The Roles of Social Mastery Motivation and Parental Response in Preschoolers' Vocabulary Knowledge and Self-regulation

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Abstract: Social mastery motivation and parental response are important correlates of children's vocabulary and self-regulation skills, but little research has examined their relationships collectively. This study investigated the direct relationships among social mastery motivation (active interaction and positive affect frequencies), parental response, and self-regulation skills and the indirect relationships via vocabulary knowledge. Participants were 182 Hong Kong children (83 girls, mean age 3.82) and their parents. Path analysis revealed that active interaction frequency had direct negative (in boys) and marginal indirect positive relationships (via vocabulary knowledge, in girls) with self-regulation, whereas positive affect frequency was indirectly related to boys' self-regulation through expressive vocabulary. Parental response was positively related to self-regulation and marginally to social mastery motivation in boys only. Findings highlight that different aspects of social mastery motivation may relate to boys' and girls' vocabulary and self-regulation skills, and that parental response may particularly shape boys' social mastery motivation and self-regulation.

Keywords: social mastery motivation, parental response, vocabulary knowledge, self-regulation, kindergarten children

Introduction

Social mastery motivation is a potential contributor to children's vocabulary knowledge (Pipp-Siegel, Sedey, VanLeeuwen, & Yoshinaga-Itano, 2003), which in turn supports their self-regulation (Salmon, O'Kearney, Reese, & Fortune, 2016). Parental response is known to be an important predictor of children's early vocabulary and self-regulation development (e.g., Fay-Stammbach, Hawes, & Meredith, 2014; Malmberg et al., 2016), while boys may be more susceptible to adverse parental sensitivity than girls (Mileva-Seitz et al., 2015). Although it was theorized in a recent review regarding the role of language ability in children's behavioral problems that early parent-child conversation can foster children's self-regulation directly and indirectly via children's vocabulary

knowledge (Salmon et al., 2016), little research has examined how social mastery motivation and parental response might collectively affect children's vocabulary and self-regulation skills (Fay-Stammbach et al., 2014). Therefore, the present study investigated the relationships among social mastery motivation, parental response and children's vocabulary knowledge and self-regulation. It also examined if parental response has different relationships with boys' and girls' social mastery motivation and self-regulation.

Social mastery motivation, vocabulary knowledge, and self-regulation

Mastery motivation drives children to explore their environment to acquire the necessary skills to tackle moderately challenging situations and thus children are motivated to explore their object (e.g., inanimate toys) and social (e.g., play partner) contexts (Wang, Hwang, Liao, Chen, & Hsieh, 2011). Social mastery motivation, defined as the amount of active social interaction (i.e., instrumental indicators including child-initiated or child-maintained interaction) and positive emotion (i.e., expressive indicator of positive affect) exhibited during play (Combs & Wachs, 1993), characterizes one's desire to initiate, continue, and control the social processes with the goals of attaining gratification from social interaction or getting information and objects from the social partners (MacTurk, Hunter, McCarthy, Vietze, & McQuiston, 1985). Children differ in their tendency to integrate object- and social-mastery behaviors during play and they seem to show more social-mastery behaviors in social than in object play tasks (MacTurk et al., 1985). However, the difference in social-mastery behaviors between social play and object play could be artificially introduced (Combs & Wachs, 1993) and, in general, children with higher social mastery motivation are more likely to direct their mastery behaviors toward the social context (Wachs & Combs, 1995).

Research has demonstrated the predictive relationships between children's mastery motivation and their developmental outcomes (e.g., Gilmore, Cuskelly, & Purdie, 2003; Messer, et al., 1986), but most of the studies considered object mastery motivation as the predictor (MacTurk, 1993). Pipp-Siegel et al. (2003) suggested that children with higher social mastery motivation would have better receptive and expressive vocabulary knowledge as they tend to make greater efforts to communicate with social partners. Therefore, social mastery motivation defines a child's social communication style which may affect vocabulary knowledge development. However, little research has yet examined how children's social mastery motivation is associated with their vocabulary knowledge and other related developmental outcomes.

