


# BMJ Open Association between maternal perceived capacity in life and physical punishment of teenage children: a longitudinal analysis of a population-based cohort in Tokyo, Japan

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## ABSTRACT

**Objectives** Perceived capacity denotes a subjective sense of having resources to cope with strains and hardships, and hence maternal perceived capacity may be protective against risk factors for child maltreatment. This study investigated the longitudinal association between maternal perceived capacity in life and child maltreatment.

**Design** This population-based longitudinal study used self-reported questionnaires from the Tokyo Teen Cohort study (TTC), a large community-based cohort study conducted in Japan between 2014 and 2019.

**Setting** Mother–child pairs were randomly recruited from the resident registries of three municipalities in Tokyo, Japan.

**Methods** A total of 2515 mothers participated. Mothers' perceived capacity in life was evaluated using the self-reported TTC wave 2 survey when their children were 12 years old.

Mothers rated the extent to which they had capacity in terms of time, finance, physical well-being, mental well-being and life in general. Physical punishment, which is linked to more severe childhood maltreatment, was assessed using a question about the use of physical punishment at the wave 3 survey when children were 14 years old.

**Results** After controlling for baseline covariates (including maternal social support, age, marital status, annual household income, educational attainment, child's age, gender, sibling and birth order, and behavioural difficulties), higher perceived capacity in finance (OR 0.95, 95% CI 0.90 to 0.99,  $p=0.026$ ) and mental well-being (OR 0.93, 95% CI 0.88 to 0.98,  $p=0.005$ ) were associated with less frequent use of physical punishment with 14-year-old children.

**Conclusions** Maternal perceived capacity in finance and mental well-being may decrease the risk of frequent use of physical punishment at the 2-year follow-up. Child maltreatment prevention strategies should aim to empower mothers and promote their perceived capacity in financial management and mental health.

## INTRODUCTION

### Background

There is immense concern that the COVID-19 pandemic will increase the risk of child maltreatment as a consequence of disruption

## Strengths and limitations of this study

- The data were from a large population-based cohort, which allowed a prospective assessment of maternal perceived capacity in life, maternal and child covariates at baseline, and use of physical punishment at 2-year follow-up.
- Sample reductions due to missing data were addressed using a full information maximum likelihood.
- However, data on adverse childhood experiences and partner relationship quality were unavailable.

and decreased parental mental well-being.<sup>1–3</sup> Maltreated children often develop impairments in psychological, behavioural and physiological functioning throughout their life.<sup>4 5</sup> Measures to combat the spread of COVID-19 have included school closures and stay-at-home orders, resulting in high levels of parenting stress due to increased demands for parenting and decreased resource availability. The mismatch between demands and resources could increase the underlying risk factors of child maltreatment.<sup>6–8</sup> The COVID-19 pandemic also has the potential to exacerbate other risk factors, such as parental job loss<sup>9</sup> and social isolation.<sup>10</sup> These negative consequences of the pandemic could disproportionately impact mothers, as women with young children are more likely to have reduced working hours, compared with men,<sup>11</sup> and caring roles continue to be assumed disproportionately by women.<sup>12 13</sup> Besides numerous other challenges during the pandemic, school closures have led to a reduced number of reports of child maltreatment, implying that several cases may have gone unnoticed.<sup>14</sup> Hence, accessible targeted intervention and prevention strategies

for child maltreatment are required under the social distancing protocols imposed during the pandemic.<sup>15</sup>

