



Autonomy as Core of Creativity and Compliance: Moderated Moderation Model of Maternal Parenting Behaviors

Zhengyan Wang & Shuyang Dong

To cite this article: Zhengyan Wang & Shuyang Dong (2019) Autonomy as Core of Creativity and Compliance: Moderated Moderation Model of Maternal Parenting Behaviors, Creativity Research Journal, 31:1, 74-82, DOI: [10.1080/10400419.2019.1577674](https://doi.org/10.1080/10400419.2019.1577674)

To link to this article: <https://doi.org/10.1080/10400419.2019.1577674>



© 2019 The Author(s). Published with license by Taylor & Francis Group, LLC.



Published online: 02 May 2019.



Submit your article to this journal [↗](#)



Article views: 79



View Crossmark data [↗](#)

Autonomy as Core of Creativity and Compliance: Moderated Moderation Model of Maternal Parenting Behaviors

Zhengyan Wang and Shuyang Dong
Capital Normal University

Autonomy is one of the core motivators of children's creativity and (non)compliance. But it is less known how children's (non)compliance links to later creative potential and how maternal parenting behaviors contribute to those links. This article, as part of a longitudinal study, tested whether preschoolers' committed compliance and self-assertion related to their potential for motor creativity and how maternal autonomy-supporting and relatedness-supporting behaviors predicted those relations. Eighty-two Chinese children (32 boys) and their families were included. At 38 months, committed compliance and self-assertion were coded from a cleanup task. Maternal autonomy-supporting and relatedness-supporting behaviors were coded from two 5-min mother-child free-plays. At 60 months, the Thinking Creativity in Action and Movement test (TCAM) was used to measure children's potential for motor creativity. Results showed that after controlling for gender and receptive language, the 38-month-olds' committed compliance negatively, and self-assertion positively, linked to creative potential at 60 months. Moderation analyses revealed that the association between self-assertion and creative potential was strengthened by maternal autonomy-supporting behavior. This moderating effect, however, was weakened by maternal relatedness-supporting behavior. But maternal parenting behaviors did not moderate the association between committed compliance and creative potential. The limitations of this study were discussed.

Researchers pay special attention to how young children's creativity develops, which, as a form of highly flexible cognitive thinking, is said to be rooted in children's self-generated solutions and early parenting (Amabile, 1996; Csikszentmihalyi, 1988). Young children first develop the autonomous orientation, then acquire the competence to initiate the self-directed thinking (Hunter, Bedell, & Mumford, 2007).

Accordingly, this study highlighted individual's autonomy as one of the essential motivators of young children's creative potential (Peng, Cherng, Chen, & Lin, 2013; Sheldon, 1995) and examined the associations between children's autonomy-oriented behaviors and creative potential from the perspective of self-determination theory (SDT; Ryan & Deci, 2000).

On the one hand, it has been reported in past literature that personal autonomy and nonconformity were two key traits of the creative personality (Kirsch, Lubart, & Houssemand, 2015; Martinsen, 2011). Children who have a sense of choice to express their ideas freely could realize their potential dispositions of innovation (Albert & Runco, 1988). According to autonomy theory, autonomy was seen as independence, self-reliance, and freedom from external control (Forman, 2007). Specifically for young children, the ability and willingness to say *no* to parents' requests are considered as an indicator of autonomy (Spitz, 1965). Young children use verbal refusal and negotiation to assert their desires of continuing exploring what interests them. When doing so, the children are self-motivated to control the outcomes of their behaviors (Dix, Stewart, Gershoff, & Day, 2007; Forman, 2007). Thus, self-assertion

Address correspondence to Shuyang Dong, Department of Developmental Psychology, Utrecht University, Utrecht 3584CS, the Netherlands.
E-mail: s.dong@uu.nl, dosuyatim1011@hotmail.com

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/hcrj.

Zhengyan Wang and Shuyang Dong, Beijing Key Lab of "Learning and Cognition", School of Psychology, Capital Normal University, Beijing, China.

Shuyang Dong is now at Department of Developmental Psychology, Utrecht University, Utrecht, the Netherlands.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

might reflect children's behavioral orientation towards autonomy in early years.

On the other hand, the important role of self-control in creativity development has been recognized recently. Dacey and Lennon (1998) differentiated two categories of self-control and one of them was relevant to creativity, which included regulated behaviors that required insight and a vision of the future. In line with those views, researchers argued that the ability to not only resist the spontaneous activation of design heuristics but also generate other solutions could support creativity development at all ages (Cassotti, Agogué, Camarda, Houdé, & Borst, 2016; Scibinetti, Tocci, & Pesce, 2011). When it comes to young children, committed compliance represents their ability of self-control—the ability of resisting the spontaneous impulsivity and displaying subdominant behaviors. Forman (2007) proposed that children's committed compliance reflected the potential to choose and to act effectively on the choice. Children pursued committed compliance wholeheartedly with positive affect because it solved the conflict of the wish to comply and the wish to be autonomous (Kochanska, Coy, & Murray, 2001). Hence, though it is abiding by the caregivers' agenda, committed compliance could also be regarded as a behavioral orientation towards autonomy in early years.

Rather than conceptualizing motivation dichotomously as extrinsic and intrinsic, SDT posed that the underlying motivation of a behavior could be decomposed from the controlled orientation (external-to-introjected) to the autonomous orientation (identified-to-intrinsic; Pelletier, Fortier, Vallerand, & Brière, 2001). According to SDT, autonomy-oriented behaviors were positively, and the behaviors that oriented toward the controlled motivation were negatively, related to creative potential (Liu et al., 2013; Peng et al., 2013; Sheldon, 1995). Regarding the empirical evidence of the association between autonomous motivation and creative potential, some cross-sectional studies have shown that the self-reported autonomous motivation was positively correlated with creativity (Liu et al., 2013; Sheldon, 1995).

