Good can be stronger than bad: the daily relationship among maternal warmth, mother-teen conflict and adolescents' self-esteem

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Abstract

Self-esteem is associated with adaptive adolescent outcomes but tends to decline in adolescence. Parent-teen warmth has been linked to concurrent increases in adolescents' self-esteem while adolescents' conflict with parents is detrimental to their self-esteem in cross-sectional or longitudinal studies. However, it is unknown how adolescents experience of maternal warmth and conflict with mothers are correlated with their daily self-esteem, and whether these associations vary in adolescents' gender, age and family subjective socioeconomic status (SES) from the perspective of Process-Person-Context-Time (PPCT) theory. To address this gap, 293 adolescents ($M_{age} = 13.88$ years, $SD = .62$) were recruited from a school, reporting their daily experience of maternal warmth, conflict with mothers and self-esteem by answering checklists for up to 7 days. Multilevel analysis showed that adolescents reported significantly higher self-esteem on days they experienced more warmth or less conflict with mothers than usual. Moreover, maternal warmth was linked to next-day self-esteem positively, yet mother-teen conflict not shown this spill-over effect. Gender, age and subjective SES did not moderate all the daily associations among mother-teen warmth, conflict and self-esteem. Findings suggest that mother-teen interactions play both protective and detrimental role in adolescents' daily self-image and that "good" interaction goes a longer way than "bad" one.

Keywords Self-esteem · Maternal warmth · Mother-teen conflict · PPCT theory

Introduction

Self-esteem is the core of self and reflects one's global evaluation or appraisal of his or her value (Rosenberg, 1965). The findings from existing literature show that self-esteem is closely associated with a variety of important life outcomes. For instance, individuals who exhibit high levels of self-esteem are more likely to engage in better interpersonal relationship (Cameron & Granger, 2019) and show better academic performance (McClure et al., 2010). Besides, longitudinal research shows self-esteem negatively predicts later psychological problems like depression (Masselink et al., 2018) and anxiety (Sowislo & Orth, 2013).

However, although individuals usually show relatively high self-esteem in their childhood, their self-esteem usually decreases when they enter adolescence (Chung et al., 2017; Robins & Trzesniewski, 2005). The apparent importance and long-term impact of self-esteem provoke the question of what factors influence (both positively and negatively) individuals' self-esteem in their adolescence. A large body of research has claimed that parenting is a vital influencing factor to individuals' self-esteem development (Khaleque, 2013; Orth, 2018). Therefore, based on Process-Person-Context-Time (PPCT) Model (Bronfenbrenner, 1995), the current study using a daily diary method aims at examining associations between daily self-esteem and perceived maternal warmth and mother-teen conflict.

The state component of self-esteem

Self-esteem was recognized as a relatively stable and trait-like component for a long time. However, subsequent evidence indicates that self-esteem is less steady than other personality traits (e.g., extroversion) (Conley, 1984). More recent evidence suggests that self-esteem should be

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considered as a construct comprising both stable (trait-like) and variable (state-based) components (Anusic & Schimmack, 2016). And considerable variation has been found in daily self-esteem within one week among adolescents (Fuller-Tyszkiewicz et al., 2015). The temporal fluctuations of self-esteem are believed to reflect situation-based, temporary self-worthiness (Kernis, 2005). What is more, the state part of self-esteem, over and above the role of global self-esteem, is related to multiple psychological adjustments such as depression (Zeigler-Hill & Wallace, 2012), envy (Vrabel et al., 2018) and perceived aggression (Zeigler-Hill et al., 2014).

Although these findings have recognized the importance of state self-esteem, little is known about the within-person correlations between mother-teen relationships and self-esteem. Self-esteem research and theory have generally emphasized that adolescents' experience of parental warmth and conflict with parents as influencing factors of their trait self-esteem (Davis et al., 2018; Kiviruusu et al., 2014; Leung Ling et al., 2020). These between-person associations at the dispositional level provide initial evidence for proposing the within-person relationships among maternal warmth, mother-teen conflict and self-esteem at daily level. However, considering the trait and state components of self-esteem are independent (Nezlek, 2001), it is unknown whether adolescents' daily self-esteem covaries with mother-teen interactions.