Empirical evidence has revealed that vocabulary knowledge generally facilitates children's self-regulation (e.g., Bohlmann, Maier, & Palacios, 2015; Petersen, Bates, & Staples, 2015), while expressive vocabulary may be particularly important in shaping boys' self-regulation (Vallotton & Ayoub, 2011). Self-regulation is conceptualized as the integrated construct of effortful control and executive functioning (Bridgett, Burt, Edwards, & Deater-Deckard, 2015) and research has demonstrated the executive functioning and effortful control aspects of self-regulation among kindergarten children (Merz, Landry, Montroy, & Williams, 2017). Theoretically, advanced vocabulary knowledge facilitates children's effortful control as they can better internalize verbal instructions (Vallotton & Ayoub, 2011) or mediation (Alderson-Day & Fernyhough, 2015) that support them in suppressing a dominant response and carrying out a subdominant response (Kochanska, Murray, & Harlan, 2000). Moreover, children with better vocabulary knowledge are more mentally resourceful (Vygotsky, Hanfmann, & Vakar, 1962) in regulating their executive functioning processes of working memory (encode and manipulate information in mind), response inhibition (inhibit non-adaptive

behavior), and attention shifting (direct focus to target) (Chung, Lam, & Cheung, 2018). Given the close connections among receptive and expressive vocabulary (i.e., vocabulary knowledge) and self-regulation, this study extended the current research by investigating how vocabulary knowledge mediates the relationship between social mastery motivation and self-regulation. In addition to social mastery motivation, parental response is another factor that determines children's vocabulary and self-regulation development (Fay-Stammbach et al., 2014).

Parental response, vocabulary knowledge, and self-regulation

Research has documented how children's vocabulary and self-regulation skills are associated with parental response, which is conceptualized as paternal and maternal responsivity and sensitivity in daily parent-child interaction (e.g., Gros-Louis, West, & King, 2014; Lucassen et al., 2015). Specifically, parents showing more responsive and sensitive communication styles could facilitate their children's growth in vocabulary knowledge (Malmberg et al., 2016; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009). Likewise, improved parental response could foster kindergarten children's effortful control and executive functioning (Chang, Shaw, Dishion, Gardner, & Wilson, 2015; Lucassen et al., 2015; Merz et al., 2017). In a recent review of parental influences on executive functioning, Fay-Stammbach et al. (2014) proposed that improvement in children's vocabulary knowledge could be one of the mechanisms that explain the relationship; however, further research should take children's characteristics and both paternal and maternal behaviors into account. In response to the call, this study investigated the direct relationships among social mastery motivation, parental response, and self-regulation and the indirect relationships that were mediated by vocabulary knowledge.

Despite the generally positive impact of parental response on children's vocabulary and self-regulation, another line of research has suggested that boys could be more vulnerable to the undesirable social environment (Kraemer, 2000) such as negative parenting style (McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996). Conversely, boys seem to benefit more than girls from a nurturing home environment in terms of working memory (Horton, Kahn, Perera, Barr, & Rauh, 2012). Similarly, parental sensitivity at 36 months predicted response inhibition at 52 months in boys only (Mileva-Seitz et al., 2015). Therefore, it is reasonable to expect that the relationship between parental response and self-regulation would be stronger in boys than in girls. As gender differences in the associations among parenting and cognitive outcomes were chiefly reported by research conducted in Western societies (e.g., Horton et al., 2012; Mileva-Seitz et al., 2015), this study examined gender differences in the relationships among parental response, social mastery motivation, and self-regulation skills in a sample of Chinese kindergarteners.

The present study

In the present study, social mastery motivation and parental response were regarded as distal antecedents to self-regulation by establishing a closer parent-child relationship that would directly facilitate children's internalization of regulatory strategies (Chang et al., 2015). Moreover, social mastery motivation and parental response could jointly affect the quantity and quality of children's language exposure which contributes to children's vocabulary knowledge that in turn further supports their self-regulation (Salmon et al., 2016). Therefore, vocabulary knowledge was regarded as a proximal antecedent to self-regulation (Figure 1). Based on the theorized model of the plausible direct and indirect impacts of parent-child conversation on children's self-regulation (Salmon et al., 2016) and findings from prior studies (Bohlmann et al., 2015;

Fay-Stammbach et al., 2014; Pipp-Siegel et al., 2003), we first hypothesized that children's social mastery motivation and parental response would have direct and indirect relationships with children's self-regulation that are mediated by children's vocabulary knowledge. Second, considering parental response may have differential impacts on boys and girls (Mileva-Seitz et al., 2015), we expected that parental response would have stronger positive relationships with social mastery motivation and self-regulation in boys than in girls.

