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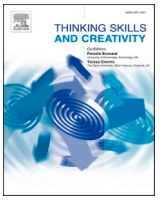

Interrelationships among parental play support and kindergarten children's playfulness and creative thinking processes

Wing Kai Fung [a,*], Kevin Kien Hoa Chung [b]

[a] Early Childhood, School of Education, Liverpool Hope University, United Kingdom
[b] Department of Early Childhood Education, The Education University of Hong Kong, Hong Kong

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ABSTRACT

This study examined the direct and indirect relationships of parental play support with playfulness and creative thinking processes in Hong Kong Chinese kindergarten children. Participants were 181 (age range 4 to 5 years) local kindergarten children (54.1 % girls) and their parents. Parents reported demographic information, parental play support, and children's playfulness (physical spontaneity, social spontaneity, cognitive spontaneity, manifest joy, and sense of humor) through a questionnaire. Participating children were administered behavioral assessments of convergent thinking and divergent thinking at their kindergarten. Results from a path analytic model revealed social spontaneity and cognitive spontaneity as the mediators in the indirect relationships of parental play support with children's convergent thinking and divergent thinking, respectively. In contrast, the direct relations between parental play support and creative thinking processes were nonsignificant. The findings suggest that parents supporting household play might foster their children's creative thinking processes by nurturing children's playfulness. Practically, the findings underscore the importance of fostering creativity in the early years by promoting kindergarten children's playfulness.

1. Introduction

Play is theorized as an important way children manifest and develop their creativity (Chávez-Eakle et al., 2012; Russ & Wallace, 2013; Vygotsky, 2004). Aligning with the theoretical perspectives on play, recent research has revealed the facilitative role of kindergarten children's playfulness, defined as their tendencies to display a characteristic style of play behaviors (Barnett, 1991; Lieberman, 1977), in predicting their creative potential (e.g., Fung & Chung, 2021, 2023b; Fung et al., 2021). This line of research examining playfulness and creative potential in early years conceptualized children's creative potential as their creative personality traits without considering alternative indicators (e.g., creative thinking processes; Rhodes, 1961), reflecting a significant methodological limitation. Grounded on the bioecological model of human development (Bronfenbrenner & Ceci, 1994), parental beliefs in the benefits of play in early development (e.g., parental play support; Hyun et al., 2021) are important factors within the microsystem that shape children's play characteristics (e.g., Fung & Chung, 2022b; Lin & Li, 2018) like playfulness. However, prior research was very limited to examining the interrelationships between family factors such as parental play support and children's playfulness and creative thinking processes. The aims of the present study are twofold. First, it examined the links between playfulness and creative

* Corresponding author at: Department of Early Childhood, School of Education, Liverpool Hope University, Hope Park, Liverpool, L16 9JD, United Kingdom.
E-mail address: fungw@hope.ac.uk (W.K. Fung).

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potential by administering behavioral assessments of creative thinking processes (i.e., convergent thinking and divergent thinking; Cropley, 2006) in a sample of Hong Kong Chinese kindergarten children. Second, it investigated the direct relationships between parental play support and children's creative thinking processes and their indirect relationships mediating through children's playfulness. Findings from this study can provide more explanations for the theories (Rhodes, 1961; Vygotsky, 2004), further validating the positive role of playfulness in children's creativity. Practically, parents in Hong Kong have high expectations of children's academic performance (Ma et al., 2018), and Hong Kong students are high-achievers in international academic assessments, such as the Programme for International Student Assessment (i.e., PISA; OECD, 2023). Nevertheless, Hong Kong students scored statistically significantly below the OECD average in creative thinking assessment, and over half held a fixed mindset about creativity (OECD, 2024). As early childhood is a critical period in creative thinking development (Leggett & Rezaei, 2023), the present results can inform early childhood education policy and practice both locally and internationally, indicating the possible way to foster early creativity development, for example, through shaping parental play beliefs.