But it is unknown how self-assertion and committed compliance are associated with later creative potential, as they might represent two different autonomy-oriented behaviors. In addition, it has been rare in past research to test the longitudinal relation of autonomy-oriented behavior and creative potential at early ages. Because, theoretically, both committed compliance and self-assertion were autonomy-oriented behaviors, they were expected to be positively related to creative potential in the present study.

Apart from the motivation underlying the self-generated creative thoughts, environmental factors also scaffold the early development of creativity. SDT posits that individuals have essential psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2000) and family factors that fulfill children's basic psychological needs might facilitate children's creativity (Moltafet,

Firoozabadi, & Pour-Raisi, 2018). An autonomy-supportive family environment encourages more flexibility and openness. In turn, the flexible thinking contributes to active processing and creative performance (Moltafet et al., 2018; Weinstein, Hodgins, & Ryan, 2010). For young children, parenting behaviors are one of the most important factors that influence their creativity development (Deng, Wang, & Zhao, 2016; Runco & Albert, 2005). Maternal autonomy-supporting behavior, therefore, was first highlighted as a critical promoter of young children's creativity (Gagné, 2003; Grolnick, Gurland, DeCoursey, & Jacob, 2002; Liu et al., 2013).

Previous studies have found a positive effect of maternal autonomy-supporting behavior on children's creative potential (Grolnick et al., 2002; Niu, 2007). Autonomy-supportive mothers scaffold children's cognitive abilities by giving choices, acknowledging children's feelings, and stimulating children to initiate or maintain autonomy-oriented activities (Gagné, 2003). To facilitate continuous curiosity, mothers should encourage children to manipulate some parts of their world for themselves (Albert & Runco, 1988). Thus, maternal autonomy-supporting behavior was hypothesized to be positively associated with children's creative potential.

Furthermore, it was possible that maternal autonomy-supporting behavior played a moderating role. Situational autonomy provided individuals with a sense of self-determination and freedom of choice, which facilitated the experience of being an initiator of one's own behaviors and ideas (Xiao, Wang, Chen, Zheng, & Chen, 2015). As a type of situational autonomy, maternal autonomy-supporting behavior might fuel children's autonomous motivation to express themselves in an imaginative way (Gagné, 2003; Grolnick et al., 2002). This indicated that maternal autonomy-supporting behavior might strengthen the associations between autonomy-oriented behaviors and creative potential. One study showed that situational autonomy strengthened the effect of induced mood on creativity (Xiao et al., 2015), but another study found that maternal autonomy-supporting behavior did not moderate the relation of adolescents' autonomous motivation and creativity (Liu et al., 2013). However, no conclusive explanation was given to those mixed findings and researchers did suggest that other parenting behaviors might also play a role (Liu et al., 2013).

Maternal relatedness-supporting behavior might be a candidate of those parenting behaviors because an autonomy-supporting behavior could also impact an individual's psychological need for relatedness—the need to feel belongingness and connectedness with others (Ryan & Deci, 2000; Weinstein et al., 2010). A study showed that adolescents' exhibition of autonomy and relatedness was consistently positively linked to their ego-development (Allen, Hauser, Bell, & O'Connor, 1994). Young children effectively explore and act in the world on the condition that they are tied to caregivers' presence and support (Forman, 2007). No study, however, has

examined how maternal relatedness-supporting behavior influenced the relations among children's autonomy-oriented behaviors, creative potential, and maternal autonomy-supporting behavior. Based on the culture-specific perspective in SDT, some relevant findings have shown the possibility of a moderating effect. It has been found that maternal relatedness-supporting behavior interacted with the 2-year-olds' autonomy in predicting sociability 2 years later (Liu, Chen, Zheng, Chen, & Wang, 2009). Although sociability was found to be positively related to creative potential in Western cultures (e.g., Mahon, Yarcheski, & Yarcheski, 1996), it was negatively associated with creativity in Eastern cultures (e.g., Lim & Smith, 2008).

SDT suggests that although the basic psychological needs are common to all humans, cultures with various values and practices are differentially apt to fulfill these needs (Chirkov, Ryan, & Willness, 2005). The socialization ideology of relatedness is endorsed by Chinese parents because they shoulder the cultural responsibilities to educate their children about the importance of seeking and maintaining emotional closeness and physical proximity (Liu et al., 2005). Unlike the socialization goals of autonomy and independence shared by Western parents, Chinese parents might use relatedness-supporting behaviors to assist children to affiliate with standard rules and social norms. This socialization ideology of relatedness might obstacle the pathway from children's autonomy to cognitive abilities, such as deep thinking, analytical thinking, and divergent thinking. As a result, Chinese children's creativity is undermined in the long-run (Deng et al., 2016). Thus, contrast to autonomy-supporting behavior, maternal relatedness-supporting behavior was hypothesized to weaken the association of autonomy-oriented behaviors and creative potential in Chinese children.