Methods

Participants

Participants were 182 Hong Kong children (83 girls, mean age 3.87; 99 boys, mean age 3.78) and their parents recruited through kindergartens' parent groups, with Cantonese as their first language. Fathers and mothers reported their education level with a 4-point scale: 1 primary school; 2 secondary school; 3 bachelor's degree; 4 postgraduate degree, with the mean education level regarded as a proxy for the family socioeconomic status (Schmitt, Pratt, & McClelland, 2014).

Procedure

Individual assessment tasks of social mastery motivation, vocabulary knowledge (receptive and expressive vocabulary), self-regulation (executive functioning and effortful control), and non-verbal intelligence were administered at the child's home and the tasks were counterbalanced by randomization. Ethical approval was obtained before the research was conducted and informed consent was obtained from parents before individual assessment. Both parents were asked to report their education level and to rate spouse' parental response through questionnaires.

Measures

Social Mastery Motivation

To avoid artificial introduction of social interaction (Combs & Wachs, 1993) that could contaminate the finding and to attain a better control over the experimenter's behavior, social mastery motivation was assessed by two object play tasks (puzzle and lego tasks) with reference to previous studies (Gilmore et al., 2003; Fung, Chung, & Cheng, 2018). First, each child was asked to build a puzzle by referring to a photo for three minutes. Then, the child was told to build lego blocks according to a picture (including two children figures and one dog figure) for another three minutes, but the children and dog figures were purposely kept in a transparent bag placed before the child. In both tasks, the experimenter sat quietly next to the child, responded only to any child-initiated interaction, and asked questions only in specific situations for checking task completion.

All play behaviors were videotaped and coded based on the frequency code scheme of the previous study (Combs & Wachs, 1993). Active interaction frequency was the total frequency of child-initiated and child-maintained interaction, whereas positive affect frequency indicated frequency of laugh/ smile expressed by the child during active interaction. Child-initiated interaction was defined as verbal/non-verbal behavior directed towards the experimenter as indicated by verbal content or eye-contact whereas child-maintained interaction was verbal/non-verbal behavior for continuing an interaction occurring within three seconds prior to the considered action. Two experienced assistants were trained for the coding and 10% of the videos were randomly selected to check the inter-rater reliability (inter-rater reliability was also checked in expressive vocabulary, response inhibition, and effortful control). The intra-class correlations of active interaction frequency and positive affect frequency were .88 and .81, respectively.

Vocabulary Knowledge

The mean of standardized scores of receptive vocabulary and expressive vocabulary represented vocabulary knowledge.

Receptive Vocabulary. Receptive vocabulary was assessed by 25 items from the Cantonese Receptive Vocabulary Test (Cheung, Lee, & Lee, 1997), which were evenly extracted according to their difficulty levels, and one additional item for increasing the discriminative power (Ho, Leung, & Cheung, 2011). A pilot study was conducted to confirm the appropriateness of all items. For each item, the experimenter read out the word and the child was asked to point out the target from four pictures. Each correct answer scored one mark, with a maximum of 26. The Cronbach's alpha was .65.

Expressive Vocabulary. Expressive vocabulary was assessed with reference to the previous study (Ho et al., 2011). Twenty common words as appeared in textbooks from three local kindergartens were selected according to their conceptual difficulty and a pilot study was conducted to confirm their appropriateness. For each item, the child looked at a picture (e.g., spoon) and was asked to tell its name and function. Each correct word or function was awarded two marks, whereas a relevant but ambiguous word or function was given one mark, with a maximum score of 80. The intra-class correlation was .96, and the Cronbach's alpha was .84.