1.1. Kindergarten children's creative potential

Creativity is broadly defined as generating novel and useful ideas across different areas (Amabile, 1996), while children may show differing potential for creative expression (i.e., creative potential; Runco, 2014). At the same time, kindergarten children may express their creative potential in everyday situations (i.e., little-c;Richards, 2007, 2019) by reintegrating standing resources and knowledge into new ideas or products for fun and pleasure, whereas these ideas or products may not be functional (Fung & Chung, 2022a; Runco & Jaeger, 2012). For example, play is a prominent way for children to express and understand their creative potential (Chávez-Eakle et al., 2012; Fung & Chung, 2021). Vygotsky (2004) proposed that creative processes are fully demonstrable in early childhood through play and that children's intellectual (e.g., richness of personal experiences) and emotional (e.g., emotion arousal associated with external objects) processes are both contributing to their creative ideations. Aligning with Vygotsky's (2004) propositions, Russ (2003) and Russ and Wallace (2013) highlighted how the cognitive and affective processes in pretense may support children's creative potential. In pretend play, children engage cognitively by employing object substitution, symbolic representation, and free association, while these processes are closely connected with divergent thinking skills (Russ, 2003). Children also engage emotionally through emotion expression and affect-laden thinking, guiding the combination of unrelated concepts (Russ & Wallace, 2013).

Creative potential can be reflected in different strands: *press* (i.e., perception of environmental stimuli), *person* (i.e., creative traits/personality), *process* (i.e., creative thinking processes), and *product* (i.e., creative outcomes) (Rhodes, 1961). Drawing upon Rhodes's conceptualization (1961), past research has operationalized children's creative potential with different approaches. For instance, a line of studies has assessed children's creative personality traits through teacher- or parent-reported measures (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021), corresponding to the person strand. In another line of research (e.g., Besançon & Lubart, 2008; Hui et al., 2015), researchers assessed children's creative potential by referring to their story or drawing production, which corresponded to the *product* strand. Concurring with the *process* strand, Lloyd and Howe (2003) and Lubart et al. (2010) operationalized children's creative potential as their convergent thinking and divergent thinking, which was the adopted approach in the present study.

Extensive research has emphasized the role of divergent thinking in creative potential, and some even equate divergent thinking to creativity (Zhu et al., 2019). Divergent thinking indicates one's ability to generate multiple and diverse alternatives from a reference question (Vries & Lubart, 2019). Children with better divergent thinking can creatively link up with ideas and generate novel solutions, contributing to their creative potential (Cropley, 2006). On top of the prominent emphasis on divergent thinking, studies agree that convergent thinking is another vital aspect of the creative thinking process (e.g., Lloyd & Howe, 2003; Zhu et al., 2019). Convergent thinking represents one's competency to deduce the best solution to a well-represented problem speedily, accurately, and logically (Cropley, 2006). In problem-solving, divergent thinking is essential in the earlier stage of method searching, while convergent thinking is necessary for the later stage of choice-making (Zhu et al., 2019). Divergent thinking enables the generation of possible solutions, while convergent thinking serves as a threshold for evaluating the generated ideas to narrow down the number of choices (Zhu et al., 2019). There can be a cyclic pattern between divergent and convergent thinking to generate the best solution (Vries & Lubart, 2019). Therefore, convergent thinking and divergent thinking are crucial creative thinking processes, and both were included in this study to represent children's creative potential.

1.2. Kindergarten children's playfulness and creative potential

Playfulness reflects an individual likeliness to engage in playful circumstances (Pinchover, 2017), and this characteristic governs children's play patterns across multiple contexts and environments (Barnett, 1991; Lieberman, 1977). Barnett (1991, 2018) conceptualized children's playfulness as five aspects: physical spontaneity (tendency to motor movement and activity level), social spontaneity (tendency to direct and participate in peer play), cognitive spontaneity (tendency to imagine, pretend, and originate), manifest joy (tendency to express positive emotions), and sense of humor (tendency to make fun and humor). Aligning with classic developmental theories highlighting the role of play in early learning and development (e.g., Piaget, 1976; Vygotsky, 1967), playfulness has been suggested to predict children's cognitive skills and social-emotional competence (e.g., Fink et al., 2020; Fung & Chung, 2022b, 2023a).

A separate line of research has proposed the relationship between playfulness and creative potential among adults (e.g., Bateson, 2015; Bateson & Nettle, 2014; Luria et al., 2018) and children (Trevlas et al., 2003). Conceptually, playful people tend to engage in a broader range of experiences that may be conducive to their subsequent innovative problem-solving (Bateson & Nettle, 2014). In early childhood, playfulness drives children to test and combine play materials, explore the boundaries between reality and fantasy, and

create novel play ideas (Chávez-Eakle et al., 2012). Prior theories and evidence (Russ, 2003; Russ & Wallace, 2013; Vygotsky, 2004) highlighted the link between children's pretend play and their creative potential. As an individual factor governing children's play styles, playfulness may predispose children to varied levels of group pretense participation, impacting their creative potential (Fung & Chung, 2021).