Last but not the least, because young children were said to express their thoughts mainly through the kinesthetic modality (Memmert, 2007; Pagona & Costas, 2008), the TCAM test was chosen in this study as a developmentally appropriate measurement of preschoolers' potential for motor creativity (Torrance, 1981). The TCAM is suitable for children aged from 3 to 8 because not only the verbal responses but also the responses of movements are encouraged and scored (Cooper, 1991). In line with other divergent thinking tests, the TCAM measures fluency (how many ideas there are), originality (how unusual the ideas are), and imagination (what children generate about their novel experience). Previous studies have demonstrated that the TCAM was a reliable measurement of preschoolers' creative potential (Cooper, 1991; Zachopoulou, Makri, & Pollatou, 2009). The moderate, but significant, correlations in the scores of fluency and originality were found between the TCAM and the other tests (Scibinetti et al., 2011). Although imagination is not easy to define or measure quantitatively, this dimension should be included as

creative imagination peaks during preschool years and preschoolers enthusiastically express their imaginative ideas (Diener, Wright, Brehl, & Black, 2016).

METHOD

Participants

All the participants participating in a 7-wave longitudinal study were recruited from the urban areas of Beijing, China. The previous study primarily focused on the development of children's committed compliance in toddlerhood from Wave 3 to Wave 5 (Dong, Wang, Lu, Liang, & Xing, 2018), whereas data from 82 participants (32 boys) on Wave 5 (W5) and Wave 6 (W6) assessments are reported in this study. Twenty-eight percent of the total sample was omitted due to attrition (56%; e.g. moved to other cities, parents were too busy), unwillingness to participate in the laboratory visits (38%; e.g. only the data on questionnaires were available), or children's noncooperation in the cleanup task and the TCAM (6%). The Mann-Whitney U test showed that maternal educational status was lower in those who were excluded, $Z = 2.09$, $p = .04$. A Chi-square test showed that more boys excluded, and more girls included, $\chi^2(1) = 7.90$, $p < .01$. But all the maternal demographic characteristics were not related to the variables of interest in this study ($ps > .05$).

Procedure

At W5 ($M_{age} = 37.81$ months, $SD = 1.03$), the laboratory assessment lasted for 2 to 2.5 hr, including two 5-min mother-child free-plays, a cleanup task about putting away blocks into a box, and a receptive language test. At W6 ($M_{age} = 60.35$ months, $SD = 0.73$), children participated in a 2.5-hr assessment in the laboratory, during which, after a warm-up session, one female experimenter guided each child to complete a series of activities measuring their potential for motor creativity. The mothers signed the informed consent and debriefed any questions. After each wave of the assessment, the family received an elaborate gift.

Measures

Committed compliance and self-assertion

Children's behaviors in the W5 cleanup task were coded for every 10-s segment. Based on the standardized coding system (Kochanska & Aksan, 1995), six mutually exclusive categories were used: (a) committed compliance, (b) situational compliance, (c) passive noncompliance, (d) self-assertion, (e) defiance, and (f) other behaviors or time out. This study focused on children's committed compliance (the child continuously cleaned up the blocks with wholehearted willingness) and self-

assertion (the child's simple refusal to maternal requests and the attempts to negotiate). Thirty percent of the video samples were randomly selected to establish inter-rater consistency of two coders ($\kappa = .84$). The proportion scores of committed compliance and self-assertion were created by dividing the frequency of each category by the total frequency of the coded segments.

Maternal autonomy-supporting and relatedness-supporting behaviors

The standardized coding system was used via an event sampling and episodic approach (see Liu et al., 2009, for more details). Two W5 mother-child free-plays were tallied to 10 min (600 s). Maternal verbal and nonverbal behaviors were coded into four broad categories: (a) autonomy-supporting, (b) autonomy-suppressing, (c) relatedness-supporting, and (d) relatedness-suppressing. Maternal autonomy-supporting/autonomy-suppressing behaviors were composed of the frequencies of behaviors that encouraged/discouraged a child to (a) initiate self-directed activities, (b) maintain self-directed activities, or (c) make his/her own decision. Maternal relatedness-supporting/relatedness-suppressing behaviors consisted of the frequencies of behaviors that encouraged/discouraged a child to (a) cooperate with the mother, (b) express emotional communication, or (c) seek proximity with the mother. Two master students coded the videos. Based on 20% of the videos, the kappa for the overall coding was .95.

For data reduction, all the frequencies of four broad categories were first standardized. To deemphasize the influence of autonomy-suppressing behavior, the standardized score of autonomy-supporting behavior subtracted the standardized score of autonomy-suppressing behavior. Its outcome was further standardized. The same data reduction procedure was used for maternal relatedness-supporting/relatedness-suppressing behaviors. Eventually, a positive score represented maternal propensity of using autonomy-supporting behavior or relatedness-supporting behavior.

Motor creativity

The TCAM (Torrence, 1981) was used to measure children's potential for motor creativity at W6. After systematic training and discussion with the trainer, two experimenters made some appropriate adaptations for the scoring manual when translating it from English to Chinese. This test was composed of four activities. Children's performance in the first, third, and fourth activity was scored for fluency and originality, and their performance in the second activity was scored for imagination (Zachopoulou & Makri, 2005). Fluency was scored by summing up the numbers of alternative ways to walk across the room in the first activity, to put a paper cup into a trashcan in the third activity, and to use

a paper cup to make something unique in the fourth activity. Based on the scoring manual, originality was calculated by adding up the score of each behavior in these three activities. In addition, imagination was indexed by the ratings (ranging from 1 = *no movement* to 5 = *excellent imitation*) of children's performance on six descriptive scenarios (Zachopoulou et al., 2009).

Two raters coded the videotapes and the kappas based on 20% of the tapes were .90 for fluency, .92 for originality, and .92 for imagination, correspondingly. Three components of creative potential were highly correlated (r s from .54 to .93, p s < .01). To reduce the risk of multicollinearity, a principal components analysis was conducted to create one factor (named *motor creativity*), which has explained 79.46% of the total variance.

