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Maternal control and children's inhibitory control in China: The role of child exuberance and parenting contexts

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ABSTRACT

Parental control is widely considered to have a detrimental effect on children's psychological development. However, it is commonplace and generally accepted in China and is intended to regulate children's behavior. It is unclear whether Chinese parental control promotes or hinders children's inhibitory control (IC) development. This study investigated the influence of maternal control on Chinese children's development of IC using a longitudinal design (N = 163), with attention to the influence of children's temperamental exuberance and different parenting contexts. Children's exuberance (at 2 years of age) was assessed via laboratory observations. Maternal control (at 3 years of age) was coded during parent–child interaction in play-based and cleanup contexts. Children's IC (at 3 years of age) was assessed by day–night and snow–grass tasks. Results suggested that maternal control in the play-based context was negatively related to IC development. The association between maternal control in the cleanup context and IC varied in children with different levels of temperamental exuberance. Specifically, maternal control in the cleanup context impeded low-exuberant children's IC development but promoted it for highly exuberant children. These findings support the self-determination theory and the goodness-of-fit model and have implications for educational practice in China.

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Introduction

Parental control, which refers to parents' efforts to intrude and redirect children's thoughts, feelings, and behaviors, has received great attention for its effect on children's social adjustment (Grolnick & Pomerantz, 2009). Parental control has invoked a variety of conceptualizations and operationalizations such as behavioral versus psychological control (e.g., Barber, 1996; Steinberg et al., 1989) and firm versus lax control (e.g., Fauber et al., 1990; Rowe, 1981). In the context of self-determination theory, Grolnick and Pomerantz (2009) refined multiple forms of parental control approaches and identified intrusiveness, which may violate children's autonomy, as a core characteristic of parental control. The current study followed this conceptualization that parental control is parenting characterized by pressure, intrusion, and dominance regardless of whether it is used to regulate children's thoughts or behaviors. Parents may be well-intended, but their controlling behaviors often do not contribute to children's ability to regulate their own behaviors they originally intended (Grolnick, 2002). This may be because of the disrupting feelings of autonomy—children who are exposed to great parental control either are used to following their parents' instructions and thereby lose their intrinsic motivation and regulatory ability or are resistant to their parents' instructions and become rebellious (Grolnick, 2002).

Recent theoretical and empirical work indicated that the roles of parental control might vary across cultures due to differences in parenting goals and practices (Lansford et al., 2018). Parental control is commonplace and generally accepted in China; it is particularly reflected in the Chinese concept *guan,* which semantically means "to govern," although it is a wider concept often combined with "to care for" or even "to love" (Chao, 1994; Luo et al., 2013; Pomerantz & Wang, 2009). Such a phenomenon may derive from the traditional Chinese orientation and social values. Compared with Western cultures, Chinese culture, in a more consistent and absolute manner, emphasizes self-restraint and a hierarchical structure (Ho, 1986; Ng & Wang, 2019). Therefore, Chinese children are highly expected to be well-behaved and compliant—in other words, to develop an advanced inhibitory control (IC), which is an important regulation ability in children (Chen et al., 2003; Luo et al., 2013). Meanwhile, parents feel responsible for guiding and correcting their children's behaviors, which leads them to display a high degree of controlling behaviors toward their children from an early age (Chao, 1994; Huntsinger & Jose, 2009). Thus, it is of great theoretical and practical significance to determine how parental control influences young children's IC in China.

Chinese parental control and its relation with children's IC

Parental control has been widely demonstrated to have negative association with children's socioemotional development (e.g., low self-esteem, low life satisfaction, high internalizing and externalizing problems; Eisenberg et al., 2015). However, parental control was originally proposed and defined based on studies in the Western setting (Grolnick & Pomerantz, 2009), and there is still some debate as to whether it has a culture-specific or universal role in child development.

From a *culture-specific perspective,* several studies have found that the manifestations and outcomes of parental control may vary significantly among Chinese samples (see Pomerantz & Wang, 2009, for review). For example, although Chinese and Chinese immigrant parents may exercise higher levels of control over their children than Western parents (Chao, 1994; Huang & Lamb, 2014; Huntsinger & Jose, 2009), they execute control in a more deliberate and calm way with less negative affect (Pomerantz & Wang, 2009). In addition, Chinese parents firmly believe that their exercise of parental control is for their children's benefit (Chao, 1994; Pomerantz & Wang, 2009). Chinese children are socialized from an early age to understand that their parents' control is out of love and affection, and thus they are less likely to be angry about or resistant to it (Chao & Aque, 2009; Smetana et al., 2014). Therefore, research has found that parental control might not influence Chinese children's psychological function (Supple et al., 2004). However, the results of recent cross-cultural research support another view—the *universal perspective*—by indicating similar negative associations between parental control and children's social adaptation in both Western and East Asian countries (Barber et al., 2005;

Wang et al., 2007). Although parental control is prevalent and motivated by love in China, Chinese children in mid- to late childhood, with the need of asserting autonomy, evaluated parental control as negatively as their Canadian counterparts (Helwig et al., 2014). Given that the self-determination theory proposed that autonomy is a universal need (Deci & Ryan, 1985), parental control may reduce children's feelings of autonomy and undermine their intrinsic motivation regardless of culture (Pomerantz & Wang, 2009).

