpret the reported differences between boys and girls in relation to social-emotional and behavioral skills.

Nonverbal intelligence has also been found to be related to preschoolers' social-emotional and behavioral skills. Higher intelligence is associated with lower emotional and behavioral problems in five-year-old children from low-income backgrounds (Flouri et al., 2015; Peyre et al., 2016). This advantage was attributed to the children's better ability to cope during the transition to primary school, where they would have to enter a learning-focused structured programme whilst also managing peer relationships. Peyre and colleagues (2016) investigated whether there were any differences in the social-emotional and behavioral skills of 5 to 6-year-old children from the EDEN cohort whose IQs were in the high (IQ>130), normal (IQ=70 to

130), and low (IQ<70) range. Children in the low IQ range were more likely to exhibit hyperactivity/inattention symptoms as compared to those in the normal IQ range.

There has also been increasing interest into the potential influence of emotion recognition on social-emotional and behavioral skills. The motivation for such studies originates, in part, from the recognition that there is an association between children's emotional competence and their growing social competence (Boyatzis, Chazan and Ting 1993; Nowicki 1998). Previous research indicates that preschool-aged children who are more adept at recognizing emotional expressions should experience fewer problems in social interactions than their less adept peers. For example, Zuckerman and Pruwuzman (1979) asked 3 to 5-year old children to differentiate emotions from a series of pictures in which adults made facial expressions. The authors found that children with a better ability to recognize emotions had higher social competence scores, as rated by teachers. Similar results were found by Denham and colleagues (2003) who found that 3 to 4-year-olds' understanding of emotions was related to their social competence. The results indicated that children's emotional competence is associated with their emotional expressiveness and empathic reactions to peers' and others' emotions. Denham (2007) suggested that the ability to recognize an emotion is considered necessary for higher-level abilities of understanding emotions. Hence, emotional knowledge and accurate identification of emotions may provide information to help a child in initiating and maintaining peer relations.

Factors related to family environment could also influence children's social-emotional and behavioral skills. For example, Flouri et al. (2015) found that children exhibited less externalising and internalising problems when their mothers had a university education. In addition, income is commonly cited as a factor that influences children's social-emotional and behavioral skills (Bradley el al. 2001). Winer and Thompson (2013) demonstrated in a path

model that demographic features (indexed by maternal education and family income), and maternal emotional risks explained 59% of the variance in preschoolers' social and emotional competence over time. Lower household income and maternal education levels were associated with lower quality of interactions between mothers and children, and consequently affected children's social competence at school entry. Given these outcomes found in the literature, mother's education level and family income are included as independent variables in the current study.

The Current Study

Only a few studies have investigated the relationship between bilingualism and social-emotional and behavioral skills in preschoolers (Halle et al. 2014). Those who investigated this topic mainly focused on language competence in single language pairs (e.g. English-Spanish), rather than the various facets of bilingual language experience across populations. Generally, a positive link between bilingualism and social-emotional and behavioral skills is apparent in the literature (but see Farver et al. 2006) and there is a need for knowledge about which specific aspect of the bilingual experience could be significantly correlated with these children's social-emotional and behavioral skills in general. Halle and colleagues (2014) noted that it is important to make a distinction as to which factors contributing to children's social-emotional and behavioral development apply to all children (e.g. parental stress), and which are unique to bilingual children (e.g. use of L1 in the classroom). The inclusion of more specific (e.g. input quantity, input quality, and output) aspects of the bilingual experience would allow us to understand their relationship with social-emotional and behavioral skills, and potentially plan intervention strategies that meet the unique needs of bilingual preschool children. The current study examined bilingual experience in a comprehensive manner across three different language

pairs (English-Mandarin, English-Malay and English-Tamil), and also examined other individual factors. The goal is to explore the association between bilingual experience and preschoolers' social-emotional and behavioral skills whilst addressing the following questions:

1. Which aspects of bilingual language experience are significantly correlated to children's social-emotional and behavioral skills, after controlling for other individual differences? Bilingual language experience in the current study has been operationalized as bilingual input quantity, input quality, output quantity, and bilingual receptive vocabulary knowledge. Individual difference factors have been specified as gender, nonverbal intelligence, affect recognition, mother's educational level and family income.