Mother-teen interactions and teenagers' self-esteem under PPCT Model's perspective

Maternal warmth and mother-teen conflict are central to adolescents' daily self-esteem adherent to PPCT model. This model provides a framework for understanding development by proposing that individuals' development is driven by proximal process, which refers to the reciprocal interactions with people, objects and symbols in one's the immediate environment (Bronfenbrenner, 1995). A typical proximal process for adolescents is the interactions with their mothers, as mothers usually have more time being accessible to teenagers and also spend much time directly interacting with them (Phares et al., 2009). This critical proximal process may contribute to the development of adolescents' self-esteem. The immediate interactions with mothers might make teenagers develop a definition about themselves that mimics the form and content conveyed by the interactions. For instance, when mothers express love and appreciation to their children through warm and kind behaviors, adolescents may tend to feel emotionally secured and worthy. On the contrary, conflicts and quarrels implying mothers' anger and disapproval could make teenagers experience denied and rejected. Therefore, maternal warmth is hypothesized to be

associated with adolescents' high daily self-esteem, while conflict with mothers is thought to be linked with low daily self-esteem.

These assumed relationships have gained supports from the other theoretical and empirical evidence. The notion that maternal warmth may link to higher self-esteem while mother-teen conflict may link to lower self-esteem in adolescents is supported by sociometer theory (Leary & Baumeister, 2000), which claims that perceived positive social relationship is related to high self-esteem and negative interpersonal relationship plays an opposite role. In addition, empirical evidence indicates that mother-teen interactions may have universal effect on adolescents' self-esteem. Although Tadayon and Khodi (2017) have pointed out that people grow up in different cultures have different constructions about themselves, and their self-constructions may change under the new cultural background through learning and using new language. Therefore, it is possible that mother-teen interactions influence teenagers' sense of self differently in different cultures. However, empirical studies from different countries and cultural backgrounds demonstrated that mothers' supportive and loving behaviors are positively related to their children's self-esteem (Koutra et al., 2022; Leung Ling et al., 2020; Martinez et al., 2020). On the contrary, parent-adolescent conflict is negatively associated with self-esteem in different countries (Davis et al., 2018; Yaffe, 2021) and ethnic subgroups (Li & Warner, 2015), even though parent-adolescent conflict in culturally divergent families has different nature (Kwak, 2003). Drawing on prior evidence, our hypothesis is that adolescents' daily self-esteem is positively related to maternal warmth while negatively related to mother-teen conflict.

In addition, PPCT model emphases that, to fully understand how proximal processes prompt individual development, information about person, context, and time should be taken into consideration for those factors are likely to interact with proximal processes. The most common person-level characteristics like gender and age might change how proximal processes links to self-esteem. The sex identification effect posits that the attachment quality with same-gender parent is more impactful to teenagers' self-esteem than that of the other-gender parent (Wilkinson, 2006). We thus hypothesized that the association between the mother-teen interactions and teenagers' daily self-esteem was stronger for girls than for boys. Similarly, teenagers have more attempts to establish behavioral autonomy (Branje et al., 2012) and perceived their parents to be less powerful and dominant as they grow older (De Goede et al., 2009), which suggests that young adolescents might be influenced more by interactions with mother than older counterparts.

In addition to person-level characteristics, social context in which individuals grow up may also cause variations in the relationship of proximal processes and development

outcomes. For instance, Cheon and Chung (2020) found a greater sensitivity to fathers' emotional support among teenagers in less affluent family than more affluent family. The current study hypothesized a similar pattern that adolescents who perceive higher subjective socioeconomic status (SES) might show less self-esteem fluctuations due to interactions with mother. Additionally, since this study is focused on short-term processes, whether time affect the relationship between mother-teen interactions and adolescents' self-esteem is not tested. However, it is worth noticing that this research was conducted during COVID-19 epidemic, during which period teenagers' mental health is greatly threatened by pandemic and family shows especially importance to teenagers' well-being (Wang et al., 2021). Therefore, this study focused on whether personal features and environmental characteristics moderate the daily relationships between maternal warmth, parent-teen conflict and self-esteem.