Most studies exploring the effect of Chinese parental control concern children's social development such as internalizing or externalizing problems and social competence (e.g., Chao & Aque, 2009; Lan et al., 2019). However, Chinese parents' exercise of great control has been shown to be associated with their parenting goals, especially their stronger expectation that their children will be self-restrained and follow social norms compared with North American parents (Chao, 1994; Luo et al., 2013; Zhou et al., 2004). Here, we focused on IC, a domain-general process and a core aspect of self-regulation that refers to the ability to voluntarily and flexibly regulate one's behavior. IC emerges during the first year of life and develops especially fast during the early preschool years (Kochanska et al., 2000). Chinese parents start to focus on children's IC as early as toddlerhood, regarding it as one of the most important qualities in children (Chen et al., 2003; Luo et al., 2013). Many Chinese parents believe that their controlling behaviors are necessary and can promote their young children's ability of behavioral regulation (Luo et al., 2013). Relevant research has found that high levels of parental control are associated with high compliance in children (Chen et al., 2003; Huang & Lamb, 2014) and better academic achievement in China (Chua, 2011; Wang et al., 2007). However, the outcomes of these studies were largely dependent on parents' external control rather than on children's internal control. For example, Chen (2003) found that power-assertive parenting increases situational compliance (i.e., parent-monitored obedience without internalization) but reduces committed compliance (i.e., wholehearted and eager compliance) in Chinese toddlers. In other words, although Chinese children may be more obedient to parents' immediate instructions than Western children, it does not mean that the former fully internalize self-generated regulation. By 5 years of age, Chinese children exhibit high situational compliance rather than committed compliance (Huang & Lamb, 2014).

According to self-determination theory (Ryan & Deci, 2000), overly controlling parental behaviors can impair the evolution of children's inner resources for behavioral self-regulation. Due to excessive interference with children's need for autonomy, parental control may result in "ego depleting" (Vansteenkiste & Ryan, 2013). That is, under high levels of parental control, children lose opportunities to plan and adjust themselves, and their IC is undermined if they remain in a controlled state for a prolonged period of time, at least in Western samples (e.g., Geeraerts et al., 2020; Rathert et al., 2011; Taylor et al., 2013). However, it is unclear whether parental control has the same pattern of influence on Chinese children's regulatory behaviors.

Influence of temperamental exuberance

The goodness of fit between parental behavior and children's characteristics is a classical topic in education and developmental psychology (Thomas & Chess, 1977). Previous studies have demonstrated that the effect of parenting largely depends on child temperament (Bates & Pettit, 2007). To gain a nuanced picture of how parental control influences children's development of IC, we included temperamental exuberance as a key factor. Exuberance, a temperament trait arising from the behavioral approach system (BAS; Gray, 1981), is characterized by a predisposition to approach novel stimuli and experience unrestrained joy (Degnan et al., 2011). The high-arousal states of exuberance are not encouraged in Chinese society, which values interpersonal harmony and self-control (Chen, 2010; Markus & Kitayama, 1991). Indeed, Chinese preschoolers display less observable exuberance than European preschoolers (Louie et al., 2013). Although exuberant children often show intense pleasure and high sociability, they may also experience an increased risk of externalizing behavioral problems such as impulsivity, irritability, and disruptive behaviors (Degnan et al., 2011; He et al., 2017; Putnam & Stifter, 2005; Stifter et al., 2008). Such externalizing behavior is totally at variance with the Chinese social standard and is intolerable to Chinese parents (Luo et al., 2013). Thus, IC, which

can help exuberant children to control their impulsive behavior in ways that are appropriate to the setting, is particularly important for social adaptation among highly exuberant Chinese children. Many studies have found that if exuberant children develop advanced IC, they are less likely to develop externalizing behavior problems during preschool years (Buss et al., 2014; Lahat et al., 2012; Stifter et al., 2008). Nevertheless, some research has found that temperamental exuberance is negatively associated with IC during early childhood, putting exuberant children at an increased risk of social maladjustment (Gunnar et al., 2003; Morales et al., 2016; Stifter et al., 2008).

These studies indicate that child exuberance may influence the association between Chinese parental control and children's IC. Exuberant children may need some additional external constraints to help them learn to effortfully control when they cannot override the prepotent tendency to approach. Thus, we expected that the detrimental effect of parental control may be attenuated among exuberant children, at least in terms of IC. In contrast, children low in exuberance may be susceptible to parental control given that they are obedient and thus likely to lose their motivation to develop their own control ability. Relevant research has found that maternal control in a free-play task during infancy was negatively related to self-regulation during preschool age among average-approach children; this was not the case for exuberant children (Augustine & Stifter, 2019).

Contexts of parental control

The function of parenting in a particular culture depends not only on the features of the parents and children but also on the specific situation (Davidov, 2021). The fit between parental behavior and parenting contexts should be considered in exploration of Chinese parental control. A previous study explored the effect of parental control in the personal and conventional domains on adolescents' psychological development. Personal domain mainly involves children's private preference and choice, whereas conventional domain mainly involves obligation and norms. Results showed that in both the United States and Japan, parental control in the personal domain was positively correlated with adolescents' internalizing symptoms, whereas parental control in prudential and conventional domains had no adverse effect (Hasebe et al., 2004). This finding suggests that parental control over the personal domain is more threatening to children's autonomy than parental control consistent with social norms, at least during adolescence. An interesting question here is whether Chinese parental control in different situations has different effects on children's IC during early childhood.