2. Is there a difference between particular bilingual language pairs in the relationship between bilingualism and social-emotional and behavioral skills? Bilingual language pairs have been operationalized based on the three major Mother Tongue languages in Singapore, namely, Mandarin-English, Malay-English and Tamil-English.

Methodology

Participants

As part of the Singapore Kindergarten Impact Project that started in 2015, data was initially collected from 1123 Singaporean and Singapore Permanent Resident (PR) children. The proportion of PR students in local schools is approximately 9% (Teng, 2016). Different from other contexts, for instance, as in Winsler, Kim and Richard's (2014) study of immigrant children in the US, PR children in Singapore are not necessarily from low-income families, as there are education and employment criteria for the attainment of PR status.

The participating Kindergarten 1 (4 to 5-year-olds) children were from 54 different preschools sampled across all main preschool provider types in Singapore (not-for-profit,

commercial, government subsidized, and public providers) from 14 geographical locations throughout Singapore to ensure a representative mix of SES and population density. The authors of this paper obtained ethics approval from the institutional review board of their university. The voluntary participation of teachers in the study were confirmed through discussion with school leaders and teachers, while parental consent of children's participation and children's assent to complete the assigned activities were acquired through forms.

To be able to specifically study bilingual language experience, children were excluded from the dataset when they had been exposed to more than two languages (usually due to mixed heritage), or when their Mother Tongue was not among the three official languages offered in local preschools. The final dataset included 805 Kindergarten 1 children (4 years 1 month to 5 years 8 months old) consisting 403 boys and 402 girls. 551 of the participating children were Mandarin-English speaking children, 105 Malay-English speaking, and 149 Tamil-English speaking.

Data Collection and Measures

A series of questionnaires and standard tests were used to explore children's bilingual language experience, nonverbal intelligence, emotion recognition, family environment and social-emotional and behavioral skills. The standard tests were conducted by full-time and part-time research assistants holding diplomas or degrees in psychology, early childhood education and other related fields. They underwent a rigorous training program, which equipped them with skills to administer the measures and to interact with the child participants. Children's preferred language was acquired from parents through consent forms, to facilitate administration of the tests. 68.2% (n=549) of children were indicated to prefer English, 2.7% (n=22) preferred Mandarin, 0.1% (n=1) preferred Malay, 0.6% (n=5) preferred Tamil, and 6.0% (n=48) had more

than one language indicated as preferred. No language preference was provided for 22.4% (n=180) of children by parents. The research assistants confirmed children's language preferences during administration and conducted tasks in the applicable language. The details of each task are as follows.

Children's bilingual vocabulary knowledge & dual language experience.

Children were tested for their bilingual receptive vocabulary knowledge using the Bilingual Language Assessment Battery (BLAB) (Rickard-Liow, Sze and Lee 2013), a similar standardized test to the Peabody Picture Vocabulary Test II (Dunn and Dunn 1997). The auditory-picture matching task was locally developed and has been normed in English, Mandarin and Malay (Rickard-Liow et al. 2013). A Tamil version was prepared specifically for the current project through the translation of items from the normed versions. The BLAB was reported to be a reliable measure of receptive vocabulary proficiency in the context of Singapore within the original norming sample (alphas of .75 –.77) (Rickard-Liow et al. 2013). Each BLAB version is an iPad application that contains 80 trials. Children listened to pre-recorded words in the program and then selected one picture out of four that best conveyed their understanding of the word mentioned to them.

A parent questionnaire was designed based on studies that discussed different factors of home language environment (Bedore et al. 2012; Farver et al. 2006; Phillips & Lonigan 2009). Parents were asked about the extent of children's language input quantity, quality and output at home. Language input quantity was estimated based on the extent of English dominance at home (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Primary). The higher the ranking, the more English (i.e. the less MT language) was assumed to be used in the family. Children's length of English and MT output were calculated separately by subtracting the child's onset age of speaking the language, from the child's current age. The shorter length of the two values (in

months) was taken as the bilingual output variable as it would allow us to estimate how long each child had used both languages actively (Luk & Bialystok 2013). Children's English and MT input quality were estimated with the number of English and MT books at home, using a scale ranging from 0 to 6 (0 = None, 1 = 1-10, 2 = 10-30, 3 = 30-60, 4 = 60-90, 5 = 90-120, 6 = More). Questionnaires were disseminated to parents in their preferred language. 35.0% (n=282) did not indicate a language preference, 64.5% (n=519) requested English, 0.2% (n=2) requested Mandarin, none requested Malay and 0.2% (n=2) requested Tamil versions of the parent questionnaires.