Receptive language

To control for children's cognitive ability and receptive language, the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997) was administered to the child individually at W5. The child was instructed to point out the picture that matched the word the experimenter told in a display of four pictures. If the child missed eight items in a set of 12 items, the test stopped, and the raw score was computed by subtracting the number of errors from the number of the ceiling item. Age-adjusted standardized scores were converted from the raw scores and further used as a covariate in the analyses.

RESULTS

Participants who participated in at least one assessment of W5 or W6 were included in this study, resulting in 22% of the missing data at W5 and 8.5% at W6. The assumption of missing completely at random (MCAR) was tenable, suggested by a nonsignificant Little's MCAR test, $\chi^2(31) = 25.62, p = .74$ (Little, 1988). Hence, the missing values were imputed by the expectation-maximization (EM) algorithm (Enders, 2001). According to Fisher r -to- z transformation tests, EM imputation did not cause significant changes in the correlation coefficients. The means, standard deviations (SD), and correlation coefficients among EM-imputed variables were displayed in Table 1.

Preliminary results showed that self-assertion was positively, and committed compliance was negatively, related to motor creativity, either before or after controlling for children's gender and receptive language. Additionally, motor creativity was associated with maternal relatedness-supporting behavior at a marginally significant level, $r = .19, p = .08$, but not with autonomy-supporting behavior, $r = -.01, p = .93$. Although motor creativity was not related to gender or receptive language, these two variables were controlled for in the moderation models because both gender ($r = .24, p = .03$) and receptive language ($r = .22, p < .05$) were significantly associated with committed compliance.

By using the Hayes Process v2.13 (Hayes, 2013) with the bootstrapping strategy ($N = 1,000$), the moderating effects of maternal autonomy-supporting behavior were first examined. The results showed that maternal autonomy-supporting behavior alone did not moderate the relations between motor creativity and either committed compliance or self-assertion. Next, two moderated moderation models were conducted, in which maternal relatedness-supporting behavior was added to the model as another moderator. As shown in Table 2, in the model that motor creativity was predicted by self-assertion, the 3-way interaction effect (autonomy-supporting behavior \times relatedness-supporting behavior \times self-assertion) was significant, $B = -4.20$, 95% CI = $[-7.58, -0.83]$. Because the 2-way interaction of maternal relatedness-supporting behavior \times self-assertion

exerted a negative effect, $B = -4.78$, 95% CI = $[-9.26, -0.30]$, and maternal autonomy-supporting behavior \times self-assertion displayed a positive effect in this model, $B = 7.99$, 95% CI = $[2.60, 13.37]$, the 3-way interaction could be seen as maternal relatedness-supporting behavior weakened the strengthening effect of maternal autonomy-supporting behavior.

Based on this 3-way interaction, the regions of significance were depicted by using the Johnson-Neyman technique. The results indicated that the conditional moderating effect of self-assertion \times autonomy-supporting behavior was significant when maternal relatedness-supporting behavior was lower than 0.70, which covered 68.29% of the score ranges of relatedness-supporting behavior. The minimum and the maximum regions of significance were graphically illustrated in Figures 1 and 2, respectively. Figure 1 showed that maternal autonomy-supporting behavior strengthened the positive relation between self-assertion and motor creativity. Compared with Figure 1, the significant region in Figure 2 was not only larger in the positive zone, but also including a zone of the negative relationships. Figures 1 and 2 indicated that when maternal relatedness-supporting behavior was moderate, autonomy-supporting behavior moderately strengthened the positive effect of self-assertion on motor creativity. Although, when maternal relatedness-supporting behavior was rare, the positive effect of self-assertion was strongly strengthened by autonomy-supporting behavior. But if maternal autonomy-supporting behavior was also quite scarce, self-assertion could negatively predict motor creativity. However, as shown in Table 2, none of the interactions among committed compliance, maternal autonomy-supporting behavior, and relatedness-supporting behavior predicted motor creativity significantly.

TABLE 1
Means (M), Standard Deviations (SD) and correlations among variables

Variables	1	2	3	4	5	6	7
1. Committed compliance	—	-.46**	.03	-.34**	-.39**		
2. Self-assertion	-.49**	—	-.06	.29**	.26*		
3. AS	.06	-.08	—	.07	-.01		
4. RS	-.33**	.30**	.07	—	.19 [†]		
5. Motor creativity	-.37**	.25*	-.01	.19 [†]	—		
6. Receptive language	.22*	-.15	.06	-.04	-.06	—	
7. Gender	.24*	-.13	.09	-.02	.05	-.00	—
M	0.76	0.05	—	—	—	94.20	—
SD	0.24	0.08	—	—	—	17.21	—

Notes: The left lower zone exhibits the correlations and means (SD) of variables. The upper right zone exhibits the partial correlations controlling for children's gender and receptive language. AS = Maternal autonomy-supporting behavior, RS = Maternal relatedness-supporting behavior.

[†] $p < .10$, * $p < .05$, ** $p < .01$.