The need for autonomy is evident during early childhood (Ryan & Deci, 2019). Children as young as 3 years can distinguish personal issues from moral and conventional issues (Nucci & Weber, 1995). We speculated that a similar context effect may also exist during early childhood. In a play-based situation that is high in enjoyment and low in obligation, autonomy is devolved to children. Parental control in this situation may largely derive from parents' own desire for control. We can infer that parents who frequently display controlling behaviors even in a play-based situation may act as a "helicopter" to comprehensively monitor and manage their children's lives. Children with such parents are forced to obey their parents rather than internalizing social rules. In contrast, in a situation that is high in obligation but may be low in enjoyment, such as cleanup, there are explicit rules that children must follow or specific tasks that must be completed. Parental control, although sometimes coercive, harsh, or intrusive, can highlight rules and prompt children to internalize the rules as their own, especially for young exuberant children who are overactive and often violate rules.

As far as we know, few studies have considered the role of parenting contexts when examining the effect of parental behaviors on young children's regulatory behaviors. Augustine and Stifter (2019) found that gentle maternal control in a cleanup task in 18-month-olds was positively related to 4.5-year-olds' self-regulation among the exuberant children, whereas the same type of control in a free-play task was negatively related to self-regulation for children in the average-approach group. However, this study focused on gentle parental control, which can also be defined as parental structure. In contrast to parental control, parental structure grants children autonomy by providing guidelines and information that children need and thus did not show any negative effect on self-regulation (Levitt et al., 2022). Therefore, it remains unconfirmed how parental control displayed in various contexts influences children's development of IC.

The current study

Altogether, the current study incorporated the dynamic interplay between individual characteristics (temperamental exuberance), microsystems (maternal control in different contexts), and macrosystems (Chinese culture) based on the framework of ecological system theory (Bronfenbrenner & Morris, 1998). Given that controlling is ubiquitous in Chinese samples, we wanted to explore the role of maternal control in Chinese young children's development of IC and considering the potential effect of child temperament and parenting contexts. We measured maternal control in two mother–child interaction contexts: cleanup (high in obligation and low in enjoyment) and play-based (low in obligation and high in enjoyment) contexts. We hypothesized that maternal control in the play-based context would have a more negative association with children's IC than maternal control in the cleanup context because this context did not entail much behavioral restriction for children. Besides, given that exuberant children are likely to be impulsive and hyperactive, maternal control may show a less negative association with exuberant children's IC development than with less exuberant children's IC development. We focused on 2- and 3-year-olds because this is a sensitive period not only when IC ability is emerging and developing rapidly but also when Chinese parents begin to regulate children's behaviors.

Method

Participants

The current study included 163 children (70 girls) who were recruited for participation in an ongoing longitudinal study on the role of temperament in children's social development. Participants were recruited to undergo temperament at the first visit (T1) when they were 2 years old via mail and social media messages sent to parents residing in Hangzhou, a large modern city in Mainland China. At 3 years of age (T2), 144 preschoolers continued to participate to facilitate the measurement of IC and mother–child interaction. T1 visits were completed from April 2016 to January 2018, and T2 visits were completed from May 2017 to January 2019. Most participants were of Han Chinese ethnicity (95.7%), and 4.3% were from Chinese ethnic minorities. Of the mothers, 79.8% had at least a college education, and the others had at least a high school education. Children mainly belonged to middle-class families; this socioeconomic classification was based on self-reported monthly family income (1.2% with less than ¥5,000, 16.0% with ¥5,000–10,000, 63.2% with ¥10,000–30,000, and 19.6% with more than ¥30,000). At the time of data collection (2016), the average monthly family income in Hangzhou was about ¥11,529.

Procedure

At 2 years of age, the children (N = 163) were first (T1; M_{age} = 2.59 years, SD = 0.25) invited to the laboratory and completed temperamental exuberance by laboratory observation. A year later (T2; M_{age} = 3.68 years, SD = 0.25), 144 families returned to the laboratory and participated in the measurements of children's IC and maternal control. At T2, children's IC was measured again using two IC tasks (i.e., day–night and snow–grass) and maternal control was coded during mother–child interactions in two contexts (i.e., cleanup and play-based).

All children yielded valid data for temperamental exuberance at T1. At T2, 144 children returned to the laboratory at 3 years of age, and 139 yielded valid data for IC (complete at least one task; 133 children completed the day–night task and 137 children completed the snow–grass task). The missing data on IC tasks was due to children's refusal or experimenter error. In addition to 19 children who did not participate at T2, 5 participants had missing data for maternal control (3 due to mothers' absence for that visit, 1 due to video error, and 1 due to the mother's leaving midway). Little's MCAR (missing completely as random) showed no support for the hypothesis that data were not missing completely at random, $\chi^2(15) = 19.37$, $p = .197$, and thus all participants were included in the final analytic sample. Follow-up analyses indicated that the children who had complete versus partial data

had no significant differences on age, sex, temperamental exuberance, maternal education, and family income (*ps* > .11).