Children's individual characteristics.

The Ravens Coloured Progressive Matrices (CPM) test (Raven and Rust 2004) was used as a nonverbal measure of children's general ability, and consists of three sections (A, AB, B) of twelve items each. Children were provided an incomplete puzzle and are asked to choose one out of six pieces to complete the puzzle. The items are arranged to allow for the assessment of consistency in the children's reasoning using analogy and inference skills. The Ravens CPM test has been extensively used across a variety of settings worldwide as a fair culture instrument of non-verbal intelligence.

The Affect Recognition subtest from the NEPSY-II battery (Korkman, Kirk & Kemp 2007) was used to assess children's affect recognition in terms of their ability to discriminate between different facial expressions that relay different affect (happiness, sadness, anger, fear, disgust, and neutral emotion). Photos of children portraying different emotional expressions were provided, and the child participants were asked to (1) decide whether or not two photographs depicted faces with identical affect, (2) select two photographs with identical affect from either three or four photographs, or (3) select one of four photographs that depicted identical affect as the photograph at the top of certain pages in the stimulus book. Rasch modelling has been used

to investigate the psychometric properties of the NEPSY-II Affect Recognition subtest within the current sample. Results show that it is a reliable and valid measure of children's affect recognition ability (Yao et al., 2017).

Demographic information (i.e. gender, mother's educational level and household income) was also collected using the parent questionnaire, designed based on the Singapore Census of 2010. Mother's educational level refers to the highest educational qualification she has obtained, ranging from no qualification to doctorate degree. Monthly household income ranges from "Below 1000" to "10,000", with S$500 increment for each higher level.

Socio-emotional development outcome variables.

Teachers were asked to rate children's social-emotional and behavioral skills on the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ is a screening questionnaire measuring children's social-emotional and behavioral strengths and difficulties, which contributes to their wider social-emotional and behavioral skills. Goodman (1997) included the focus on positive attributes, aside from symptoms, as focusing solely on symptoms presents limitations to determining the absence or presence of psychiatric disorders. The SDQ has been found to detect conduct and emotional issues (Goodman & Scott, 1999). DeVries, Gebhardt and Voss (2017) described the SDQ as a tool for assessing psychological and psychosocial development. It has been used in various countries to detect potential developmental issues such as the rise in child or adolescent mental health and disorders, as well as other risk factors.

The SDQ has been widely evaluated and applied across different linguistic and cultural contexts, and the instrument's subscales have been shown to correlate significantly to clinician diagnoses of related behavioral issues (Downs et al. 2012; Woerner et al. 2004). Moreover, a series of studies have demonstrated its satisfactory psychometric properties as a screening tool

for preschoolers' social-emotional and behavioral skills (e.g., good validity; Croft et al. 2015). Bull et al. (2015) found strong evidence for SDQ's convergent and discriminant validity in the context of Singapore. The SDQ has 25 items to identify behavioral problems in children aged 3 to 16. There are 5 subscales with 5 items each, examining children's (1) emotional symptoms, (2) conduct problems, (3) hyperactivity or inattention, (4) peer-relationship problems, and (5) prosocial behavior. Each item was rated on a 0 (not true) to 2 (certainly true) scale, and the sum score of each subscale ranges from 0 to 10, with higher scores indicating increased social-emotional and behavioral difficulties (scales 1-4) or better prosocial skills (scale 5). A Total Difficulties score ("Difficulty") was generated by summing the first four subscales and a prosocial skills score ("Prosocial) was derived based on the last subscale.