Adverse childhood experiences, such as exposure to maltreatment and household dysfunction, are well-established risk factors for child maltreatment in mothers.<sup>16</sup> However, the impact of adversity could be mitigated by the person's psychological resilience.<sup>17</sup> Resilience refers to the person's capacity to navigate access to resources during adversity.<sup>18</sup> Psychological resilience moderates the effect of childhood adversity on emotion dysregulation.<sup>19</sup> Parenting programmes for child maltreatment prevention sometimes focus on psychological resilience as protective factors, including parents' potential, strengths, knowledge and capacities.<sup>20</sup> Meanwhile, engaging mothers in educational interventions and therapies might be a more challenging task during the pandemic,<sup>21</sup> as they may feel having little capacity to engage in programmes besides lifestyle changes and increased demands for parenting. Although the pandemic-related restrictions have been lifted along with increased full vaccination, several countries have experienced a resurgence. The long-term, uncertain circumstances may cause social deprivations to people who have had limited capacity in life.<sup>22–23</sup> Even in the pre-COVID-19 period, high rates of programme attrition in child maltreatment prevention services were common.<sup>24</sup> Therefore, mothers' perception of their own capacity would be a priority target for child maltreatment prevention. Perceived capacity in life refers to a subjective sense of having sufficient resources to cope with strains and adversity.<sup>25–26</sup> Thus, maternal perceived capacity can form psychological resilience and can be improved through social support and networking that is oriented to increase access to resources of people vulnerable to teenage motherhood and deprivation.<sup>27</sup> Understanding the consequences of mothers' self-perceived capacity can provide valuable insights into identifying opportunities for child maltreatment prevention during the COVID-19 pandemic. However, there has been no examination of the longitudinal outcomes of maternal perceived capacity in a child maltreatment framework.

## Objectives

To inform future interventions and the selection of outcome measures to evaluate them, this study aimed to investigate the longitudinal association between perceived capacity in life and maternal child maltreatment. We used physical punishment as a primary outcome measure in this study. Physical punishment is included in the WHO definition of child maltreatment,<sup>28</sup> and we assumed that this type of behaviour would be less likely to be under-reported than other types of physical and emotional ill treatment. Furthermore, the use of physical punishment has been linked with an increased risk of mental disorders among children, including mood disorders and anxiety disorders.<sup>29–31</sup> We hypothesised that mothers who report feeling more capable at baseline are less likely to use physical punishment with their children at follow-up.

## METHODS

### Study design

This population-based longitudinal study used data from the ongoing Tokyo Teen Cohort study (TTC)<sup>32</sup> (<http://ttc.umin.jp/>). The TTC is a multidisciplinary survey of adolescents and their primary caregivers (98.5% mothers at the first-wave survey). The TTC contains questions about perceived capacity in life, physical punishment and social support, as well as a variety of other potentially confounding variables.

### Participants and setting

A sample of 3171 households with children aged 10 years who were born between September 2002 and August 2004 were randomly chosen from the residential registries of three municipalities (Setagaya-ku, Chofu-shi and Mitaka-shi). The first-wave survey was conducted between October 2012 and January 2015. When these children were 12 years old, 3007 households participated in the second wave of the study (follow-up rate: 94.8%). When these children were 14 years old, 2667 households (84.1%) participated in the third wave of data collection. Of the 2667 primary caregivers, 2515 mothers were included in the analysis.

### Procedures

At each wave, the survey was completed during two home visits. During the first visit, written informed consent from the primary caregiver (generally the mother) was obtained, and part 1 self-report questionnaires were distributed. The participants were then asked to complete the questionnaires at home before the second visit. During the second visit, both the adolescents and the primary caregivers were asked to complete part 2 self-report questionnaires separately. The questionnaires were enclosed in envelopes immediately after completion. In addition, the primary caregiver responded to a semistructured interview. All data were collected anonymously.

The TTC second-wave survey was conducted when the children were 12 years old, from July 2014 to January 2017. The third-wave survey, when the children were 14 years old, was conducted from October 2016 to January 2019. Measurements on the questionnaires at each wave are provided in online supplemental table 1.

### Variables and measurement

The primary outcome measured was maternal use of physical punishment as a disciplinary measure when the child was 14 years old. Physical punishment is defined as the use of physical force with the intention of causing the child to experience pain, but not injury, to discipline them and correct or control their behaviour.<sup>33</sup> The use of physical punishment is a type of child maltreatment that has been associated with more severe types of physical and/or emotional ill treatment.<sup>34–35</sup> The following question in the third-wave survey was asked to assess the current frequency of physical punishment: 'Do you slap your child as a means to discipline them?' Mothers were

asked to choose one of five responses: 'never', 'rarely', 'sometimes', 'often' or 'always'. In the analysis, responses were reclassified into the following three categories: 'never', 'rarely' or 'sometimes or more (often/always)', due to the low percentage of mothers who answered 'often' (1.0%) or 'always' (<0.1%).