Self-regulation

The mean of standardized scores of executive functioning and effortful control represented self-regulation. Like previous studies on Hong Kong kindergarten children (e.g., Chung, Liu, McBride, Wong, & Lo, 2017; Liu et al., 2018), this study employed the assessments of response inhibition, verbal working memory span, and spatial working memory span as children's executive functioning.

Response Inhibition. Response inhibition was measured by the first and second sections of head-toes-knees-shoulders task (McClelland et al., 2014). The child was

asked to play a game by responding with the opposite of the experimenter's instruction. Two instructions were used in section one (touch your head/toes) and two more instructions were added in section two (touch your shoulders/knees). There were six and five practice items with feedback on correctness in section one and two respectively; and each section had ten assessed items. Two points were awarded for a right response and one point was given to a self-corrected response. The maximum score was 62. The intra-class correlation was .99, and the Cronbach's alpha was .96.

Working Memory. Spatial working memory span was measured by the Wechsler Memory Scale-Third Edition spatial task (Wechsler, 1997). First, the child memorized the sequence of blocks touched by the experimenter at a rate of one per second. The child then needed to recall the sequence by touching the blocks. There were five span levels and each had two sequences. Verbal working memory span was measured by the simple span recall task (Archibald & Griebeling, 2016). First, the child heard a sequence of digits as told by the experimenter at a rate of one per second. Then, the child needed to repeat the digits. There were eight span levels and each had three sequences. The task terminated if the child wrongly repeated any single sequence at a level, and span length was the level that s/he correctly recalled at least one sequence. The Cronbach's alphas of spatial- and verbal-working memory span were .82 and .92, respectively.

Effortful Control. Effortful control was assessed by the wrapped gift task (Chang et al., 2015). The child was told that a gift was brought but s/he needed to wait without peeking on a chair while the gift was noisily wrapped for three minutes. Peeking duration (reversed) and latency to first peek were coded and both were included in the self-regulation aggregated score. The intra-class correlations of reversed peeking duration and latency were .95 and .85, respectively.

Non-verbal Intelligence.

Non-verbal intelligence was assessed by 24 items from sets A and A_B of the Raven's Coloured Progressive Matrices (Raven, 1998). For each item, the child was shown a matrix that contained a missing part and then asked to complete the matrix by picking a pattern out of six choices. Each correct choice scored one mark.

Parental Response

Parental response was assessed using items extracted from the Parenting Behavior Importance Questionnaire-Revised, which is a reliable and valid measure of parenting style (Mowder, & Shamah, 2011). Nine items tapped responsivity (e.g., my spouse provides timely response to child's request), whereas eleven items tapped sensitivity (e.g., my spouse responds to child's needs precisely). Both parents rated spouse's responsivity and sensitivity as demonstrated in daily interaction with the child on a 5-point scale: 1 (never) to 5 (always). The total average score represented parental response. The Cronbach's alpha was .94.

Path analyses

Path analyses were performed by using the lavaan package (version 0.6-1) in R (version 3.5.0; R Core Team, 2018). Goodness of fit of models was assessed by Chi-square fit index (χ^2), comparative fit index (CFI), non-normed fit index (NNFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). A non-significant χ^2 indicates a good model fit. Moreover, CFI and NNFI values above .95 and RMSEA and SRMR values below .05 suggest good model fit (Hu & Bentler, 1999).

Our initial model included direct paths from social mastery motivation and parental response to self-regulation, and indirect paths via vocabulary knowledge, with non-verbal intelligence, family socioeconomic status, and child age as covariates. As

different aspects of social mastery motivation may have independent relationships with vocabulary and self-regulation skills (MacTurk et al., 1985), active interaction frequency was first used as a predictor of the outcomes, followed by the inclusion of positive affect frequency. Based on results from the initial model, non-significant paths were set to zero to obtain a more parsimonious model. Furthermore, to test for statistical invariance of the model across the gender groups, multi-group analyses were also conducted. In the unconstrained model, all paths were freely estimated within each gender group; in the constrained model, corresponding paths were constrained as equal across the gender groups. The Chi-square difference test (Kline, 2011) was employed to test if constraining the parallel paths would lead to a significant decrease in the overall fit of the models.