The current study was conducted according to the guidelines laid down in the Declaration of Helsinki, with written informed consent obtained from a parent or guardian for each child before any assessment or data collection. All procedures involving human participants in this study were approved by the institutional review board for the Department of Psychology and Behavioral Sciences at Zhejiang University.

Measures

Temperamental exuberance (2 years of age)

Children's temperamental exuberance was measured by laboratory observations of the children's behavioral approach and high level of positive affect using paradigms modified from previous studies (Degnan et al., 2011). Children and their mothers were brought into an unfamiliar test room where there were many toys. Children were allowed to play with the toys while the mothers were asked to sit about 2 m away and complete the questionnaires. After 5 min of free play, all the toys were put away and an unfamiliar female experimenter (E1) entered the room to invite the children to read a book together. E1 then introduced the children to a series of novel stimuli (i.e., a toy snake, a black box, a wolf mask, poppers, a vacuum, a trampoline, and a blood pressure cuff). Children were asked to touch or play with each stimulus for 1 min. Once the children approached a presented stimulus or clearly refused to approach, E1 moved on to the next stimulus. Subsequently, E1 left and a male experimenter (E2) dressed as a clown entered the room, remained silent for 1 min, then said "Hello" with a neutral tone twice to invite the children to approach him. Successively, E2 took out a dump truck, an electric robot, and a toy tunnel and invited the children to play with him if they did not approach on their own. For each stimulus, if the children did not approach it on their own, the experimenter was permitted to prompt them using a neutral tone and expression up to a maximum of three times.

Two coders who were blinded to the design of this study coded each task for the children's latency (in seconds) to touch/approach the stimuli or the experimenter, the proportion of time for which the children stayed within arm's reach of their mothers, the number of prompts given by the experimenter, the intensity of the children's approach toward the stimuli (on a scale of 0 = *did not touch* to 3 = *played with the stimulus more than twice and for an extended period of time*), and the number of times the children talked to the experimenter. Each task was also coded for the presence of positive affect (i.e., facial happiness based on the facial action coding system [FACS] and positive vocalization such as "Wow!"), whether the children smiled at the experimenter, proximity to the experimenter (on a scale of 0 = *avoid* to 3 = *direct physical contact with the experimenter*), and refusals in 10-s epochs. Reliability across 25% of the cases was achieved separately for each of the codes during each episode. Cohen's kappa ranged from .76 to 1.00 (M = .92), and the intraclass correlation coefficient (ICC) of the latency codes and the proportion of time codes ranged from .70 to 1.00 (M = .96).

All codes were standardized to create three subscales independently: approach, sociability, and positivity (Degnan et al., 2011; Putnam & Stifter, 2005). The approach subscale included latency to touch/approach the stimuli or the experimenter (reverse-scored), proportion of time for which the children stayed within arm's reach of their mothers (reverse-scored), number of prompts given by the experimenter (reverse-scored), the children's intensity of approach toward the stimuli, and the children's frequency of refusal (reverse-scored). The sociability subscale included smiling at the experimenter, talking to the experimenter, and proximity to the experimenter. The positivity subscale included the presence of positive affect and vocalization. In each task, the codes that did not show any significant correlation (*ps* > .05) to any other codes of the same subscale in the same task (proportion of time for which the children stayed within arm's reach of their mothers in the book reading, wolf mask, toy snake, and black box tasks and intensity of approach toward the stimuli in the dump truck and electric robot tasks) or were highly skewed (positive vocalization in the vacuum and blood pressure cuff tasks and frequency of refusal in the toy snake task) were excluded when calculating the average scores for that task. The standardized high approach scores and the positive affect scores for all tasks were averaged to yield the approach composite (α = .77), the sociability composite (α = .85), and the positivity composite (α = .85). Finally, the *temperamental exuberance composite* score was

computed as the average of the standardized approach, sociability, and positivity composite (α = .76, *r*s = .31–.65, *p*s < .001).

Maternal control (3 years of age)

Maternal control was observed in two distinct mother–child interaction contexts: cleanup and play-based contexts.

Cleanup context. After a 10-min warmup of free play, the experimenter stealthily reminded the mothers to tell their children that it is time to clean up the toys. Mothers were given an instruction card beforehand showing that they needed to tell the children to clean up but to let the children clean up the toys by themselves. The average duration of cleanup was 3.64 min (range = 0.67–6.00).

Play-based context. When the children tidied up all the toys, the experimenter entered the room and told them it was time for an interesting game—car reassembly (allotted 15 min). Children were provided with a box of accessories with instructional pictures inside (see online supplementary material). Mothers were given an instruction card showing that they could help and guide their children in the car reassembly task when they needed assistance, but the mothers could not assemble the cars for their children and were further instructed to refrain from touching the accessories, if possible, during the task.

Maternal control was coded during each context (cleanup and play-based) by two coders who were blinded to the study's design. Based on the observational taxonomy used by Rubin et al. (2001), the amount of control a mother exerted over the child was coded for two tasks. The number of times the mother showed ill-timed, excessive, and inappropriately controlling behaviors (e.g., interrupted or commanded the child when the child was normally on task, grabbed a block from the child, forced the child to sit still) were coded in 20-s epochs. The sum of number of times in each epoch was divided by the total number of 20-s time samples to create an average score for each context (i.e., cleanup and play-based). The length of the cleanup task was significantly correlated with the average score of maternal control in this context ($r = -.233$, $p = .006$). Reliability across 20% of the cases was achieved separately for each of the codes during each of the observed cleanup and car reassembly sessions. Intercoder reliability (Cohen's kappa) was .77.