The current study

Within the framework of the PPCT model, the current study examines the role of maternal warmth and mother-teen conflict in adolescents' same-day and next-day self-esteem, and whether these daily associations vary in age, gender, and subjective SES. Adolescents' perceived conflict with parents increases (Mastrotheodoros et al., 2020) while perceived parental warmth declines after entering adolescence (Shanahan et al., 2007). At the same time, teenagers' self-esteem generally declines (Chung et al., 2017) and thus it is important to understand whether and how mother-teen interactions link to this phenomenon. The daily relationship between mother-teen interactions and adolescents' self-esteem is tested using the daily diary method, which obtains more reliable and accurate data than those from traditional retrospective method by captures teenagers' self-esteem and their perceived relationship with mothers in real life (Bolger et al., 2003). Furthermore, multilevel analysis enables us to explore the interaction between high level factors (i.e., personal and contextual) and low level (i.e., proximal processes) factors on self-esteem.

Based on PPCT model, we predicted that maternal warmth was related to self-esteem positively and mother-teen conflict was related to self-esteem negatively. Considering that daily experiences can spill over to the next day (Cheon & Chung, 2020), we further hypothesized the warmth and conflict teenagers perceived might be able to predict their next-day self-esteem. And person-level characteristics and context-level factor like age, gender and subjective SES might regulate the associations between daily mother-teen interactions and adolescents' self-esteem.

Method

Participants

A total of 293 adolescents took part in this daily diary study. Participants were recruited from a school using convenience cluster sampling. The inclusion criterion was (1) students volunteered to participant this study after knowing the mainly procedure; (2) students need to live with their parents during the whole week when conducted the experiment to ensure that mother-teen interactions could be recorded. The mean age of this sample that we obtained was 13.88 years (SD = 0.62; from 12 to 15), with 139 identifying as female and 146 as male. The final sample included 277 students because 8 completing none of the daily surveys, 2 did not live with parents and 8 responded scales using the same answers more than 6 days. Participants were given one diary scale at afternoon and instructed to complete it each night before going to bed for 7 consecutive days. Participants who agreed to participant were compensated with a reward and those who completed all the daily diaries were also rewarded with an extra gift. All participants provided written consent. And this study was approved by approved by the Committee for Protecting Human and Animal Subjects in the School of the Psychological and Cognitive Sciences, Peking University.

Measures

All items were answered on a 5-point Likert scale with from 1 ("completely disagree") to 5 ("completely agree"). Descriptive statistics and reliability estimate for all measures are presented in Table 1.

Daily maternal warmth Adolescents reported on the extent to which they perceived maternal warmth on a given day. The two items were selected from emotional warmth subscale of the Chinese version of the Short-Form Egna Minnen av Barndoms Uppfostran (s-EMBU-C) (Jiang et al., 2010) and adapted to assess daily maternal emotional warmth. Items included "Today, I can feel through my mother's words and expressions that she likes me." and "Today, I feel a warm, thoughtful, and intimate feeling with my mother." In all analyses, responses of two items were averaged to obtain daily perception of maternal warmth scores for each adolescent. The higher scores reflected higher degree of perceiving mother' warmth. The reliability was 0.611 at the between-person level and 0.987 at the within-person level.

Daily mother-teen conflict Adolescents' daily conflict with mother was measured with three items adapted from Silva

Table 1 Means, standard deviations, ICC, reliability and correlations of variables

	Mean	SD	ICC	α_w	α_b	1	2	3	4	5
Self-esteem	3.71	0.69	0.45	0.519	0.817					
Warmth	3.68	0.96	0.58	0.611	0.987	0.61**				
Conflict	1.56	0.63	0.29	0.658	0.982	-0.39**	-0.43**			
Gender						0.11	-0.05	-0.06		
Age						-0.01	-0.03	-0.09	0.12*	
Subjective SES						0.16**	0.02	-0.06	0.08	0.02

$^*p<0.05$, $^{**}p<0.01$. ICC represents intraclass correlation; α_w and α_b represents within-and between-level reliability, respectively; correlations of variables are analyzed with mean values

et al. (2020). Items consisted of "my mom got mad at me today.", "I was angry at my mom today." And "my mom punished me today." Responses of three items were averaged to obtain adolescents' daily conflict with their mothers. The higher scores indicated more conflict between adolescents and their mother. The reliability was 0.658 at the between-person level and 0.982 at the within-person level.