TABLE 2
Children's self-assertion or committed compliance, AS, and RS predict motor creativity

Predictors	IV: self-assertion			IV: committed compliance		
	B	t	95%CI	B	t	95%CI
Gender	0.02	0.09	$[-0.46, 0.50]$	0.24	0.95	$[-0.26, 0.74]$
Receptive language	0.001 ^a	0.01	$[-0.02, 0.02]$	0.002 ^a	0.24	$[-0.01, 0.02]$
AS	-0.09	-0.84	$[-0.32, 0.13]$	0.54	1.00	$[-0.53, 1.61]$
IV	9.20	3.13**	[3.34, 15.06]	-1.92	-3.20**	[-3.11, -0.72]
AS \times IV	7.99	2.96**	[2.60, 13.37]	-0.66	-1.12	$[-1.82, 0.51]$
RS	0.08	0.74	$[-0.14, 0.30]$	-0.43	-0.99	$[-1.29, 0.44]$
RS \times IV	-4.78	-2.13*	[-9.26, -0.30]	0.58	1.16	$[-0.41, 1.57]$
AS \times RS	0.04	0.51	$[-0.11, 0.18]$	-0.07	-0.16	$[-0.94, 0.80]$
AS \times RS \times IV	-4.20	-2.48*	[-7.58, -0.83]	0.08	0.16	$[-0.85, 1.00]$
	$R^2 = .20, F(9, 72) = 3.31, p < .01$			$R^2 = .20, F(9, 72) = 2.20, p = .03$		

Notes: IV = Independent variable, AS = Maternal autonomy-supporting behavior, RS = Maternal relatedness-supporting behavior.

* $p < .05$, ** $p < .01$.

^a Three decimal places are reported for the relatively small regression coefficients.

DISCUSSION

A review of the literature indicated that this was the first prospective study that examined the longitudinal relations between committed compliance/self-assertion and creative potential in young children. This study also comprehensively tested how maternal autonomy-supporting and relatedness-supporting behaviors impacted those longitudinal relations. The results showed that self-assertion was positively, and committed compliance was negatively, associated with later creative potential. Besides, maternal parenting behaviors displayed a moderated moderation effect on the association between self-assertion and creative potential. Maternal autonomy-supporting behavior strengthened the association between self-assertion and creativity, but this moderating effect was weakened by maternal relatedness-supporting behavior.

These finding was generally consistent with previous results that individuals with higher creative personality exhibited less conformity to authority and social norms (Albert & Runco, 1988). Additionally, this study partially demonstrated the assumption based on SDT that autonomy-oriented behavior, more specifically, young children's self-assertion, positively predicted creative potential. SDT posed that the dynamics of an individual's motivation for acting could be applied to understand the creative performance in the real-life contexts (Weinstein et al., 2010). There are two possible explanations of why young children

with more self-assertion had higher creative potential. First, it is possible that they were more intrinsically rewarded and interested in the assessment of the potential for motor creativity. Second, they might be identified with stating what they thought and more daring to do so. Because children's performance on the TCAM was influenced by their tendencies of enjoying the challenges and expressing own solutions, the essence of autonomy underlying self-assertion and motor creativity was more similar.

By contrast, the children with more committed compliance might choose to follow the standard rules and find it hard to "think out of the box." (Wang & Greenwood, 2013) The behavioral tendency of saying *yes* to rules might orient them to internalize the existing solutions, instead of expressing something new. This, perhaps, explains why committed compliance was negatively related to creative potential. However, it cannot be concluded that self-control (committed compliance as one form in early years) is only negatively associated with creativity. More studies are needed to comprehensively examine how other forms of self-control influence creativity at the other ages, as the previous study showed that, at least for adults, inhibitory control of spontaneous ideas was important for the generation of new ideas (Cassotti et al., 2016).

For the influences of maternal parenting behaviors, a special attention was paid to maternal autonomy-supporting behavior and relatedness-supporting behavior. Based on SDT, maternal autonomy-supporting behavior was expected to predict

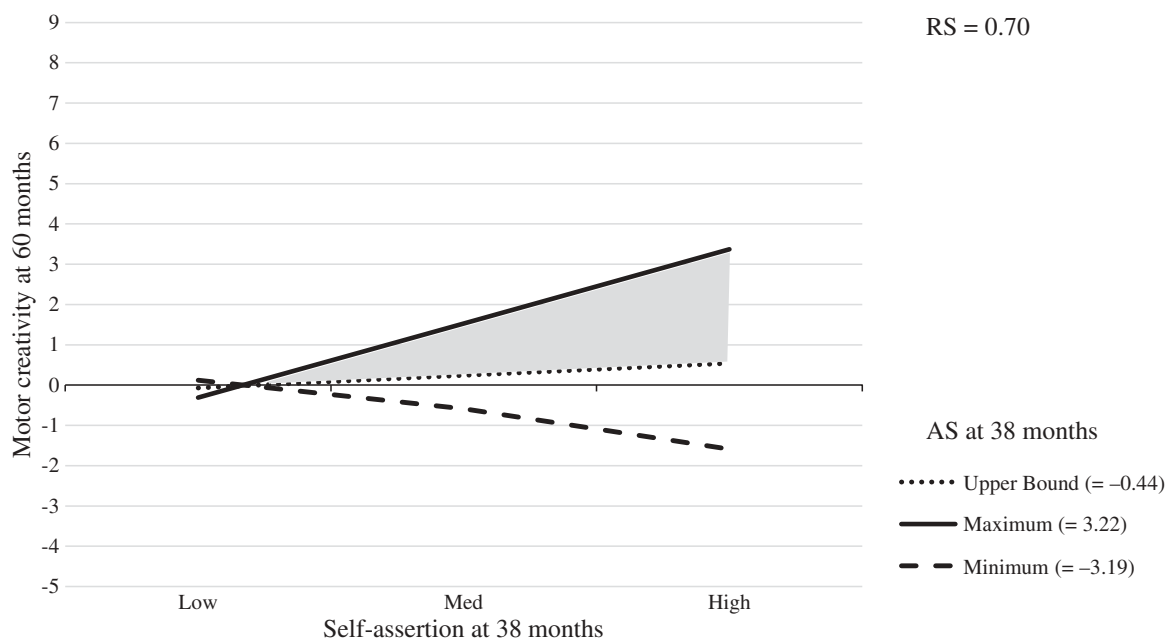


FIGURE 1 AS moderates the relation of self-assertion and motor creativity when $RS = 0.70$. Note: AS = Maternal autonomy-supporting behavior, RS = Maternal relatedness-supporting behavior. The dashed line represents the nonsignificant simple slope of the minimum AS score. The solid line represents the significant simple slope of the maximum AS score. The dotted line represents the upper bound of the region of significance. The shaded zone represents the region of significance.