Inhibitory control

At 3 years of age, IC was measured by two IC tasks (day–night and grass–snow; Carlson, 2005) that were conducted after mother–child interaction. We selected the IC tasks according to children's age, expecting to capture the greatest variability of individual differences at a given age.

Day–night task (3 years of age). Children were asked to say the word "day" when presented with a picture of the moon and to say the word "night" when presented with a picture of the sun. Children were given two (or more) practice trials and 16 test trials, with 8 "day" cards and 8 "night" cards presented in a pseudorandom sequence. Before the test phase, the children were told to react as quickly as possible. The number of correct responses was recorded to compute the accuracy of the day–night task (range = 0–16).

Grass–snow task (3 years of age). After verifying that the children could name both grass and snow correctly, they were told to point to the white card when the experimenter said "grass" and to point to the green card when the experimenter said "snow." The experimental procedure and scoring for this task were the same as for the day–night task (range = 0–16).

The correlation between the day–night task and the grass–snow task was .41 ($p < .001$). Thus, the average accuracy in the two tasks was calculated as the *IC composite* score.

Data analyses strategy

First, we performed preliminary analyses to examine the effects of demographic variables such as age, sex, and mothers' education on the key variables (exuberance, maternal control, and IC). Second,

we examined the relations among the key variables. In particular, we were interested in the correlations between maternal control and IC. Third, to address the main aims of the study—examining the roles of maternal control in IC among different children and parenting contexts—linear regression models were conducted with full information maximum likelihood (FIML) estimation to handle missing data to reduce potential bias in the parameter estimates using Mplus Version 7.4 (Muthén & Muthén, 1998–2013). This analysis allowed the inclusion of all participants with data on one or more variables (as opposed to listwise deletion). Model fit was examined by reviewing indices for good model fit such as the chi-square/degrees-of-freedom ratio test < 3.0, root mean square error of approximation (RMSEA) < .06, standardized root mean square residual (SRMR) < .08, and comparative fit index (CFI) > .90 (Bollen, 1989; Hu & Bentler, 1999). IC was the outcome variable, and the predictive variables were entered into the model in the following order: age, sex, family income, maternal control in the play-based context or in the cleanup context, and temperamental exuberance. To examine the interaction effect of maternal control and temperamental exuberance on IC, interaction terms (temperamental exuberance by maternal control in the play-based context or temperamental exuberance by maternal control in the cleanup context) were respectively then entered into the two models. Before creating the interaction terms, exuberance and maternal control in two contexts were mean-centered to reduce multicollinearity and aid in interpretation.

Results

In our sample, a child's age was significantly correlated with exuberance (r = .25, p = .001) and was marginally significantly correlated with IC (r = .16, p = .056) and maternal control in the play-based context (r = −.15, p = .083). A sex (0 = boy, 1 = girl) difference was found in exuberance that girls were less exuberant than boys, $t(161)$ = 2.35, p = .020, Cohen's d = 0.37). Family income (1 = less than ¥5,000 to 4 = more than ¥30,000) was correlated with IC (r = .25, p = .003). No significant effect of age, sex, and family income was found on the other variables (ps > .26). Maternal education showed no significant effect on key variables (ps > .17). To avoid interference from the child's age, sex, and family income, we conducted further analyses controlling for these variables.

Correlations between primary variables are reported in Table 1. Maternal control in two contexts was significantly correlated. Temperamental exuberance did not show any significant correlation with maternal control in either context or IC.

Role of maternal control in two contexts

Maternal control in the cleanup context was significantly higher than it was in the play-based context, $t(139)$ = 3.31, p = .001, Cohen's d = 0.28). The role of maternal control in IC varied across contexts. That is, maternal control in the play-based context was negatively associated with children's IC, whereas maternal control in the cleanup context was found to have no significant correlation with IC. These results were still robust after controlling for age, sex, and family income (see Table 1).

Table 1
Correlations of key variables.

Variable	*N*	*M*	*SD*	Skewness	Kurtosis	1	2	3	4
1 Exuberance	163	−0.06	2.41	0.54	0.76	–	*.012*	*−.053*	*−.140*
2 Maternal control in cleanup context	139	0.25	0.41	2.61	7.93	−.009	–	*.227***	*−.085*
3 Maternal control in play-based context	139	0.13	0.13	1.43	2.08	−.076	.227**	–	*−.212**
4 Inhibitory control	139	12.56	3.05	−1.08	0.67	−.083	−.112	−.199*	–

Note. Values in *italics* indicate partial correlations of the key variables after controlling for age, sex, and family income. Sex: 0 = boy, 1 = girl. Family income: 1 = less than ¥5,000, 2 = ¥5,000–10,000, 3 = ¥10,000–30,000, 4 = more than ¥30,000.
*p < .05.
**p < .01.