Daily self-esteem Adolescents' daily self-esteem was assessed with three items adapted from Nezlek and colleagues (Nezlek et al., 2019). Items consisted of "Today, I felt that I was a valuable person, at least as good as others.", "Today, I felt like a failure.", and "Today I'm satisfied with myself." Responses on the second item was reversed and then three items were averaged to create adolescents' daily self-esteem. The higher scores indicated adolescents' higher self-esteem on a given day. The reliability was 0.519 at the between-person level and 0.817 at the within-person level.

Demographic moderators Demographic variables were assessed using the single-item scales at the first day of this dairy study. Subjective SES was measured with the Chinese version of MacArthur Scale of Subjective Social Status (Adler et al., 2000).

Analysis

The two-level data structure that daily measures nested within individuals was analyzed with hierarchical linear modeling in HLM 6.08 (HLM; Raudenbush & Bryk, 2002). For all of the analyses, missing values were handled with restricted maximum likelihood estimation. The first analyses were unconditional models that had no predictors to estimate the mean and the variances at the within- and between-level. The intraclass correlation coefficient (ICC) of daily self-esteem could be obtained in this model, providing information about whether self-esteem varied from day to day.

Then, we tested the daily association between maternal warmth and adolescents' self-esteem using two models. One model examined the same-day relationships, and the second examined lagged relationships to evaluate the spillover effect

of maternal warmth and self-esteem. Both models treated daily maternal warmth as a random effect and the score of this predictor was group-mean centered. Group-mean centering for daily predictor was necessary for estimate within-person associations (Bolger & Laurenceau, 2013). In these analyses, adolescents' gender, age and socioeconomic status (SES) were added at level 2 to control these variables and entered to the slope of maternal warmth to evaluate the two-way interactions. We split the sample by the mean age to compare whether younger and older adolescents in this sample varied in the daily relationship between maternal warmth and their self-esteem.

The model we used to examine same-day relationships between maternal warmth and adolescents' self-esteem was presented below:

Level 1 Model:

Y(daily self-esteem) $= P0 + P1 *$ (daily maternal warmth) $+ E$ (error term)

Level 2 Model:

(intercept) $P0 = B00 + B01 *$ (Gender) $+ B02 *$ (age) $+ B03 *$ (SES) $+ R0$
(slope) $P1 = B10 + B11 *$ (Gender) $+ B12 *$ (age) $+ B13 *$ (SES) $+ R1$

The next model tested lagged relationships between maternal warmth and adolescents' self-esteem. Daily self-esteem was predicted by previous day's maternal warmth and self-esteem on previous day was controlled. This model was presented below:

Level 1 Model:

Y(daily self-esteem) $= P0 + P1 *$ (previous day's maternal warmth) $+ P2 *$ (previous day's self-esteem) $+ E$ (error term)

Level 2 Model:

(intercept) $P0 = B00 + B01 *$ (Gender) $+ B02 *$ (age) $+ B03 *$ (SES) $+ R0$
$P2 = B20 + R2$
(slope) $P1 = B10 + B11 *$ (Gender) $+ B12 *$ (age) $+ B13 *$ (SES) $+ R1$

After that, the daily associations between mother-teen conflict and adolescents' self-esteem were estimated using the same procedures by replacing daily maternal warmth with daily mother-teen conflict. And the first model

examined the same-day relationships while the second tested lagged relationships between mother-teen conflict and self-esteem.