Recent research has explored the predictive link between playfulness and creative potential among kindergarten children (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021). For instance, children's cognitive spontaneity and manifest joy positively predicted their creative potential, as reported by parents (Fung et al., 2021). Likewise, kindergarten children's cognitive spontaneity and social spontaneity exhibited in the school context positively predicted their creative potential rated by the teachers (Fung & Chung, 2022a). Fung and Chung (2023b) further demonstrated how kindergarten children's social spontaneity, cognitive spontaneity, and creative potential predicted each other over time above and beyond their autoregressive effects. Among the five aspects of playfulness, children's social spontaneity and cognitive spontaneity consistently appeared to be important correlates of their creative potential. Yet, this line of studies solely refers to children's creative potential as creative personality traits without considering alternative indicators. Considering Rhodes's (1961) conceptualization suggesting that creativity also covers children's thinking processes, such as convergent thinking and divergent thinking, prior evidence (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021) only partially supported the interlink between playfulness and creativity in early childhood and a further investigation using an alternative operationalization is warranted. To address the limitations of previous research and assess the strengths and weaknesses of different methodologies, the present study examined how children's playfulness would be associated with their creative thinking processes with behavioral assessments in both convergent thinking and divergent thinking.

1.3. Parental play support and children's playfulness and creative potential

Apart from individual characteristics, the bioecological model (Bronfenbrenner & Ceci, 1994) proposed the impact of environmental factors, such as parental characteristics, on children's early development. In the context of children's play and creativity, parental play support is a potential antecedent predicting the concerned outcomes. Parents with higher levels of play support endorse the benefits of play, and regard play as a natural situation of learning (Fogle & Mendez, 2006). These parents are more willing to engage in household play, provide necessary guidance (Fung & Chung, 2022b), and offer additional opportunities and resources for play (Lin & Li, 2018). Thus, parental play support is an imperative factor influencing children's household play experience and characteristics (Hyun et al., 2021), while children's playfulness might be the underlying factor explaining their development. For example, a recent study demonstrated that the indirect relationship between parental play supportiveness and children's peer problems was mediated through children's playfulness. In contrast, their direct relationship was nonsignificant (Fung & Chung, 2022b). Similarly, the relationship between parental play support and kindergarten children's social competence was indirect and mediated through their playfulness and school play behaviors (Fung & Chung, 2024a). These findings pointed to the proposition that parental play support may shape children's playfulness and further impact their development through daily play participation.

Despite the sound conceptual links of parental play support with kindergarten children's playfulness and creative potential, no prior research has been conducted on the interrelationships among the three factors to the best of our knowledge. A handful of studies examined how parenting styles such as mindful parenting (Pugsley & Acar, 2020), constructive parenting (Jankowska & Gralewski, 2022), and parental emotional warmth/rejection (Zhao & Yang, 2021) predicted creativity in late childhood or early adolescence. However, these studies neither focus on development in early childhood nor examine creative potential through the lens of play. The present study expanded from previous research by investigating the direct relationships between parental play support and kindergarten children's creative thinking processes and their indirect relationships mediating through children's playfulness.

1.4. The present study

This study investigated the interrelationships between parental play support and kindergarten children's playfulness (physical spontaneity, social spontaneity, cognitive spontaneity, manifest joy, and sense of humor) and creative thinking processes using child-assessed measures of convergent thinking and divergent thinking. Considering the bioecological model (Bronfenbrenner & Ceci, 1994) suggesting how parent (e.g., parental play support) and children's (e.g., playfulness) characteristics may jointly influence child development and the Vygotskian perspectives (Russ, 2003; Russ & Wallace, 2013; Vygotsky, 2004) highlighting the role of group pretense in fostering early creative potential, the present study proposed a conceptual framework examining the indirect relationships among parental play support and children's playfulness and creative thinking processes. Based on the literature reviewed (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021; Russ, 2003; Russ & Wallace, 2013; Vygotsky, 2004), it was hypothesized that children's playfulness, particularly social spontaneity and cognitive spontaneity, would mediate the relationships of parental play support with children's creative thinking processes of convergent thinking and divergent thinking. Considering a study that found a nonsignificant direct relation between parental play supportiveness and children's social development (Fung & Chung, 2022b), nonsignificant direct relationships between parental play support and children's creative thinking processes would be found in Chinese children.