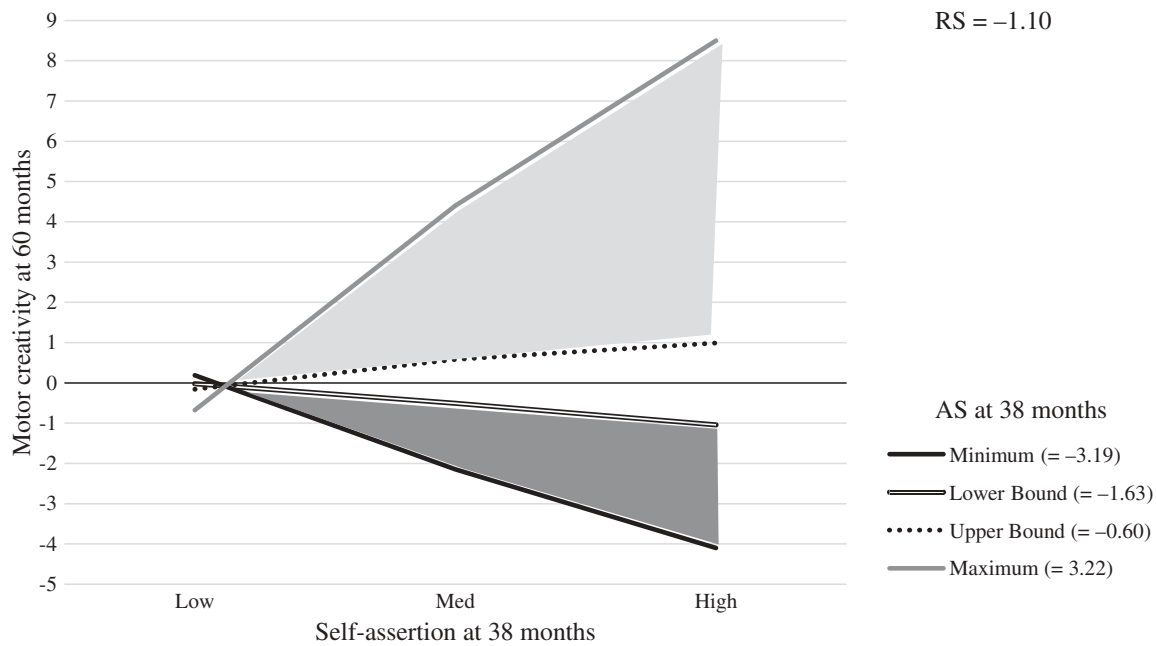


FIGURE 2 AS moderates the relation of self-assertion and motor creativity when $RS = -1.10$. Note: AS = Maternal autonomy-supporting behavior, RS = Maternal relatedness-supporting behavior. The black solid line represents the significant simple slope of the minimum AS score. The compound line represents the lower bound of the region of significance. The dotted line represents the upper bound of the region of significance. The grey solid line represents the significant simple slope of the maximum AS score. The light-shaded zone represents the positive region of significance and the dark-shaded zone represents the negative region of significance.

children's creative potential positively. Surprisingly, it was maternal relatedness-supporting behavior, rather than autonomy-supporting behavior, that had a trend to relate to children's creative potential. This result was contradicted to previous results reporting a positive relationship between maternal autonomy-supporting behavior and Chinese adolescent's creative potential (Liu et al., 2013; Niu, 2007). The age difference is a possible explanation of the contradictory findings.

For Chinese preschoolers in this study, the need for relatedness was quite important because preschoolers still needed caregivers' presence if they wanted to willingly transform external information into their personally endorsed ideas. It is possible that by facilitating active integration and enjoyment of interacting with others in cognitive activities, maternal relatedness-supporting behavior could promote children's creative potential. Thus, relatedness-supporting behavior exhibited a trend of the positive association with creative potential in this study. However, for the adolescents in the other studies, the need for autonomy peaked at their ages. The developmental relevance of maternal autonomy-supporting behavior was essential, and this behavior directly linked to their creative potential.

Besides, the moderating effects of maternal parenting behaviors were found in this study. First, similar to the

previous study (Liu et al., 2013), the two-way interactions (maternal autonomy-supporting behavior \times committed compliance/self-assertion) alone did not predict creative potential. But because SDT also stressed on the cultural diversity in the fulfillment of basic psychological needs (Chirkov et al., 2005), maternal relatedness-supporting behavior was conceptualized as a candidate moderator that helped to explain those nonsignificant 2-way interaction effects.

In the moderated moderation models, one three-way interaction (self-assertion \times autonomy-supporting behavior \times relatedness-supporting behavior) significantly predicted children's creative potential. After adding maternal relatedness-supporting behavior to the model, the two-way interaction of maternal autonomy-supporting behavior and self-assertion displayed a positive effect on motor creativity. Consistent with the expectations, maternal autonomy-supporting behavior promoted the transformation from children's self-assertion to creative potential; this strengthening effect was weakened by maternal relatedness-supporting behavior. According to the depicted regions of significance, a balance of maternal relatedness-supporting behavior at a moderate level and autonomy-supporting behavior at a higher level might be optimal for scaffolding Chinese children's creativity development from an early autonomy-oriented behavior. But these findings also

revealed that when maternal relatedness-supporting behavior was scarce, once maternal autonomy-supporting behavior decreased, children were at risk that self-assertion negatively predicted creative potential. Overall, those results indicated that the families that balanced children's needs for autonomy, self-expression, and exploration in a safe environment may be ideal for the early development of children's creativity (Lim & Smith, 2008).