Results

Descriptive Statistics and Bivariate Correlations

The descriptive statistics of the bilingual language experience, individual characteristics, and social-emotional and behavioral skills variables of all 805 children are summarized in Table 1. Children obtained higher vocabulary competence in English ($M = 35.46$, $SD = 8.70$) than in MT ($M = 29.02$, $SD = 7.92$) and on average have more English books (10-30) than MT books (1-10) at home. Children have actively spoken both languages for approximately 2 years, and frequently or primarily hear English at home. Paired t-tests demonstrated that discrepancies between English and MT were significant, both in vocabulary proficiency ($t (804) = 17.28$, $p = .000$; $d = 0.77$) and in reading environment ($t (791) = 27.46$, $p = .000$; $d = 0.87$). Pearson correlations were computed to assess the relationship between the predictors (Table 2), in order to avoid multicollinearity issues. It demonstrated that none of the variables are strongly correlated, therefore, all variables were included in the analyses.

Mixed Effects Model for Factors that Significantly Associate with Social-Emotional and

Behavioral Skills

The linear mixed-effects regression model (using the lme4 package in R) was used to explore which factors are significantly associated with social-emotional and behavioral skills. Compared to traditional approaches such as ANOVA, the mixed-effects model is more appropriate for handling datasets with nested structures as in the current study (Baayen, 2008; Jaeger, 2008). In our case, we had to take into consideration the random effect due to variations among teachers' evaluations, as the social-emotional and behavioral skills of children from the same class were assessed by the same teacher. Two models were examined for children's prosocial skills and difficulty levels respectively.

Prediction of prosocial behavior by bilingual language factors and other relevant factors.

Table 3 demonstrates the model of prosocial behavior obtained from the mixed effects model analysis. It shows that when taking into account all the predictors in Table 1, the whole model, including the fixed and random effects, explained about 63.1% of the variance. Prosocial behavior was significantly predicted by English vocabulary scores ($\beta = 0.03$, $SE = 0.01$, $t = 3.62$), duration of speaking both English and MT languages ($\beta = 0.01$, $SE = 0.00$, $t = 2.13$), gender ($\beta = 0.78$, $SE = 0.12$, $t = 6.36$), and affect recognition scores ($\beta = 0.05$, $SE = 0.02$, $t = 2.20$). Specifically, the larger the receptive vocabulary children obtained in English, the better their prosocial behavior was. For language output, children who actively used both languages for a longer period showed better prosocial behavior. Besides bilingual language experience, girls demonstrated better performance in prosocial behavior than boys. Those children who were good at emotion recognition also demonstrated better prosocial skills. The same results were found for children across the three MT language groups. As demonstrated in Table 3, there is no differences between Mandarin speaking children and Malay speaking children. The same held

true for Mandarin and Tamil speaking children. As one model can only present us two contrasts, we changed the contrast specification and explored the differences between Tamil speaking children and Malay speaking children. The result remains the same: there was no difference between these two ethnic groups of children.

Prediction of difficulty level by internal and external factors.

Table 4 reveals the mixed-effects regression model for difficult behavior. The whole model explained about 46.80% of the variance. Children's English vocabulary proficiency (β = -0.06, SE = 0.02, t = -2.62), MT vocabulary proficiency (β = -0.05, SE = 0.03, t = -1.97), and gender ((β = -1.75, SE = 0.34, t = -5.21) were found to be significantly associated with children's socio-emotional and behavioral difficulty. Children with larger bilingual receptive vocabulary were identified as having fewer difficulties. Girls performed better than boys, with fewer reported difficulties. In terms of children's MT language, similar to what was found in the prosocial model, children of the three MT groups were not different from each other in difficulty levels.

Discussion

The current study explored the association between bilingual language experience and children's social-emotional and behavioral skills in Singaporean preschoolers. To our knowledge, this is the first study outside of the Western context that took a comprehensive view in examining the association between children's social-emotional and behavioral skills and various aspects of their bilingual language experience (i.e. input quantity, input quality, output, and receptive vocabulary knowledge). With the inclusion of a series of rival predictors (i.e. individual characteristics) that were previously shown to influence children's social-emotional and behavioral skills development, we could make a relatively unbiased estimate of the association between bilingual language experience and children's social-emotional and behavioral skills. Moreover, by taking three language pairs (i.e. Mandarin-English, Malay-

English and Tamil-English) into consideration simultaneously, such an association is likely to be more generalizable across different populations.