Interaction effect of maternal control and temperamental exuberance

Two hierarchical multiple regression analyses were conducted to examine whether the correlations between parental control in different contexts and IC were moderated by temperamental exuberance. In the first step, exuberance and parental control were entered, and children's age, sex, and family income were also included as control variables. Second, the interaction between exuberance and parental control was entered. Before the creation of the interaction terms, all independent variables were mean-centered.

Two hierarchical multiple regression analyses were conducted to examine whether the effect of maternal control in two contexts on IC varied as a function of the temperamental exuberance level. The following fit indices provided evidence for good model fit: model for play-based context: $\chi^2(7) = 7.23$, $p = .41$, CFI = .993, RMSEA = .014, SRMR = .035; model for cleanup context: $\chi^2(17) = 9.10$, $p = .25$, CFI = .944, RMSEA = .043, SRMR = .042. Parameter estimates of the models are presented in Table 2. The models revealed that maternal control in the play-based context showed a significant main effect on IC, suggesting that high maternal control in the play-based context was associated with low IC, and this effect did not differ in children with different levels of exuberance. However, although maternal control in the cleanup context did not show a significant main effect, there was a significant interaction between temperamental exuberance and maternal control in the cleanup context on IC. To interpret this interaction, the relation between maternal control in the cleanup context and IC was examined separately for children with high (+1 standard deviation), mean, and low (−1 standard deviation) levels of exuberance. For low-exuberant children, maternal control had a significantly negative association with IC ($b = -2.84$, $SE = 0.96$, $p = .003$). For mean-exuberant children, maternal control had a positive but no significant association with IC ($p = .636$). However, for highly exuberant children, maternal control had a significantly positive association with IC ($b = 2.22$, $SE = 1.11$, $p = .046$). These results demonstrated that high maternal control in the cleanup context impeded low-exuberant children's development of IC but promoted high-exuberant children's development of IC. The regression lines for the high-, mean-, and low-exuberant groups are plotted in Fig. 1.

Table 2
Summary of results of regression analysis examining exuberance and maternal control on inhibitory control.

Variable	Play-based context			Cleanup context		
	B	*SE*	*β*	*B*	*SE*	*β*
Step 1						
Age	1.92	1.01	1.91†	2.01	1.03	1.94†
Sex	0.03	0.49	0.05	0.09	0.50	0.17
Family income	1.27	0.37	3.38**	1.13	0.38	2.94**
Exuberance	−0.22	0.10	−2.10*	−0.19	0.11	−1.80†
Maternal control	−5.22	1.89	−2.76**	−0.60	0.67	−0.89
R^2	0.16*			0.11*		
Step 2						
Age	1.95	1.00	1.94†	1.86	1.00	1.86†
Sex	0.06	0.49	0.12	0.08	0.49	0.17
Family income	1.27	0.37	3.40**	1.00	0.37	2.68**
Exuberance	−0.20	0.10	−1.93†	−0.12	0.10	−1.19
Maternal control	−4.99	1.90	−2.63**	−0.31	0.65	−0.47
Exuberance × Maternal Control	0.94	0.92	1.02	1.05	0.33	3.14**
R^2	0.16***			0.16**		

Note. Sex: 0 = boy, 1 = girl. Family income: 1 = less than ¥5000, 2 = ¥5000–10,000, 3 = ¥10,000–30,000, 4 = more than ¥30,000.
†$p < .10$.
*$p < .05$.
**$p < .01$.
***$p < .001$.

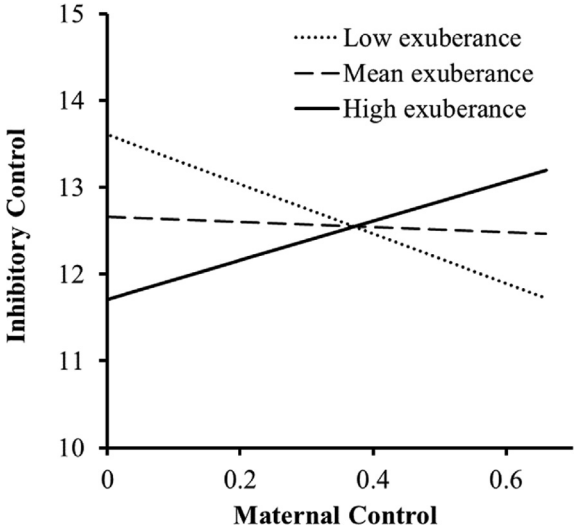

Fig. 1. Interaction of exuberance and maternal control in the cleanup context on inhibitory control.

Discussion

Framed from the self-determination theory and goodness-of-fit model, the current study aimed to examine how maternal control influences IC in young Chinese children, with comprehensive consideration of the influence of maternal control contexts as well as children's temperamental exuberance. In China, an advanced IC of children is viewed as a parenting goal and social expectations, and parental control is widely regarded as a necessary parenting practice to help children improve. However, the current study is the first to examine the influence of such empirical parenting—whether maternal control can benefit or undermine Chinese young children's development of IC—which can provide direct guidance for Chinese parents and an indispensable complement to parenting theory. Results were largely consistent with our expectations. Maternal control in a play-based context was found to have a significant negative influence on Chinese children's development of IC. Maternal control in a cleanup context did not show significant association with IC and showed various associations among children with different temperaments.