2. Method

2.1. Participants

Participants were 181 Hong Kong Chinese kindergarten children (54.1 % girls) and their parents. At the time of data collection, all

participating children were in kindergarten year 2 (i.e., typical age range 4 to 5 years). Participants were recruited from nine kindergartens located in low to middle socioeconomic strata across three regions in Hong Kong. A Hong Kong kindergarten class usually consists of twenty to thirty children and the employment of the play-based approach (particularly free play) is stipulated in the latest Kindergarten Education Curriculum Guide to facilitate children's holistic development (Curriculum Development Council of HKSARG, 2017). Parents reported their age and education level: (1) primary, (2) lower secondary, (3) upper secondary, (4) college, (5) undergraduate, (6) master, and (7) doctoral. Among the parents, 48 % completed upper secondary education, 19 % completed lower secondary education, 16 % completed college, and 16 % completed undergraduate or above. Mothers completed 78 % of the parental questionnaires.

2.2. Procedure

Ethical approval was granted by the concerned university (approval reference number: A2018- 2019-0175-01). The principals of the participating kindergartens also provided written consent. Informed consent and questionnaire forms were sent to the parents to invite their participation. Parents reported demographic information, parental play support, and children's playfulness through a questionnaire. Participating children were administered behavioral assessments of convergent thinking and divergent thinking by experienced research assistants in a quiet area of the kindergartens. Verbal consent from the children was obtained before conducting the assessment tasks, which could be completed in 20 min.

2.3. Measures

2.3.1. Parental play support

Parental play support was assessed by the play support subscale of the Parent Play Beliefs Scale (PPBS; Fogle & Mendez, 2006), which was commonly employed in international research (e.g., Hyun et al., 2021; Jiang & Han, 2016) with demonstrated reliability (Cronbach's alpha > 0.80) and construct, convergent, divergent, and predictive validity (Fogle & Mendez, 2006). The play support subscale consists of 17 items (e.g., "Play can help my child develop better thinking abilities," "Through play, my child develops new skills and abilities"). Parents rated each item on a 5-point scale ranging from 1 (*disagree*) to 5 (*very much agree*). The average score of the subscale represented parental play support. The Cronbach's alpha was 0.95.

2.3.2. Child playfulness

Children's playfulness was assessed by parents' ratings on the Children's Playfulness Scale (CPS; Barnett, 1991), with adequate reliability (Cronbach's alpha > 0.80), construct and factorial validity (Barnett, 2018). The CPS has been employed in research on kindergarten children locally (e.g., Fung & Chung, 2022b, 2023a) and internationally (e.g., Barnett, 2018; Trevlas et al., 2003). The CPS contains five subscales: physical spontaneity (four items; e.g., "The child's movements are generally well-coordinated during play activities"), social spontaneity (five items; e.g., "The child plays cooperatively with other children"), cognitive spontaneity (three items; e.g., "The child invents his/her own games to play"), manifest joy (five items; e.g., "The child demonstrates exuberance during play"), and sense of humor (five items; e.g., "The child enjoys joking with other children"). Parents rated the items on a 5-point scale ranging from 1 (*not like*) to 5 (*exactly like*). The average scores of the corresponding subscales represented children's playfulness. The Cronbach's alphas of physical spontaneity, social spontaneity, cognitive spontaneity, manifest joy, and sense of humor subscales were 0.74, 0.76, 0.81, 0.80, and 0.78, respectively.

2.3.3. Child convergent thinking

Following Lloyd and Howe's (2003) approach, children's convergent thinking was assessed by the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981). The PPVT-R was recently employed in creativity research of kindergarten children, with demonstrated reliability (Cronbach's alpha > 0.80) and construct validity (Fung & Chung, 2024b). The PPVT-R includes 125 items, each comprising four photos presented in random order: the target object, a distractor object with similar sound (phonological distractor), a distractor object with similar meaning (semantic distractor), and an irrelevant distractor. For each test item, the experimenter verbally presented a vocabulary that corresponds to the target object, and the participating child was asked to point out the correct photo. One mark was scored if the child pointed to the target object, while zero marks were given if any distractor was pointed. The task was discontinued if a child gave six wrong answers (i.e., point to any distractor) in eight continuous items. The total mark received by a child after attempting the items represented his/her convergent thinking. The Cronbach's alpha was 0.96.