Results

Preliminary considerations

The data were screened for non-normality (skewness or kurtosis exceeding +/-1) and missing values. Non-normality was noted in expressive vocabulary, active interaction frequency, and positive affect frequency and the data contained missing values (9 children refused to complete the response inhibition task) that were completely at random according to Little's (1998) test (χ^2 (14) = 18.08, p = .20). Therefore, path analyses were conducted with full information maximum likelihood estimation with robust standard errors and robust scaled test statistics (i.e., estimator MLR), while correlations were performed by using pairwise deletion.

Descriptive statistics and correlations

Table 1 shows the descriptive statistics and Table 2 shows the Pearson's correlations by gender across study variables. Girls' active interaction frequency was marginally and positively related to their receptive vocabulary (r = .21, p < .10),

whereas boys' positive affect frequency was positively correlated with their expressive vocabulary (r = .26, p < .01) and vocabulary knowledge (r = .23, p < .05). Unexpectedly, boys' active interaction frequency was marginally and negatively associated with their self-regulation (r = -.20, p < .10). Separately, parental response was marginally and positively correlated with boys' self-regulation (r = .18, p < .10) and active interaction frequency (r = .17, p < .10), but non-significant relationships were found in girls (r = .04 - .11, p > .10). Although parental response was unrelated to receptive vocabulary, expressive vocabulary, or vocabulary knowledge in both boys (r = .01 - .05, p > .10) and girls (r = .09 - .11, p > .10), vocabulary knowledge was positively correlated with self-regulation in both gender groups (r = .50 - .58, p < .01).

Path analyses predicting self-regulation

Figure 2 shows the model for predicting children's self-regulation from active interaction frequency, parental response, and vocabulary knowledge controlling for non-verbal intelligence, socioeconomic status, and age. The model demonstrated a reasonably good fit to the data χ^2 (6, N = 182) = 9.18, p = .16, CFI = .97, NNFI = .93, RMSEA = .05, SRMR = .04, R^2 = .35. The model showed a direct path from active interaction frequency (β = -.25, p < .001) and a marginal direct path from parental response (β = .13, p < .10) to self-regulation, and an indirect path (indirect effect: β = .07, p < .05) between active interaction frequency (β = .17, p < .01) and self-regulation (β = .39, p < .001) via vocabulary knowledge. To examine the role of parental response in boys and girls, multi-group analysis was conducted. Constraining the paths to be equal across the gender groups resulted in a statistically significant drop in the overall model fit ($\Delta\chi^2$ = 20.39, Δdf = 11, p < .05). The fully unconstrained model showed a good fit to the data, χ^2 (12, N = 182) = 13.10, p = .36, CFI = .99, NNFI = .98, RMSEA = .03, SRMR = .05; R^2_{Boys} = .37, R^2_{Girls} = .47. Multi-group models in Figure 2

shows that the two direct paths from active interaction frequency (β = -.25, p < .01) and parental response (β = .21, p < .05) to self-regulation emerged in boys, whereas a marginal indirect path (indirect effect: β = .05, p = .07) between active interaction frequency (β = .13, p < .10) and self-regulation (β = .35, p < .001) via vocabulary knowledge appeared in girls. Moreover, parental response was marginally and positively related to boys' active interaction frequency (β = .17, p < .10) only.

Although boys' active interaction frequency was not positively related to their vocabulary knowledge or self-regulation, positive affect frequency was positively associated with expressive vocabulary in boys. Given the documented relationship between expressive vocabulary and self-regulation particularly in boys (Vallotton & Ayoub, 2011), path analyses with active interaction frequency, positive affect frequency with parental response, expressive vocabulary, and self-regulation included were performed. Two control paths from socioeconomic status to expressive vocabulary (β = .02, p = .83) and self-regulation (β = .10, p = .13) were set to zero as they are non-significant in the initial model. The hypothesized path from positive affect frequency to self-regulation (β = .01, p = .89) was also set to zero since positive affect frequency was not associated with self-regulation in both gender groups (r = -.03 to .04, p > .10) while the reduced model fitted similarly as the full model ($\Delta\chi^2$ = 0.17, Δdf = 1, p > .05). Figure 3 shows the reduced model which demonstrated a fairly good fit to the data, χ^2 (7, N = 182) = 10.05, p = .19, CFI = .98, NNFI = .95, RMSEA = .05, SRMR = .04, R^2 = .33. Further multi-group analysis revealed that constraining the paths to be equal across the gender groups led to a statistically significant worsening in the overall model fit ($\Delta\chi^2$ = 23.35, Δdf = 10, p < .05). The fully unconstrained model showed an adequate fit to the data, χ^2 (14, N = 182) = 20.33, p = .12, CFI = .97, NNFI = .92, RMSEA = .06, SRMR = .06; R^2_{Boys} = .33, R^2_{Girls} = .46. The boys' model in Figure 3 shows an indirect