Role of maternal control in different contexts

Despite the widely accepted parental control beliefs and practices in Chinese parents, our results indicated that parental control, at least in a play-based context (high in enjoyment and low in obligation), backfires with young children's IC development. This result is consistent with prior studies on Chinese samples and supports the self-determination theory that parental control may undermine children's innate need for autonomy and detract from children's motivation and agency regardless of culture (Eisenberg et al., 2009; Pomerantz & Wang, 2009; Qin et al., 2009; Wang et al., 2007). Although Chinese children are taught to obey and respect parents, parental control can still decrease their sense of competence and cause them to relinquish self-control over their world. This detrimental effect is particularly pronounced when parents exert control over areas of free choice. Previous studies have found that parental control over adolescents' personal sphere rather than the conventional sphere can lead to psychological problems (Hasebe et al., 2004). Similar to the personal sphere of adolescence, the play-based context of the current study did not involve a behavioral norm or an executive standard, so activities should be left up to the children themselves, and the exercise of maternal control in that context may be highly ill-timed and unnecessary. Mothers who exhibit

frequent controlling behavior in a play-based context are critical about minor details of children's behavior or may make decisions for their children (e.g., asking them to choose nails of a specific color, asking them to use specific tools). In this scene, children may be ego-depleted given that they cannot control themselves but need to obey their mothers (Ryan & Deci, 2019). As followers, they may have less initiative and do not feel that they need to be responsible for their behavior, losing the opportunity for regulatory development and frustrating their needs for autonomy (Linkiewich et al., 2021). This implies that even as early as toddlerhood, Chinese parents should be supportive of autonomy rather than over-controlling.

Although maternal control in the cleanup context (high in obligation and low in enjoyment) was higher than maternal control in the play-based context, it did not show a significant association with children's IC. The differential role of parental control in the two contexts is consistent with the results of a previous study about gentle control in the cleanup context, which had a weaker negative effect on children's self-regulation than control in a free-play context (Augustine & Stifter, 2019). It may be that maternal control in that situation reiterated rules that the children already knew and therefore showed less destruction to their autonomous arrangements. Meanwhile, compared with the consistently strong negative effect of parental control in the West, the current findings may partly reflect cultural influence. The negative effect of parental control on Chinese children might not be as strong as it is for Western children (Eisenberg et al., 2015; Geeraerts et al., 2020; Taylor et al., 2013), at least in terms of young children's development of IC. A previous study on parental control with respect to emotional function (Pomerantz & Wang, 2009) found a similar pattern that the negative effect of parental control is evident but substantially weaker in China than in the West. This might be partially due to the acceptance and tolerance of parental control in Chinese culture (Chao, 1994). Especially when children are young, Chinese parents think that they need to set rules for them and impress on them what they should and should not do. This can be partially supported by our finding that parents exerted high controlling behavior in the cleanup task, where cleaning is a good habit to be cultivated. Besides, Chinese children understand that such discipline is grounded in love and care (Chao & Aque, 2009), so in the cleanup context they are likely to obey and internalize their parents' demands to gain praise and rewards (Wang et al., 2008). As a result, the negative influence of the exercise of parental control on children's autonomy may be attenuated. However, it does not mean that parental control in high-obligation contexts is unconditionally encouraged given that there is no positive association with IC. When parents exert control—coercive and pressuring behaviors and ignoring children's perspectives—the children are likely to move from active problem solving (taking a child's perspective) to passive compliance (taking a parent's perspective). Parental control might not violate or even emphasize the rules in the context, but it still carries the potential risk of harming autonomy, especially for less exuberant children.

Interaction between exuberance and maternal control in the cleanup context

As we noted above, when focusing on the group of less exuberant children, we can still find a negative association of maternal control in the cleanup context with IC. According to motivational systems theory (Gray, 1981), less exuberant children tend to have low intrinsic motivation, and thus their own behavioral regulation may be difficult to motivate and easy to disrupt. A previous study found that it was difficult to motivate less exuberant children's regulatory behaviors. Although less exuberant children usually behave obediently and less impulsively, they are not as persistent as highly exuberant children in a high-incentive value task (He et al., 2016). The current study further extends the fragility of less exuberant children's regulatory capacity given that the adverse effect of maternal control was particularly salient among them. For less exuberant children, when exposed to maternal control, they may immediately behave compliantly and rarely resist or fight for autonomy. For example, when a mother continuously gives commands, a less exuberant child may silently follow her finger pointing and repeatedly execute the "put it in" command, not even knowing when the task has been completed until the mother says, "Okay, done." Thus, under high maternal control, less exuberant children may display outward compliance that is not out of inner endorsement at the moment, and their IC may suffer in the long term.