2.3.4. Child divergent thinking

Children's divergent thinking was assessed by the Torrance Tests of Creative Thinking figural circle task (TTCT; Torrance, 1974), which was previously employed in early childhood creativity research (e.g., Dziedziewicz et al., 2013; Lubart et al., 2010) with decent reliability (Cronbach's alpha > 0.80) and predictive, criterion, and discriminant validity (Torrance, 1972; Wechsler, 2006). Children were asked to draw on an A4-sized paper showing 15 identical circles for four minutes. In each circle, the child added elements to form an interesting drawing (e.g., a face, a ball, a wheel). After the four minutes, the experimenter reviewed all drawings produced and clarified the meaning of any ambiguous drawing with the child. Each distinctive drawing scored one mark. If two or more drawings were highly similar (e.g., a man's face and a woman's face) or repetitive, only one mark was given. Any uninterpretable drawing (after clarifying with the child) scored zero marks. The total score corresponding to the number of distinctive drawings a child created within four minutes, indicating the fluency of idea generation (Torrance, 1974), represented his/her divergent thinking. To ascertain

objective interpretation across experimenters, 10 % of children's drawings were randomly selected to check the inter-rater reliability. The inter-rater reliability was 0.99.

2.4. Data analysis plan

Correlation analysis was performed to investigate the relationships among the variables. The aspects of playfulness that were significantly related to creative thinking processes were subjected to the path analysis to examine their interrelationships with parental play support and children's convergent thinking and divergent thinking. The path model was estimated with the lavaan package (version 0.6–12) in R (version 4.2.0; R Core Team, 2023). Drawing upon Hu and Bentler's (1999) criteria, model fit was assessed by the Chi-square index (non-significant $\chi 2$), comparative fit index (CFI $\geq$ 0.95), root mean square error of approximation (RMSEA $\leq$ 0.08), and standardized root mean square residual (SRMR $\leq$ 0.08). For mediation analysis, the confidence intervals were calculated with resampling method (Tofighi & MacKinnon, 2011) and the significance of the indirect relationships were tested by using the bias-corrected bootstrapping approach with 2000 resampling (Hayes, 2009).

3. Results

3.1. Preliminary analyses

Table 1 shows the descriptive statistics, reliability statistics, and bivariate correlations of the study variables. The skewness and kurtosis of all variables were between +1 and -1, except convergent thinking, while the current sample size of 181 adequately reduced any detrimental effects due to nonnormality (against the benchmark sample size of 50; Hair, 2010). The five aspects of playfulness were positively associated (*rs*= 0.26 to 0.56, *ps* < 0.001), and they were positively related to parental play support (*rs*= 0.17 to 0.36, *ps* < 0.05). Only social spontaneity and cognitive spontaneity were significantly correlated with convergent thinking and divergent thinking (*rs*= 0.18 to 0.29, *ps* < 0.05). Given the theoretical basis supporting the connection between group pretense and creativity (i.e., Russ, 2003; Russ & Wallace, 2013; Vygotsky, 2004) and the empirical evidence linking social and cognitive spontaneity with children's creative potential (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021), only social spontaneity and cognitive spontaneity were included in the path model to examine their mediating roles in the indirect relationships between parental play support, convergent thinking, and divergent thinking. The fractions of missing data for the study variables were between 0.04 and 0.11, and the Little's missing completely at random test (MCAR; Little, 1998) was employed to determine whether there was a specific pattern governing the missing values. According to the results of the MCAR test (i.e., χ^2 (31)= 44.57, $p > .05$), our data failed to reject the null hypothesis, indicating that there was no clear pattern existed in the missing values (Little & Rubin, 2019). Therefore, the path analysis was conducted with full information maximum likelihood estimation with robust standard errors (i.e., estimator MLR), which is robust to nonnormality.