positive path (indirect effect: β = .09, p < .05) between positive affect frequency (β = .20, p < .05) and self-regulation (β = .43, p < .001) via expressive vocabulary, whereas the two direct paths from active interaction frequency (β = -.24, p < .01) and parental response (β = .23, p < .05) to self-regulation still emerged. Moreover, parental response was positively but marginally related to boys' active interaction (β = .17, p < .10) and positive affect (β = .16, p < .10) frequencies. However, positive affect frequency had no additional contribution to girls' expressive vocabulary (β = -.03, p > .10).

Discussion

This study investigated the direct and indirect relationships between social mastery motivation, parental response, and self-regulation of Hong Kong kindergarten children as mediated through vocabulary knowledge. The results first revealed that active interaction frequency had a direct negative and a marginal indirect positive (via vocabulary knowledge) relationship with self-regulation in boys and girls, respectively; whereas positive affect frequency was associated with boys' self-regulation indirectly via expressive vocabulary. Furthermore, parental response was positively associated with self-regulation but marginally with active interaction frequency and positive affect frequency in boys only. The present results are in line with previous findings showing gender difference in the relationship between parental response and response inhibition (Mileva-Seitz et al., 2015). They extended to demonstrate how different aspects of social mastery motivation were associated with boys' and girls' vocabulary and self-regulation skills as well as gender differences in the associations between parental response and social mastery motivation.

As expected, girls' active interaction frequency had an indirect positive relationship with self-regulation via vocabulary knowledge, but no direct link was

noted. Girls with higher active interaction frequency may have greater desire to interact effectively with their social partners by raising questions and seeking for explanations, which enhances the quantity and quality of language exposure and contributed to their vocabulary knowledge (Salmon et al., 2016); while the improved vocabulary knowledge may further support their self-regulation (e.g., Bohlmann et al., 2015). But, admittedly, the link between active interaction frequency and vocabulary knowledge was only marginally significant. Unexpectedly, boys' active interaction frequency had a direct negative relationship with self-regulation. A plausible reason could be boys' heightened level of impulsivity (e.g., Chapple & Johnson, 2007; Olino, Durbin, Klein, Hayden, & Dyson, 2013) that triggered them to express their need for help more frequently during the social mastery play tasks (Fung et al, 2018), while the increased social interactions could still be classified as social-mastery behaviors as they were actively communicating with and influencing the social partner (Combs & Wachs, 1993). Conversely, boys' impulsivity may lower their cognitive functioning such as working memory (e.g., Papaioannou et al., 2016; Tibu et al., 2016), which may in turn weaken the positive impact of active interaction frequency on vocabulary knowledge.

Separately, boys' positive affect frequency had an indirect positive relationship with self-regulation via expressive vocabulary. Positive affect indicates pleasure derived from the mastery attempts (Wachs & Combs, 1995). Instead of arising solely from the desire to get objects or information as driven by one's impulsivity, higher positive affect frequency may indicate the goal of the social-mastery behaviors could trend towards the attainment of gratification from social interaction (Fung et al., 2018). Therefore, boys with higher positive affect frequency may enhance parents' perception of their social-mastery behaviors that leads to high-quality parent-child interaction, which may further facilitate boys' expressive vocabulary and self-regulation (Vallotton & Ayoub, 2011).