Results

Descriptive statistics

The results of descriptive statistics were presented in Table 1. The mean value for all variables across 7 days were calculated. The mean level of daily maternal warmth was positively correlated with 7-day mean of adolescents' self-esteem, while mean parent-teen conflict was negatively related to adolescents' self-esteem, meaning that higher levels of maternal warmth and lower levels of mother-teen conflict were related to more positive self-esteem. In addition, the ICC for the daily measures ranged from 0.29 to 0.56. And the ICC of self-esteem was 0.45, indicating there was substantial within-person variability in adolescents' daily self-esteem and a multilevel analysis was necessary. The mean of daily self-esteem across 7 days was significantly correlated with maternal warmth positively and with mother-teen conflict negatively, meaning that higher level of warmth and lower level of conflict were related to more positive self-esteem.

Daily relationships between maternal warmth and adolescents' self-esteem

The results of daily relationships between maternal warmth and adolescents' self-esteem were summarized in Table 2. We first tested the same-day association between perceived maternal warmth and adolescents' self-esteem. As shown in Table 2, daily maternal warmth was significantly and positively associated with adolescents' self-esteem (b = 0.27, SE = 0.05, p < 0.001) at the same day after controlling for

adolescents' gender, age and family SES at level 2. This result was consistent with our expectations, suggesting that on days when adolescents experienced more maternal warmth than usual, they evaluated their value more positively. In addition, adolescents' self-esteem was associated with SES (b = 0.08, SE = 0.03, p = 0.020), but not with gender or age (ps > 0.125), as the intercept model shown. These results indicated that adolescents enjoyed the higher level of overall self-esteem when their SES was higher, while teenagers' gender or age had no relationship with their self-esteem in this sample. Lastly, none of the moderating effect of all these variables were not significant (ps > 0.436), suggesting adolescents in different gender, age and SES enjoyed the same benefit of maternal warmth in their daily self-esteem.

Then, the spillover effect of maternal warmth on adolescents' self-esteem was examined. Results about this relationship was like the same-day relationship between maternal warmth and adolescents' self-esteem reported above (see Table 2). First, daily maternal warmth was positively associated with adolescents' next-day self-esteem (b = 0.12, SE = 0.05, p = 0.015), with models' intercept and slope included all moderators. This association supporting the spillover effect of maternal warmth on adolescents' self-esteem, suggesting that adolescents had higher level of self-esteem than usual when they experienced more warmth with their mother previous day. Additionally, self-esteem was associated with SES (b = 0.08, SE = 0.03, p = 0.014) but not with gender or age (ps > 0.190). Lastly, the moderating effect of age on the association between maternal warmth and adolescents' next-day self-esteem was marginally significant (b = -0.10, SE = 0.04, p = 0.064), while neither gender nor SES showed moderating effect (ps > 0.465). That was, the spillover effect of maternal warmth on adolescents' self-esteem was not varied by gender or SES, though younger adolescents might benefit more from maternal warmth than older adolescents.

Table 2 The relationship between maternal warmth and adolescents' self-esteem

variables	Same day			Lagged day		
	beta	SE	p	beta	SE	p
Intercept	3.65	0.10	0.000	3.60	0.10	0.000
×gender	0.12	0.08	0.125	0.11	0.08	0.190
×age group	<0.01	0.10	0.964	0.04	0.07	0.936
×SES	0.08	0.03	0.020	0.08	0.03	0.014
SE(d-1)				-0.10	0.03	0.002
Maternal warmth	0.27	0.05	0.000	0.12	0.05	0.015
×gender	-0.01	0.06	0.825	0.04	0.06	0.465
×age group	-0.05	0.07	0.436	-0.10	0.04	0.064
×SES	<0.01	0.02	0.859	<0.01	0.017	0.850

Daily relationships between mother-teen conflict and adolescents' self-esteem

The results of daily relationships between mother-teen conflict and adolescents' self-esteem were summarized in Table 3. We first reported the same day correlation between mother-teen conflict and adolescents' self-esteem. The main finding was that daily mother-teen conflict was negatively associated with adolescents' self-esteem (b = -0.18, SE = 0.05, p = 0.001), with this model adding adolescents' gender, age and SES at the intercept and slope part. Consistent with our expectations, on days when adolescents experienced more conflict with their mothers than the average day, they evaluated their self-value more negatively. In addition, average self-esteem was related to SES (b = 0.08, SE = 0.03, p = 0.020) but not with gender or age (ps > 0.115), suggesting the same as above that higher SES was related to adolescents' higher self-esteem but gender or age did not have such a role, as shown in the intercept part. Lastly, the slope part of this model showed gender, age group and SES not moderated the same-day association between mother-teen conflict and adolescents' self-esteem (ps > 0.122), suggesting that daily self-esteem of adolescents suffered the same from conflict with mother, regardless of adolescence gender, age or SES.