LIMITATIONS

This study has limitations. First, the sample size was moderate and all the children were from urban China. Although the observational design and the bootstrapping method guaranteed the rigors of the study, a larger sample with participants from diverse backgrounds can help to confirm and generalize our findings. Second, apart from the TCAM, more domain-specific and task-specific assessments of creative potential are advised to be used in future research (see also Runco & Acar, 2012). Besides, how the other indicators of autonomy or self-control are associated with creative potential should be investigated comprehensively. This may expand the knowledge of how to apply SDT into practical instructions and techniques for creativity education as well as how to facilitate the development of self-control and creativity simultaneously.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

This work was supported by the National Science Foundation of China under Grant number 31470994. We thank Qun Jiang and Huibin Kang for their valuable help with data collection and the coding. We also thank all the children, parents, and master students who participated in or contributed to this longitudinal project

REFERENCES

- Albert, R. S., & Runco, M. A. (1988). Independence and the creative potential of gifted and exceptionally gifted boys. *Journal of Youth and Adolescence, 18*(3), 221–230. doi:10.1007/BF02139037.
- Allen, J. P., Hauser, S. T., Bell, K. L., & O'Connor, T. G. (1994). Longitudinal assessment of autonomy and relatedness in adolescent-family interactions as predictors of adolescent ego development and self-esteem. *Child Development, 65*(1), 179–194. doi:10.1111/j.1467-8624.1994.tb00743.x.
- Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.
- Cassotti, M., Agogu e, M., Camarda, A., Houd e, O., & Borst, G. (2016). Inhibitory control as a core process of creative problem solving and idea generation from childhood to adulthood. *New Directions for Child & Adolescent Development, 151*, 61–72. doi:10.1002/cad.20153.
- Chirkov, V. I., Ryan, R. M., & Willness, C. (2005). Cultural context and psychological needs in Canada and Brazil testing a self-determination approach to the internalization of cultural practices, identity, and well-being. *Journal of Cross-Cultural Psychology, 36*(4), 423–443. doi:10.1177/0022022105275960.
- Cooper, E. (1991). A critique of 6 measures for assessing creativity. *Journal of Creative Behavior, 25*(3), 194–204. doi:10.1002/j.2162-6057.1991.tb01370.x.
- Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* (pp. 325–339). New York, NY: Cambridge University Press.
- Dacey, J. S., & Lennon, K. H. (1998). *Understanding creativity: The interplay of biological, psychological, and social factors*. San Francisco, CA: Jossey-Bass.
- Deng, L., Wang, L., & Zhao, Y. (2016). How creativity was affected by environmental factors and individual characteristics: A cross-cultural comparison perspective. *Creativity Research Journal, 28*(3), 357–366. doi:10.1080/10400419.2016.1195615.
- Diener, M. L., Wright, C., Brehl, B., & Black, T. (2016). Socioemotional correlates of creative potential in preschool age children: Thinking beyond student academic assessments. *Creativity Research Journal, 28*(4), 450–457. doi:10.1080/10400419.2016.1229975.
- Dix, T., Stewart, A. D., Gershoff, E. T., & Day, W. H. (2007). Autonomy and children's reactions to being controlled: Evidence that both compliance and defiance may be positive markers in early development. *Child Development, 78*(4), 1204–1221. doi:10.1111/j.1467-8624.2007.01061.x.
- Dong, S., Wang, Z., Lu, S., Liang, X., & Xing, X. (2018). Children's temperament and maternal behavioral control: Origins of heterogeneity in developmental trajectories of committed compliance from infancy to age 3. *Journal of Child and Family Studies, 27*(8), 2668–2677. doi:10.1007/s10826-018-1101-9.
- Dunn, L. M., & Dunn, L. (1997). *Peabody Picture Vocabulary Test (PPVT) (3rd ed.)*. Circle Pines, MN: AGS Publishers.
- Enders, C. K. (2001). A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modeling, 8*(1), 128–141. doi:10.1207/S15328007SEM0801_7.
- Forman, D. R. (2007). Autonomy, compliance, and internalization. In C. A. Brownell & C. B. Kopp (Eds.), *Socioemotional development in the toddler years: Transitions and transformations* (pp. 285–319). New York, NY: Guilford.
- Gagn e, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion, 27*(3), 199–223. doi:10.1023/A:1025007614869.
- Grolnick, W. S., Gurland, S. T., DeCoursey, W., & Jacob, K. (2002). Antecedents and consequences of mothers' autonomy support: An experimental investigation. *Developmental Psychology, 38*(1), 143–155. doi:10.1037/0012-1649.38.1.143.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2007). Climate for creativity: A quantitative review. *Creativity Research Journal, 19*(1), 69–90. doi:10.1080/10400410709336883.