However, positive affect frequency was not associated with girls' vocabulary or self-regulation skills. The path from girls' active interaction frequency to expressive vocabulary became non-significant with positive affect frequency considered, probably due to the strong correlation between girls' active interaction and positive affect frequencies. Together, the results revealed that boys and girls may benefit from different aspects of social mastery motivation and that social mastery motivation may link with self-regulation only indirectly.

Consistent with our expectation, parental response had positive relationships with self-regulation and social mastery motivation in boys only. By referring to Maccoby's (1967) model of the relationship between impulsivity and cognitive performance, Mileva-Seitz et al. (2015) suggested that parental sensitivity could be a "calming factor" that enhanced only boys' executive functioning as boys tend to be on the active end of impulsivity, while girls tend to be on the passive end. The present results are in line with such contention by demonstrating boys' higher susceptibility, in terms of self-regulation, to parental response in Chinese society. Parental response also had marginally positive relationships with active interaction and positive affect frequencies in boys only. As social mastery motivation defines one's desire to have social interaction, this characteristic may be more dependent on parenting practices in boys than in girls, which concurs with the suggestion of boys' higher vulnerability to adverse effects from early social environment (Kraemer, 2000). Research has also documented that parents tend to talk more and use more supportive speech when interacting with daughters than with sons (Leaper, Anderson, & Sanders, 1998). Perhaps parents may demonstrate similar levels of parental response to daughters regardless of their social mastery motivation. However, future study should be conducted to verify these findings.

Despite its relationships with social mastery motivation and self-regulation, parental response was not directly related to vocabulary knowledge in this study. The results suggested that, when considered in a single model, social mastery motivation may be a more important contributor to kindergarten children's vocabulary knowledge than parental response. Research evidence has demonstrated that parental response could be the most important predictor of children's vocabulary knowledge in the first 36 months (e.g., Gros-Louis et al., 2014; Malmberg et al., 2016). However, the process of vocabulary development may become more child-driven during the kindergarten years (Silvén, Niemi, & Voeten, 2002). As participants in this study were kindergarten children, they had acquired the basic language skills which enable them to direct parents' attention to objects/issues of interest. Therefore, children may learn new vocabulary by actively initiating and maintaining social interaction, which downplays the impact of parental response.

Limitations

This study had at least five limitations. First, participant recruitments were through parent groups of local kindergartens. Although they were diverse in socioeconomic status, the generalizability of the findings could be improved by evenly recruiting children from kindergartens with different socioeconomic backgrounds. Second, the number of boys and girls in the multi-group path analyses was relatively small which may affect the significance and model fit of the results. Third, this study is cross-sectional in nature which prevents us from drawing causal inference and direction of effects. Longitudinal studies should be conducted to further examine the plausible causal links between social mastery motivation, vocabulary, and self-regulation skills. Fourth, social mastery motivation was assessed by using standardized play tasks with a single experimenter to control for parent-child relationships or experimenters' behaviors

that could confound the results. As social mastery motivation depends on social partner's identity (Combs & Wachs, 1993), further studies may also assess social mastery motivation directed toward peer or parent. Finally, further studies may include measures of attention shifting and backward working memory span to have a more comprehensive assessment of self-regulation.

Conclusions

Results from the present study suggest that social mastery motivation may affect boys' and girls' vocabulary knowledge and self-regulation skills in different ways. While girls may benefit from increased social interaction, it seems that only social interaction accompanied by positive affect may benefit boys' vocabulary and self-regulation. Parents could encourage children's social-mastery behaviors so as to facilitate their early language and self-regulation skills. Furthermore, given parental response's roles in shaping boys' social mastery motivation and self-regulation, parents could provide boys with additional guidance to engage them in constructive and positive verbal interaction.

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Table 1

Mean (M), standard deviation (SD), range, skewness, and kurtosis on various measures for the two gender groups.