Then, the spillover effect of mother-teen conflict on adolescents' self-esteem was also examined. Firstly, daily conflict with mother was not associated with adolescents' next-day self-esteem (b = 0.03, SE = 0.05, p = 0.516), with all moderators were included in intercept and slope. Thus, mother-teen conflict had no lagged or spillover effect on adolescents' self-esteem, which was unexpected in this study and the pattern was different from the spillover role of maternal warmth. Again, the intercept part of the model showed the positive relationship between self-esteem and SES (b = 0.08, SE = 0.03, p = 0.016), but not with gender or age (ps > 0.189). Last, the slope part of the model showed that gender, age group and SES not moderated the next-day

association between mother-teen conflict and adolescents' self-esteem (ps > 0.715).

Discussion

The general goal of this study was to understand and examine the daily dynamics of adolescents' experience of maternal warmth and mother-teen conflict and self-esteem. Based on PPCT model, we further explored whether personal and environmental characteristics moderate how mother-teen interactions relate to teenagers' self-esteem. Our results showed adolescents ended a day with higher self-esteem if they felt more maternal warmth that day, and with lower self-esteem after having conflict with their mothers. Besides, maternal warmth has a longer influencing effect on adolescents' self-esteem than conflict, indicating that good is stronger than bad in terms of self-image. That is to say, only maternal warmth spilled over into higher self-esteem next day, whereas mother-teen conflict showed no lagged effect. Results also show that the relationship between mother-teen interactions and self-esteem is not varied by age, gender or subjective SES. Our findings are consistent with PPCT model, suggesting the proximal processes including positive and negative interactions with mothers change how adolescents evaluate their own worth.

Our first finding was that on days when adolescents perceived warmer interactions with their mother than usual, they reported higher self-esteem. And on days when they had more conflict with mother than usual, their self-esteem lowered. Though adolescents generally report less companionship and intimacy with parents and become more independent than children (Collins & Steinberg, 2006), suggesting that parents' influences on adolescents' self-esteem might weaken. Our results showed mother's kind, warm behaviors were still closely relevant to adolescents' higher daily self-esteem, whereas the disagreement and conflict between mother and adolescent were associated with lower

Table 3 The relationship between mother-teen conflict and adolescents' self-esteem

variables	Same day			Lagged day		
	beta	SE	p	beta	SE	p
Intercept	3.64	0.10	0.000	3.61	0.10	0.000
×gender	0.13	0.08	0.115	0.11	0.08	0.189
×age group	<0.01	0.10	0.939	0.02	0.10	0.849
×SES	0.08	0.03	0.020	0.08	0.03	0.016
SE(d-1)				-0.07	0.03	0.011
Mother-teen conflict	-0.18	0.05	0.001	0.03	0.05	0.516
×gender	0.09	0.06	0.122	0.02	0.05	0.715
×age group	-0.02	0.06	0.727	-0.02	0.06	0.727
×SES	<0.01	0.02	0.957	<0.01	0.02	0.792

self-esteem at daily level. These findings are in line with previous empirical studies reporting that supportive, warm parent-teen relationship correlates with positive psychological adjustment including positive self-esteem (Khaleque, 2013). On the contrary, adolescents reported more negative emotions on days when they experienced greater family conflict (Armstrong-Carter & Telzer, 2020). Our findings expand the associations between mother-teen relationships and self-esteem to daily and naturalistic situations, mirroring the role of family interactions in adolescents' positive psychological adjustment in everyday life.