However, for highly exuberant children, maternal control in the cleanup context appeared to be a positive force. Because exuberance arises from an approach motivational system, exuberant children often appear to be overactive, impulsive, and fearless (Degnan et al., 2011; Fox et al., 2001). These children often seem to be immune to harsh or assertive parenting (Cornell & Frick, 2007; Kochanska et al., 2007), and gentle control can be helpful (Augustine & Stifter, 2019) but may be insufficient to elicit their optimal level of arousal (Kiff et al., 2011). Maternal control, which serves as an extrinsic monitor, can spur them to regulate their behavior in the cleanup context. Once the goal is clarified and reinforced, exuberant children can easily be motivated to regulate their behavior (He et al., 2016), which in the long run may help them to internalize rules and facilitate their development of IC. It should be noted that maternal control and IC were measured concurrently in the current design. It will be necessary to follow children over time to determine the long-term impact of maternal control on exuberant children's IC development. Nevertheless, the current results support the goodness-of-fit model that children's temperament should be taken into account when judging whether parenting behavior is helpful.

Universal versus culture-specific perspectives

In general, our results can largely support the universal perspective that maternal control is likely to be negatively associated with the development of IC in Chinese children (except maternal control in the cleanup context on exuberant children). This finding may be inconsistent with the beliefs of Chinese parents that their controlling behaviors can help their children to recognize their misbehavior and gain self-control. One possible explanation is that Chinese parents tend to place more value on performance or attitude than on ability (Guo, 2013; Shek & Chan, 1999). A high appreciation of qualities such as diligence and humility is a typical example of this. Thus, the situation compliance, although being a short-term effect, makes parents believe that control has a satisfactory effect and thereby neglect the long-term development of the ability of self-control. Besides, the responsibility for children's performance may push parents to interfere without considering the children's needs. Chinese culture is considered a "face" culture; that is, individuals are highly concerned about their value and status in others' minds (e.g., Kim et al., 2010). A child's performance is one of the most important "faces" of a parent (Ng et al., 2014). Chinese parents attempt to make their children behave in line with social standards and to be perceived as having an advanced IC. Therefore, they may use controlling behaviors to discipline their children, especially in public settings, although it does not aid IC development.

It should be noted that the less negative effect of maternal control may show a certain degree of cultural specificity to China. Compared with the broadly negative effect in the Western sample (e.g., Eisenberg et al., 2015; Geeraerts et al., 2020; Taylor et al., 2013), the negative effect of parental control may be mitigated by the endorsement of self-restraint and respect for parental authority in Chinese society. For example, for exuberant children, parental control highlights the value of self-restraint and instantly shapes their behavior so that they adapt to the specific setting and needs of Chinese society. This is consistent with the argument that culture influences the way parents raise their children and that a parenting style that conforms to cultural norms is effective in transmitting core cultural values (Bornstein, 2012). However, Chinese parents still need to be cautious about using controlling behaviors, even for exuberant children, not only because we found that maternal control in a play-based context can impair IC but also because extensive research has confirmed the negative effect of parental control on children's emotional functions in both China and the West (Lansford et al., 2018; Pomerantz & Wang, 2009; Rothenberg et al., 2020). Altogether, these findings corroborated the ecological system theory (Bronfenbrenner & Morris, 1998), suggesting that the dynamic interactions among individual characteristics (temperamental exuberance), microsystem (maternal control), and macrosystem (Chinese culture) shape children's development.

Conclusion and limitations

The current study not only confirmed the effect of maternal control on Chinese children's IC but also revealed that this effect varied according to children's temperament and the interaction context.

Furthermore, the results, especially the negative effect of maternal control in a play-based context and the interaction between temperament and maternal control in a cleanup context, have implications for educational practice in China while providing a reference for Chinese parents to adjust their parenting behavior style.

However, this study still has some limitations that should be addressed in future research. First, although maternal control in the current study included harsh demands and behavioral interventions, extreme controlling behavior with hostility, such as corporal punishment, was not seen. On the one hand, it may have been limited by the laboratory observations because mothers are likely to restrict their behaviors in front of cameras. On the other hand, Chinese parents are known to exercise control relatively calmly; in other words, although Chinese parents do get excessively involved in their children's lives, they may use punitive behaviors sparingly (Cheah & Rubin, 2004; Grusec et al., 1997). In addition, to make car assembly a play-based task, we explicitly told mothers not to interfere or touch the accessories, which may have reduced their controlling behavior in this task. Regardless, it would make our findings convincing if future research could use naturalistic observation to validate the role of maternal control. Second, the temperamental exuberance was measured at 2 years of age, whereas maternal control was measured at 3 years of age along with the dependent variable (IC). Although temperamental exuberance is quite stable during early childhood (Fox et al., 2001), any change in temperament will affect the results of this study. Thus, a better design would be to measure maternal control when children are 2 years old or to measure temperament when children are 3 years old to clarify the interaction effect of temperamental exuberance and maternal control. Third, the current study contained only a Chinese sample, and we did not assess cultural values such as parental goals and beliefs. Our discussion of universal and culture-specific roles is speculative based on comparing our results with findings in a previous study. Because we set two specific maternal control contexts that have not been explored in previous studies, it would be much better to include two or more culturally diverse samples in future studies. Finally, our sample mainly included middle-class urban families in China and most mothers were highly educated, so the current findings should be cautiously generalized to rural China. Given the deeply entrenched traditional standards (e.g., emphasis on self-restraint, respect for parental authority) in rural China, parental control may be more prevalent but also more widely accepted in those areas (Chen et al., 2011; Yang et al., 2005) than in urban areas. Thus, we speculate that the negative effect of parental control would be greatly attenuated in rural China; however, further research that includes a diverse sample is needed.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2023.105626.

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