3.2. Path analysis predicting convergent thinking and divergent thinking

Fig. 1 shows the parameter estimates and model fit statistics for the path model of parental play support and children's social spontaneity, cognitive spontaneity, convergent thinking, and divergent thinking, which fits adequately to the data χ^2 (*df*= 9, *N* =

Table 1
Descriptive statistics, reliabilities, and bivariate correlations of study variables.

		Correlations							
Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Parental play support		–							
2. Physical spontaneity		0.36***	–						
3. Social spontaneity		0.35***	0.52***	–					
4. Cognitive spontaneity		0.35***	0.28***	0.56***	–				
5. Manifest joy		0.24**	0.40***	0.41***	0.26***	–			
6. Sense of humour		0.17*	0.34***	0.51***	0.48***	0.34***	–		
7. Convergent thinking		0.05	0.01	0.29***	0.18*	0.05	0.15	–	
8. Divergent thinking		0.01	-00.11	0.12	0.20*	-0.01	0.07	0.38***	–
Descriptive statistics	Mean	4.19	4.12	3.83	3.59	3.89	3.34	32.25	2.55
	Minimum	2.06	2.25	1.80	1.00	2.80	1.00	0.00	0.00
	Maximum	5.00	5.00	5.00	5.00	5.00	5.00	88.00	10.00
	SD	0.56	0.64	0.62	0.80	0.47	0.78	14.29	2.25
	Skewness	-0.37	-0.53	-0.08	-0.13	-0.05	-0.27	0.87	0.85
	Kurtosis	0.04	-0.10	0.06	-0.19	-0.27	0.44	1.62	0.46
	Cronbach's Alpha	0.95	0.74	0.76	0.81	0.80	0.78	0.96	–

Note: SD= Standard deviation.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

181)= 16.21, p = .063, CFI= 0.96, RMSEA= 0.06 (90 % CI: 0.00, 0.12), SRMR= 0.05, $R^2_{\text{Social spontaneity}}$ = 0.14, $R^2_{\text{Cognitive spontaneity}}$= 0.14, $R^2_{\text{Convergent thinking}}$ = 0.11, $R^2_{\text{Divergent thinking}}$ = 0.07. Children's social spontaneity and cognitive spontaneity were significantly correlated ($r = 0.49, p < .001$). Similarly, children's convergent thinking and divergent thinking were positively associated ($r = 0.37, p < .001$). Parental play support was positively related to children's social spontaneity (β= 0.35, SE= 0.08, $p < .001$) and cognitive spontaneity (β= 0.36, SE= 0.11, $p < .001$), but its direct relationships with children's convergent thinking and divergent thinking were nonsignificant. Children's social spontaneity was positively related to their convergent thinking (β= 0.31, SE= 2.03, $p < .001$) but not to their divergent thinking. In contrast, children's cognitive spontaneity was positively associated with their divergent thinking (β= 0.22, SE= 0.23, $p < .01$) but not with convergent thinking. The indirect relationship between parental play support, social spontaneity, and convergent thinking was statistically significant (indirect effect: β= 0.11, SE= 1.07, $p < .01$, 90 % CI: 0.70, 4.88). The indirect relationship between parental play support, cognitive spontaneity, and divergent thinking was also significant (indirect effect: β= 0.08, SE= 0.14, $p < .05$, 90 % CI: 0.05, 0.59).

4. Discussion

This study examined the interrelationships between parental play support and kindergarten children's playfulness and creative thinking processes. The results reveal the distinctive mediating roles of social spontaneity and cognitive spontaneity in the indirect relationships of parental play support with children's convergent thinking and divergent thinking, respectively. Importantly, the present findings have expanded the extant literature (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021) by demonstrating the interconnectedness among parental play support, playfulness, and creative thinking processes using behavioral assessments of children's convergent thinking and divergent thinking.

4.1. Direct relations between parental play support and creative thinking processes

As expected, the direct associations from parental play support to children's creative thinking processes were nonsignificant, whereas their indirect relationships mediating through children's playfulness were significant. Parents showing higher levels of support in household play tend to provide additional play opportunities and offer their children various play materials (Hyun et al., 2021; Lin & Li, 2018). Parental play support, therefore, tends to shape children's daily play experience and characteristics, which might further impact children's development in multiple domains. For example, Fung and Chung (2022b) revealed the indirect longitudinal relationship between parental play support and kindergarten children's playfulness and peer problems in the school context. The present results aligned with the previous study (Fung & Chung, 2022b) and extended to show how parental play support might indirectly promote children's creative thinking processes through their playfulness. Future work on children's early play and development can explore whether playfulness can explain the relationships between parental play support and academic skills such as reading or mathematics.