What's more, our findings suggest that maternal warmth is related to adolescents' self-esteem at the next day, whereas mother-teen conflict does not contribute to self-esteem on the following day. These results do not fit with the bad-is-stronger-than-good phenomenon (Baumeister et al., 2001), which holds that bad events generally exert more influence over individual's life and people react to bad events more strongly than good things. However, we found that maternal warmth, compared to mother-teen conflict, plays an enduring role in adolescents' self-esteem. Our findings extend Baumeister's et al. (2001) perspective by demonstrating that good can be stronger that bad, as least in terms of the role of mother-teen relationships in teenagers' self-value. A possible reason for this might be that, though individuals' motivation is susceptible to external factors like others' personalities (Khalilzadeh & Khodi, 2021), people are strongly motivated to perceive and evaluate themselves favorably (Zell et al., 2020). Adolescents hold strong motivation of self-enhancement and thus tend to pay more attention to positive information (e.g., maternal warmth) that helps to maintain self-view. They may also hold motivation of self-protection and then tend to avoid or neglect information that may threat their self-image (Sedikides et al., 2016). Supporting this proposal, Schmidt and colleges (Schmidt et al., 2020) found that for school-aged children, it is social inclusion, not exclusion that predict their evening self-esteem.

Within the framework of the PPCT model, we have tested whether person-level characteristics including gender, age, and subjective SES influence proximal processes in the association between mother-teen interactions and teenagers' self-esteem. We found teenagers with higher subjective SES showed higher self-esteem, which is consistent with the popular notion reported by large-sample study (Kiviruusu et al., 2014). However, our findings showed that subjective SES did not moderate the relationship between mother-teen interactions and adolescents' self-esteem, unlike the moderating effect of financial condition on the association between fathers' emotional support and teenagers' self-evaluation in roles reported by previous studies (Cheon & Chung, 2020). The pattern between mother-teen interactions and teenagers' self-esteem also appears consistent across teenagers' gender, suggesting that mother-teen interactions have the same role

in girls' and boys' self-esteem. However, our investigation of age-related variation revealed a marginally significant moderation, suggesting that the association between maternal warmth and daily self-esteem on following day may be stronger for younger adolescents than older adolescents. Indeed, Wilkinson (2006) also reported that the quality of adolescent attachment with mothers affect young teenagers more. Future research can further probe age-related differences when exploring the role of parent-teen interactions in individuals' developmental outcomes. Together, our results show that mother-teen interactions have both protective and detrimental role in adolescents' self-esteem in daily life, regardless of family socioeconomic status and children's personal characteristics.

We proposed that mother-teen interactions predict adolescents' next-day self-esteem based on PPCT model. However, an alternation is that adolescent's daily self-esteem is predictive of the next-day maternal warmth, given that maternal warmth and adolescent's daily self-esteem exhibit strong association in this study and prior literature also suggests the possibility that the predictive relationship between teenagers' self-esteem and parenting behaviors may be bidirectional (Bates et al., 2012). Thus, we reciprocally tested the prediction direction between maternal warmth and teenagers' self-esteem. The results demonstrate that only maternal warmth predict adolescents' self-esteem on next day (p = 0.015), nor vice versa. These findings highlight the central role of interactions with mothers in adolescents' daily self-esteem. Maternal warmth is not changed when their youth' self-esteem is high or low, but when mothers show more warmth to their adolescents, this positive behavior can buffer the same-day and next-day self-esteem in youth.