	Boys (n = 99)					Girls (n = 83)				
Measures	Range	*M*	*SD*	Skewness	Kurtosis	Range	*M*	*SD*	Skewness	Kurtosis
1. Age	3.10 - 5.60	3.78	0.59	1.28	1.04	3.10 - 5.70	3.87	0.59	1.17	0.73
2. Non-verbal intelligence (IQ)	0.00 - 20.00	7.46	4.36	0.91	0.57	0.00 - 18.00	8.30	3.53	-0.21	0.02
3. Socioeconomic Status (SES)	2.00 - 4.00	2.82	0.60	0.24	-0.75	2.00 - 4.00	2.85	0.70	0.09	-1.38
4. Receptive Vocabulary (RV)	10.00 - 25.00	17.90	3.03	-0.06	-0.49	9.00 - 24.00	17.84	3.04	-0.40	-0.14
5. Expressive Vocabulary (EV)	28.00 - 66.00	49.04	7.69	-0.96	1.13	15.00 - 64.00	46.87	10.27	-1.17	1.37
6. Vocabulary Knowledge (Z_VK)	-2.29 - 2.14	0.11	0.86	-0.74	0.77	-3.12 - 1.87	-0.10	1.12	-0.97	0.69
7. Self-regulation (Z_SR)	-1.33 - 1.17	-0.20	0.61	0.24	-0.76	-1.27 - 1.89	0.26	0.78	-0.04	-0.52
8. Active Interaction Frequency (AIF)	0.00 - 46.00	14.37	11.81	0.66	-0.11	0.00 - 36.00	7.90	9.62	1.36	0.86
9. Positive Affect Frequency (PAF)	0.00 - 14.00	2.81	3.64	1.46	1.35	0.00 - 16.00	2.11	3.52	2.23	4.77
10. Parental Response (PR)	3.25 - 4.84	4.00	0.39	0.20	-0.78	3.08 - 4.98	4.04	0.43	0.14	-0.18

Table 2

Bivariate correlations among study variables by gender

Variables	Correlations									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Age	--	.40**	-.12	.50**	.45**	.51**	.52**	-.01	.04	.13
2. Non-verbal intelligence (IQ)	.52**	--	.26*	.41**	.39**	.44**	.52**	.03	.17	.14
3. Socioeconomic Status (SES)	-.29**	.01	--	.12	.01	.04	.06	.02	-.01	.12
4. Receptive Vocabulary (RV)	.33**	.34**	.16	--	.51**	.68**	.43**	.21†	.06	.09
5. Expressive Vocabulary (EV)	.34**	.31**	-.05	.40**	--	.98**	.56**	.09	.09	.10
6. Vocabulary Knowledge (Z_VK)	.39**	.37**	.01	.65**	.95**	--	.58**	.13	.09	.11
7. Self-regulation (Z_SR)	.19†	.29**	.14	.39**	.46**	.50**	--	-.02	-.03	.11
8. Active Interaction Frequency (AIF)	-.10	-.14	.01	.05	.06	.07	-.20†	--	.61**	.04
9. Positive Affect Frequency (PAF)	.19†	.04	-.22*	.04	.26**	.23*	.04	.49**	--	-.08
10. Parental Response (PR)	-.11	-.18†	.20*	.01	.05	.04	.18†	.17†	.16	--

Note. ** $p < .01$; * $p < .05$; † $p < .10$; By gender: below diagonal = boys, above diagonal = girls

Figure Captions

Figure 1

Initial model for predicting children's self-regulation (Z_SR) from social mastery motivation (SMM; i.e., active interaction frequency or positive affect frequency), parental response (PR), and vocabulary knowledge (Z_VK) controlling for non-verbal intelligence (IQ), socioeconomic status (SES), and age.

Figure 2

Parsimonious (all children) and multi-group models (by gender) for predicting children's self-regulation (Z_SR) from active interaction frequency (AIF), parental response (PR), and vocabulary knowledge (Z_VK) controlling for non-verbal intelligence (IQ), socioeconomic status (SES), and age. Standardized coefficients are reported. All solid paths are significant or marginally significant, whereas dashed paths are non-significant. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Figure 3

Parsimonious (all children) and multi-group models (by gender) for predicting children's self-regulation (Z_SR) from active interaction frequency (AIF), positive affect frequency (PAF), parental response (PR), and expressive vocabulary (EV) controlling for non-verbal intelligence (IQ) and age. Standardized coefficients are reported. All solid paths are significant or marginally significant, whereas dashed paths are non-significant. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.