4.2. Indirect relations between parental play support and creative thinking processes

Concurring with the hypotheses, children's playfulness significantly mediated the relationships between parental play support and creative thinking processes. Interestingly, the findings highlighted the differential roles of social spontaneity and cognitive spontaneity in predicting children's convergent thinking and divergent thinking. Convergent thinking often manifests in identifying the best response or answer to a sufficiently defined question (Cropley, 2006). This process involves effectively representing a question,

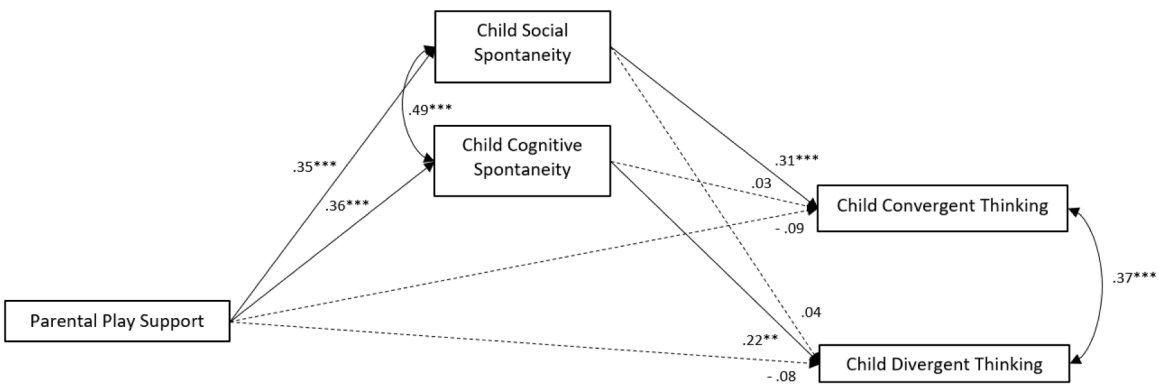

Fig. 1. Path model for predicting children's convergent thinking and divergent thinking from parental play support, and children's social spontaneity and cognitive spontaneity controlling for children's gender and parental education levels. Standardized coefficients are reported. Solid paths are statistically significant. Dashed paths are nonsignificant. * $p < .05$; ** $p < .01$; *** $p < .001$. Fit indices: χ^2 (df= 9, N = 181)= 16.21, p = .063, CFI= 0.96, RMSEA= 0.06 (90 % CI: 0.00, 0.12), SRMR= 0.05, $R^2_{\text{Social spontaneity}}$ = 0.14, $R^2_{\text{Cognitive spontaneity}}$= 0.14, $R^2_{\text{Convergent thinking}}$ = 0.11, $R^2_{\text{Divergent thinking}}$ = 0.07.

retrieving relevant knowledge, and applying appropriate mental sets and logic (Cropley, 2006; Vries & Lubart, 2019). In early childhood, language is an important tool for children to mentally represent problems and regulate their cognition and behaviors (Bodrova & Leong, 2018; Vygotsky, 1967). For instance, kindergarten children employed self-directed speech to guide their attempts in challenging problem-solving tasks (Alarcón-Rubio et al., 2014), and their vocabulary knowledge predicted subsequent behavioral self-regulation (Bohlmann et al., 2015). Perhaps children with advanced social spontaneity developed better language skills during the increased interactive peer play, potentially explaining the indirect relationship between parental play support and convergent thinking. Holmes and colleagues (2015) consistently demonstrated the interrelationships among social play, receptive vocabulary, and creative drawing in a sample of preschool children in the United States. Nevertheless, the current study did not include a measurement of children's language skills and, thus, caution should be taken regarding this speculation. Future research may explore the interrelationships between parental play support, social spontaneity, language skills, and convergent thinking among kindergarten children.