The results demonstrated that receptive vocabulary proficiency and bilingual language output (longer time spent speaking both languages) are two factors that significantly associate to children's social-emotional and behavioral skills. More specifically, better receptive vocabulary knowledge in English, which is the dominant societal language in Singapore, was found to significantly associate with lower social-emotional and behavioral difficulties and better prosocial skills. Better receptive vocabulary knowledge in MT, however, was only found to be significantly associated with lower social-emotional and behavioral difficulties. Children's bilingual output was found to be significantly associated with better prosocial skills. Even though the effect sizes of the two bilingual predictors are small, such findings are still considered meaningful. This is because, first of all, we could see a unique contribution of bilingual experience to children's social-emotional and behavioral skills after controlling for various cognitive and environmental factors. Secondly, it is feasible to manipulate the significant predictors, such as by promoting an early onset age to speak both languages at home. With regard to other individual and environmental factors, girls were found to outperform boys in both aspects of social-emotional and behavioral skills. Higher ability to recognize emotion was found to be related to the development of prosocial skills. These results held across the three language pairs.

Bilingual Receptive Vocabulary Knowledge and Social-Emotional and Behavioral Skills

Both English and MT receptive vocabulary were found to make a unique and significant contribution to children's total difficulties score, which is a sum of their hyperactivity, emotional problems, conduct problems, and peer problems. This suggested a fundamental role of bilingual

receptive language competence in social competence, in line with findings by Toppelberg and colleagues (2006). As a building block of children's general language proficiency, bilingual receptive vocabulary potentially enables children to comprehend crucial and subtle messages, thus allowing them to respond appropriately in different contexts with confidence. This therefore decreases children's chances of having disruptive behaviors (e.g. hot temperedness) or loneliness. Increased bilingual language proficiency might lead to a better command of language production, laying the foundation for children's positive social-emotional and behavioral adaptation (Collins et al., 2011; Raver and Knitzer 2002).

It is worth noting that only English receptive vocabulary, but not MT receptive vocabulary, was found to be significantly associated to children's prosocial skills, which is the voluntary behavior with the intention to benefit others (Eisenberg 2006). The discrepancy between English and MT in their relations to prosocial skills might result from the functional differences of these two languages in Singapore. English is used as a language for inter and intra ethnic communication in Singapore, while MT languages are mostly treated as a school subject in the curriculum (Dixon et al. 2011). Therefore, children's English proficiency levels might heavily influence their interactions with others, for instance, in enabling them to offer help, share ideas, or show sympathy. In conclusion, dual language competence is crucial for children's social-emotional and behavioral skills, and proficiency in the dominant societal language is particularly important.

Bilingual Language Output and Social-Emotional and Behavioral Skills

Children's bilingual language output (i.e. amount of time spent actively speaking both languages) was positively related to prosocial skills, and this contribution is unique and independent from the variance explained by children's bilingual vocabulary competence.

According to Vygotsky's sociocultural theory (1978), language output is a part of human psychological processes, originating from collective behaviors (e.g. discourse) and facilitating the process of information internalization (e.g. language knowledge) to become part of people's mental activity (Min, 2006; Stetsenko & Arievitch 1997; Swain 2007). People's knowledge, thinking approach and means of actions are cultivated by these social interactions, and language output originates in or serves the purpose of such interaction (Min 2006).

In the current study, bilingual language output probably facilitates the development of prosocial skills, allowing children to use language as a cultural artefact to regulate their behavior and establish better relationships at school and at home (Lantolf & Thorne 2007). Collaborative conversations (usually with adults) enable children to participate in problem solving and knowledge building processes. During interactions, children might form inquiries and raise questions to bridge the knowledge gap (e.g. how to properly offer help). They also need to respond to the questions and coordinate with other interlocutors to search for the optimal answers. These communications might be improved significantly with longer bilingual language practice and in turn facilitate children's development in prosocial skills.