- Kirsch, C., Lubart, T., & Houssemand, C. (2015). Creative personality profile in social sciences: The leading role of autonomy. *Creativity: Theories-Research-Applications*, 2(2), 180–211. doi:10.1515/ctra-2015-0020.
- Kochanska, G., & Aksan, N. (1995). Mother-child mutually positive affect, the quality of child compliance to requests and prohibitions, and maternal control as correlates of early internalization. *Child Development*, 66(1), 236–254. doi:10.1111/j.1467-8624.1995.tb00868.x.
- Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development*, 72(4), 1091–1111. doi:10.1111/1467-8624.00336.
- Lim, S., & Smith, J. (2008). The structural relationships of parenting style, creative personality, and loneliness. *Creativity Research Journal*, 20(4), 412–419. doi:10.1080/10400410802391868.
- Little, R. J. A. (1988). Missing data adjustments in large surveys. *Journal of Business & Economic Statistics*, 6(3), 287–296. doi:10.2307/1391878.
- Liu, G., Zhang, S., Zhang, J., Lee, C., Wang, Y., & Brownell, M. (2013). Autonomous motivation and Chinese adolescents' creative thinking: The moderating role of parental involvement. *Creativity Research Journal*, 25(4), 446–456. doi:10.1080/10400419.2013.843401.
- Liu, M., Chen, X., Rubin, K., Zheng, S., Cui, L., Li, D., ... Wang, L. (2005). Autonomy- vs. connectedness-oriented parenting behaviours in Chinese and Canadian mothers. *International Journal of Behavioral Development*, 29(6), 489–495. doi:10.1177/01650250500147063.
- Liu, M., Chen, X., Zheng, S., Chen, H., & Wang, L. (2009). Maternal autonomy- and connectedness-oriented parenting behaviors as predictors of children's social behaviors in China. *Social Development*, 18(3), 671–689. doi:10.1111/j.1467-9507.2008.00501.x.
- Mahon, N. E., Yarcheski, T. J., & Yarcheski, A. (1996). Loneliness and creativity in adolescents. *Psychological Reports*, 79(1), 51–56. doi:10.2466/pr0.1996.79.1.51.
- Martinsen, Ø. L. (2011). The creative personality: A synthesis and development of the creative person profile. *Creativity Research Journal*, 23(3), 185–202. doi:10.1080/10400419.2011.595656.
- Memmert, D. (2007). Can creativity be improved by an attention-broadening training program? An exploratory study focusing on team sports. *Creativity Research Journal*, 19(2–3), 281–291. doi:10.1080/10400410701397420.
- Moltafet, G., Sadati Firoozabadi, S. S., & Pour-Raisi, A. (2018). Parenting style, basic psychological needs, and emotional creativity: A path analysis. *Creativity Research Journal*, 30(2), 187–194. doi:10.1080/10400419.2018.1446748.
- Niu, W. (2007). Individual and environmental influences on Chinese student creativity. *Journal of Creative Behavior*, 41(3), 151–175. doi:10.1002/j.2162-6057.2007.tb01286.x.
- Pagona, B., & Costas, M. (2008). The development of motor creativity in elementary school children and its retention. *Creativity Research Journal*, 20(1), 72–80. doi:10.1080/10400410701842078.
- Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brièrè, N. M. (2001). Associations among perceived autonomy support, forms of self-regulations, and persistence: A prospective study. *Motivation and Emotion*, 25(4), 279–306. doi:10.1023/A:1014805132406.
- Peng, S. L., Cherng, B. L., Chen, H. C., & Lin, Y. Y. (2013). A model of contextual and personal motivations in creativity: How do the classroom goal structures influence creativity via self-determination motivations? *Thinking Skills and Creativity*, 10(3), 50–67. doi:10.1016/j.tsc.2013.06.004.
- Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity Research Journal*, 24(1), 66–75. doi:10.1080/10400419.2012.652929.
- Runco, M. A., & Albert, R. S. (2005). Parents' personality and the creative potential of exceptionally gifted boys. *Creativity Research Journal*, 17(4), 355–367. doi:10.1207/s15326934crj1704_7.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. doi:10.1037/0003-066X.55.1.68
- Scibinetti, P., Tocci, N., & Pesce, C. (2011). Motor creativity and creative thinking in children: The diverging role of inhibition. *Creativity Research Journal*, 23(3), 262–272. doi:10.1080/10400419.2011.595993.
- Sheldon, K. M. (1995). Creativity and self-determination in personality. *Creativity Research Journal*, 8(1), 25–36. doi:10.1207/s15326934crj0801_3.
- Spitz, R. A. (1965). *The first year of life: A psychoanalytic study of normal and deviant development of object relations*. New York, NY: International University Press.
- Torrance, E. P. (1981). *Thinking creatively in action and movement*. Bensenville, IL: Scholastic Testing Service.
- Wang, B., & Greenwood, K. M. (2013). Chinese students' perceptions of their creativity and their perceptions of western students' creativity. *Educational Psychology*, 33(5), 628–643. doi:10.1080/01443410.2013.826345.
- Weinstein, N., Hodgins, H. S., & Ryan, R. M. (2010). Autonomy and control in dyads: Effects on interaction quality and joint creative performance. *Personality and Social Psychology Bulletin*, 36(12), 1603–1617. doi:10.1177/0146167210386385.
- Xiao, F., Wang, L., Chen, Y., Zheng, Z., & Chen, W. (2015). Dispositional and situational autonomy as moderators of mood and creativity. *Creativity Research Journal*, 27(1), 76–86. doi:10.1080/10400419.2015.992683.
- Zachopoulou, E., & Makri, A. (2005). A developmental perspective of divergent movement ability in early young children. *Early Child Development and Care*, 175(1), 85–95. doi:10.1080/0300443042000230401
- Zachopoulou, E., Makri, A., & Pollatou, E. (2009). Evaluation of children's creativity: Psychometric properties of Torrance's "thinking creatively in action and movement" test. *Early Child Development and Care*, 179(3), 317–328. doi:10.1080/03004430601078669.