On the other hand, children's cognitive spontaneity mediated the indirect relationship between parental play support and divergent thinking. Cognitive spontaneity indicates children's propensity to invent new games, use unusual materials, and assume different characters in play (Barnett, 1991, 2018). Children showing high cognitive spontaneity tend to employ object substitution, broad scanning, and free association in their play (Fung & Chung, 2022a; Fung et al., 2021; Russ, 2003, 2013). These play processes are fundamental to the development of divergent thinking, which involves the production of alternative solutions, creating uncommon associations, and transforming ordinary ideas (Cropley, 2006). Therefore, finding a relation between children's cognitive spontaneity and divergent thinking is not surprising. Considering the recent research revealing the links between children's playfulness and creative personality traits (e.g., Fung & Chung, 2022a, 2023b), upcoming studies can further examine how parental play support and playfulness may collectively predict children's creative potential, such as their creative product (e.g., drawing, story; Rhodes, 1961). For instance, creative story invention (Besançon & Lubart, 2008) is a popular measure for children's creative products.

4.3. Limitations

The present study has at least three limitations. First, although this study employed behavioral assessments of children's convergent thinking and divergent thinking, parents' reports of play beliefs and their children's playfulness may be subjected to biases such as social desirability (Krumpal, 2013) or common method variance (Podsakoff et al., 2003). The absence of objective data on actual parental behaviors reflecting their play beliefs may also compromise the validity of the presented results. Further work may examine the interrelationships among parental play support with playfulness and creative thinking processes using alternative observational or behavioral assessments of playfulness (e.g., Test of Playfulness scale; Bundy et al., 2001) and creative thinking processes (e.g., Remote Association Test; Mednick, 1962) and include a measure of social desirability as a control (e.g., Blake et al., 2006). Alternatively, the employment of objective informant rating (e.g., teacher's rating of children's playfulness) can lower the likelihood of biased results. Second, the number of participants was adequate but small (power analysis of 80 % (β= 0.80; α= 0.05), RMSEA $<$ 0.08, the minimum sample size was 183; Moshagen & Erdfelder, 2016). Future studies with increased sample sizes may raise the statistical power of and the amount of variances (currently 11 % of convergent thinking and 7 % of divergent thinking) explained by the model. Relatedly, participants were recruited from low to middle socioeconomic strata in Hong Kong. The present findings should be further examined in samples recruited from a broader socioeconomic background or alternative cultural contexts to validate their generalisability. Lastly, this study was cross-sectional, and the path model was intended to explore the potential mediators. However, no causal inference can be made, and longitudinal studies are necessary to better inform the directional relationships.

4.4. Conclusion and implications

Despite its limitations, the present study contributed to the literature by demonstrating the indirect relationships between parental play support and kindergarten children's creative thinking processes mediating through their playfulness. Concurring with Rhodes's (1961) theoretical perspective of creativity, kindergarten children's playfulness not only predicted their creative personality traits exhibited in the household or school contexts (e.g., Fung & Chung, 2022a, 2023b; Fung et al., 2021) but also related to their convergent and divergent thinking processes.

Practically, parents in Hong Kong possess Confucian beliefs emphasizing parental responsibility for promoting children's academic performance (Ma et al., 2018), often at the expense of quality household play opportunities. Thus, Hong Kong parents tend to show lower levels of play support than their Western counterparts (Vandermaas-Peeler, 2002). The present results revealed that parents supporting household play may nurture their children's social spontaneity and cognitive spontaneity, which may, in turn, facilitate children's convergent thinking and divergent thinking. These findings not only join forces with emerging evidence (i.e., Fung & Chung, 2022a, 2023b) highlighting the utility of encouraging children's playfulness to promote their creativity development but also underscore parental play support as the antecedent driving children's creative potential. Seminars targeting kindergarten parents are a promising way to foster parental play support. Apart from consolidating parental beliefs in the benefits of play (e.g., Fung & Chung, 2022b), interventions targeting parents' or practitioners' playfulness are alternate approaches to boost children's playfulness and creative potential (Pinchover, 2017; Proyer et al., 2021; Wu et al., 2022).

Compliance with ethical standards

This manuscript was prepared in accord with the ethical standards of the American Psychological Association

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all participants included in the study.

CRediT authorship contribution statement

Wing Kai Fung: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kevin Kien Hoa Chung:** Writing – review & editing, Supervision, Project administration, Investigation, Funding acquisition.

Declarations of interest

None.

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Data availability

The authors do not have permission to share data.

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