Other Significant Factors of Social-Emotional and Behavioral Skills

Gender was found to play a role in both children's total difficulties score and prosocial skills and girls tended to have fewer social-emotional and behavioral skills problems than boys. This is in line with findings from previous studies (e.g. Bertrand & Pan 2013; Heckman 2008). Such a gender impact might be argued from environmental perspectives (e.g. rearing input) (Kristoffersen & Smith 2015). Children's ability to discriminate emotions via facial observation was positively correlated to their prosocial skills, and this finding is in line with the results of previous studies (Lierheimer & Stichter 2011; Uljarevic & Hamilton 2013; Young & Posselt

2012). Such an association is not difficult to comprehend, since facial expressions are crucial guides for us to decode, interpret and respond to other people's behavior during interactions and facilitates the adaptation of our own behavior during the process (Marsh, Kozak and Ambady 2007).

Limitations and Implications

The first crucial limitation is that this is a cross-sectional study, so only correlations could be derived from the results. Our study implies the positive role that harmonious bilingual experience plays in social-emotional and behavioral skills. However, the opposite direction is equally plausible. Winsler and colleagues (2014) found that bilingual children's social-emotional and behavioral skills could predict their concurrent and longitudinal acquisition of the second language, after controlling children's ethnic language competence and cognitive factors. Their study implies that individual differences in child behavioral control and social-emotional skills may help some children to become fully bilingual in the first place. Good socio-emotional skills may facilitate children's competent interactions with their peers, teachers and family members, potentially contributing to their second language development. Future studies might adopt a longitudinal design to examine the causality of bilingual language experience and children's social-emotional and behavioral skills. Secondly, only bilingual receptive vocabulary breadth was measured and it would be useful to examine children's receptive vocabulary depth as well (e.g. analogy, categorization, and generalization; Sun et al. 2016). A more extensive and systematic evaluation of children's bilingual receptive vocabulary competence would allow us to better identify the specific associations between aspects of children's linguistic competence and their social-emotional and behavioral skills. Third, the current study only took teachers' evaluations of children's social-emotional and behavioral skills into consideration, and did not

include parents' viewpoints. Even though parents' evaluations might suffer from the problem of a "common standard" for average children since they only observe their own child, they could offer the researchers valuable information about children's behavior outside the classroom.

Despite these limitations, the results of the current study raise a series of implications for school and parental practices, and policy making. Children should be encouraged to use both their languages actively as soon as possible and be immersed in good bilingual language environments to develop better bilingual proficiency. This would not only aid in enhancing their bilingual language competence but might also benefit their social-emotional and behavioral skills.

Conclusion

In this paper, we investigated the relationship between children's bilingual language experience and their social-emotional and behavioral skills status, namely prosocial skills and difficult behavior. Children's bilingual receptive vocabulary proficiency and how long they had actively been speaking both languages are significantly related to their social-emotional and behavioral skills. Such results add important findings to the existing literature (Collins et al. 2011; Han 2010; Toppelberg et al. 2006; Winsler et al. 2014) by scrutinizing children's bilingual environmental factors and by presenting a study outside the Western context. The current findings suggest the importance of encouraging bilingual children to speak dual languages from an early age and developing children's bilingual language competence, especially the competence in a socially dominant language, for the purpose of developing better prosocial skills. Increased bilingual proficiency and length of speaking may result in better communication skills, reduce children's loneliness and anxiety, and make them feel relaxed and accepted. In other words, bilingualism might enhance children's interactions with their peers, increase their

connectedness with their families (Han 2010; Portes and Hao 2002), and benefit their social-

emotional and behavioral skills.

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Table 1

Variables of Bilingual Language Experience, Individual Factors, and SDQ

	Category	N	M (SD)	Range
	English Receptive Vocabulary	805	35.46(8.70)	12-65
	MT Receptive Vocabulary	805	29.02(7.92)	0-55
Language Experience	English Books (no. in home)	792	2.90(1.51)	0-6
(Parent Questionnaire)	MT Books (no. in home)	795	1.73(1.16)	0-6
	Bilingual Output	761	23.31(13.44)	0-57
	Bilingual Input	799	3.34(.88)	0-4
	Nonverbal Intelligence	776	15.22 (4.93)	2-33
Individual Factors	Affect Recognition	794	16.27 (3.05)	1-23
(Standardized Tests)	Mother Education	767	7.40 (2.32)	0-11
	Income	768	12.21 (5.93)	0-19
Outcome (SDQ)	Prosocial Skills	798	6.93 (2.24)	0-10
	Difficulty Level	798	6.45 (5.26)	0-31