Taken together, this daily diary study contributes to research and theory of self-esteem development. First, we tested the PPCT theory in daily settings and found that the proximal processes of mother-teen interactions were related to adolescents' self-esteem at a daily level in natural circumstances. We believe that our daily diary design captures the concept of proximal processes proposed by PPCT theory, which highlights a frequent exposure to everyday interactions with persons or objects in the immediate environment. Understanding the way how proximal processes works provide insights into the underlying mechanisms that shape self-esteem development. Second, our findings indicate that good can be stronger than bad in terms of self-image, at a minimum. Our study shows that, in terms of self-view, positive daily activities (i.e., maternal warmth) have longer influence than negative events (i.e., mother-teen conflict). These findings extend the notion that bad is stronger than good, which posit that the effect of bad events generally last longer and are easier to bring detrimental outcomes in developmental process (Baumeister et al., 2001).
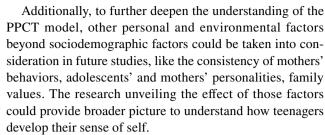
Identifying the role of parent-teen interactions in youths' self-esteem is not merely of theoretical importance. Parent–child relationships and self-esteem is changing as children enter adolescence. For adolescents, parental warmth to them generally declines and conflict with their parents tend to increase (Mastrotheodoros et al., 2020; Shanahan et al., 2007). These changes in parent-teen relationships have been used to explain youth' adaptation like well-being (Silva et al., 2020). This study further found that mother-teen interactions co-occur, or even predict adolescents' self-esteem in real-world circumstances, which might explain the declines in teenagers' self-esteem (Chung et al., 2017). As change of parent–child relationship occurred in adolescence provide opportunities to have better developmental outcomes (Branje, 2018), the findings are informative to the development of youths' healthy self-image. Parents' showing more kind and warm interactions is expected to benefit their youth to form high self-esteem, which may further contribute to youths' psychological adjustments. Fortunately, warmth parents' behaviors are equally effective and beneficial to girls and boys, regardless of their current family financial condition.

Limitations and future research

Our study has potential limitations which might provide angles for future research to dig in. Firstly, we used convenient sampling method because of the restricted research circumstance. And when extending the results obtained in our study, it should be kept in mind that the study's conclusions need to be restrained accordingly. Future studies employing random sampling method may further improve the generalization of the research.

Secondly, our micro-longitudinal study cannot clarity the effect of maternal warmth and mother-teen conflict in long term. Thus, whether the positive parenting has stronger influence on adolescents' self-esteem than negative ones on a larger time scale needs future studies to illuminate, which would help understanding adolescents' development of self.

Besides, this study focused on general maternal warmth and mother-teen conflict, and did not differentiate the specific aspects over these variables. However, specific aspects of maternal warmth or mother-teen conflict may play different roles in impacting teenagers' self-esteem. For example, Chinese parents generally concern much more about their children's academic performance than mundane household stuff. Thus, adolescents may have more increases in self-esteem when their mothers show warmth interactions with them for their school performance than housecleaning. And further exploration about which aspect impact teenagers' self-esteem more could shed light on the key influencing factor to teenagers' self-esteem.

Additionally, to further deepen the understanding of the PPCT model, other personal and environmental factors beyond sociodemographic factors could be taken into consideration in future studies, like the consistency of mothers' behaviors, adolescents' and mothers' personalities, family values. The research unveiling the effect of those factors could provide broader picture to understand how teenagers develop their sense of self.

Lastly, fathers' role in children' self-esteem was not included within the scope of this study. Whether fathers' supportive behaviors also affect teenager's self-esteem stronger than father-teen conflict? And interactions between mother's and father's behaviors are worthy inquiring. For example, can mothers' warm behaviors buffer fathers' negative effect on teenager's self-esteem? The answer to those questions will contribute to the existing knowledge about parent-teenager relationship and are of useful application value.

Conclusion

The current study extends long-standing interest in understanding how mother-teen interactions impact adolescents' self-esteem and development. Prior researches have shown that maternal warmth and conflict with mothers are influencing factors of individuals' trait self-esteem. This study extends former researches to the daily level and captures proximal processes in the way Bronfenbrenner defined. We found daily maternal warmth was related to adolescents' self-esteem positively while mother-teen conflict was related to self-esteem negatively. What is more, maternal warmth affects adolescents' self-esteem longer than conflict. Our findings confirm PPCT model and to some extent extend bad-is-stronger-than-good theory. Our results provide opportunities to understand the development of adolescents' healthy self-image and suggest possible interventions for parents to help their youth obtain better psychological adjustments.

Declarations

Ethics approval This study was approved by approved by the Committee for Protecting Human and Animal Subjects in the School of the Psychological and Cognitive Sciences, Peking University.

Consent to participate All participants gave written informed consent before the study.

Competing interests On behalf of all authors, the corresponding author states that there is no conflict of interest.

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