NOTE. Bilingual Output= duration of speaking both languages at home (in months); Bilingual Input= the degree of English language dominance at home

Table 2

Pearson Correlations of the Predictors in the Model Analysis

	1	2	3	4	5	6	7	8	9	10	11	12
1.EngVoc	-											
2.MTVoc	.19**	-										
3.EngBook	.34**	0.05	-									
4.MTBook	.23**	.28**	.62**	-								
5.BilingOutput	.19**	.17**	.13**	.18**	-							
6.BilingInput	.26**	-.20**	.27**	0.03	.12**	-						
7.NonInte	.38**	.22**	.20**	.16**	.14**	.13**	-					
8.NepAff	.25**	.07*	.12**	.08*	.15**	.09*	.29**	-				
9.EduMot	.19**	0.00	.33**	.20**	.15**	.10**	.12**	.08*	-			
10.Income	.23**	0.04	.36**	.24**	.18**	.21**	.21**	.16**	.56**	-		
11.Difficulty	-.17*	-.14**	-.04	-.08*	-.15**	-.04	-.11**	-.13**	-.08*	-.11**	-	
12.Prosocial	.22**	.18**	.06	.06	.12**	.07*	.10**	.18**	.02	.04	-.46**	-

NOTE.- EngVoc= English receptive vocabulary size; MTVoc= mother tongue receptive vocabulary size; EngBook= number of English books at home; MTBook= number of mother tongue books at home; BilingOutput= duration of speaking both languages at home (in months); BilingInput= the degree of English language dominance at home; NonInte= nonverbal intelligence measured by Raven's; NepAff= emotional recognition ability estimated from NEPSY-II; EduMot= mother's education level; Income= income range; Difficulty= social emotional difficulty level; Prosocial= prosocial level. *p <.05, **p <.01

Table 3

Fixed Part of the Model for Children's Prosocial Skills

Fixed Effects	Estimate	SE	t
(Intercept)	4.77	0.57	8.40
English Receptive Vocabulary	**0.03**	**0.01**	**3.62*****
MT Receptive Vocabulary	0.01	0.01	1.04
Bilingual Input	0.03	0.08	0.40
Bilingual Output	**0.01**	**0.00**	**2.13***
English Books (no. in home)	-0.04	0.06	-0.66
MT Books (no. in home)	0.00	0.07	-0.05
Gender	**0.78**	**0.12**	**6.36*****
Affect Recognition	**0.05**	**0.02**	**2.20***
Nonverbal intelligence	0.01	0.01	0.52
Income	0.01	0.01	0.47
Mother Education	-0.04	0.04	-1.16
MT Mandarin vs Malay	0.00	0.22	-0.02
MT Tamil vs Mandarin	-0.04	0.23	-0.19

NOTE. Bilingual Input = the degree of English language dominance at home; Bilingual Output = duration of speaking both languages at home (months); Gender (0 = boy, 1 = girl); *p* <.05, ***p <.001.

Table 4

Fixed Part of the Model for Children's Social-Emotional and Behavioral Difficulties

Fixed Effects	Estimate	SE	t
(Intercept)	12.16	1.50	8.13
English Receptive Vocabulary	**-0.06**	**0.02**	**-2.62****
MT Receptive Vocabulary	**-0.05**	**0.03**	**-1.97***
Bilingual Input	-0.03	0.22	-0.14
Bilingual Output	-0.01	0.01	-1.09
English Books (no. in home)	0.23	0.17	1.40
MT Books (no. in home)	-0.05	0.20	-0.26
Gender	**-1.75**	**0.34**	**-5.21*****
Affect Recognition	-0.04	0.06	-0.77
Nonverbal intelligence	-0.06	0.04	-1.51
Income	-0.05	0.04	-1.33
Mother Education	0.01	0.10	0.11
MT Mandarin vs Malay	-0.73	0.60	-1.23
MT Tamil vs Mandarin	0.21	0.60	0.34

NOTE. Bilingual Input = the degree of English language dominance at home; Bilingual Output = duration of speaking both languages at home (months); Gender (0 = boy, 1 = girl); $p < .05$, **$p < .01$, ***$p < .001$.