The primary independent variable was maternal perceived capacity in life when the child was 12 years old. Based on previous studies of perceived capacity in the Japanese population,<sup>25 26</sup> the following question was used to assess maternal perceived capacity: 'At present, to what extent do you feel that you are capable?' Mothers were asked to rate five items on an 11-point Likert scale ranging from 'not at all (0)' to 'completely (10)'. Each item represented the following life domains: time, finance, physical well-being, mental well-being and life. The research team developed five questions in this study. Higher scores reflected greater perceived capacity.

The secondary independent variable was maternal social support when the child was 12 years old, which was assessed using the Social Support Questionnaire (SSQ6).<sup>36–38</sup> Comprising six items, the SSQ6 assesses the number of people the individual feels they can turn to in times of need. When the respondent indicated nine or more persons, it was rated as a 9-point score. A summary score of six items was obtained and used for the analysis.

We measured covariates that have previously been linked with physical punishment, such as maternal age,<sup>39 40</sup> annual household income,<sup>40 41</sup> educational attainment,<sup>40 41</sup> marital status,<sup>42</sup> child's age,<sup>40 41</sup> gender,<sup>39 41</sup> siblings and birth order,<sup>39</sup> and behavioural difficulties.<sup>39</sup> Most covariates were collected in the second-wave survey, except for marital status, educational attainment and birth order, which were assessed only at wave 1. Regarding annual household income, we created a categorical variable as follows: income of less than 4 million yen, 4 million yen or more but less than 7 million yen, 7 million yen or more but less than 10 million yen, and more than 10 million yen. Behavioural difficulties were evaluated by the parents using the Strengths and Difficulties Questionnaire (SDQ).<sup>42 43</sup> The SDQ contains 25 items to measure adolescents' strengths and difficulties on a 3-point Likert scale. There are four domains for difficulties (emotional symptoms, conduct problems, hyperactivity/inattention and peer relationship problems) and one domain for strengths (prosocial behaviour). Further details are available at <https://www.sdqinfo.org>. In the analysis, the total difficulty score was used to summarise the four domains of difficulties.

### Statistical methods

Pearson's correlation coefficient was calculated between maternal social support and perceived capacity in each domain.

Differences in maternal and child characteristics were examined according to the use of physical punishment. To simplify the analysis, a binary classification of frequency was used as 'never' and 'rarely/sometimes/often/always'.

Student's t-test was used for maternal age, social support, child's age and behavioural difficulties; Mann-Whitney U test for annual household income and maternal educational attainment; and  $\chi^2$  test for marital status, child's gender, and sibling and birth order.

Multiple ordinal logistic regression analyses were performed to test the associations between use of physical punishment when the child was aged 14 years and maternal perceived capacity at baseline. Two models were generated: adjusted for maternal social support, and a fully adjusted model including maternal and child variables at baseline. A sensitivity analysis of the fully adjusted model was performed by excluding individuals with missing data.

In these regression analyses, full information maximum likelihood was used to estimate the missing data.<sup>44</sup> All statistical analyses were conducted using Mplus software for Windows (V.8.6; Muthén & Muthén, Los Angeles, California, USA). Statistical significance was set at  $p < 0.05$ .

### Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting and dissemination plans of our research.

## RESULTS

### Participants

Table 1 presents participants' characteristics. Mothers' mean age was 44.1 years; 4.3% were single mothers, 36.3% had an annual household income of 10 million yen or more, and 40.6% had graduated from university or graduate school. The mean social support score measured by the SSQ6 was 22.6. Children's mean age was 146.0 months; 53.0% were boys, 17.4% had no siblings and 38.5% were the eldest children. The mean score for behavioural difficulties measured by the SDQ was 7.3 (table 1). Mothers who reported using physical punishment were younger than those who did not report. Children who experienced physical punishment included more boys, eldest children among siblings and had greater behavioural difficulties than those who did not experience physical punishment (online supplemental table 2).

Table 2 shows the mean and SD of perceived capacity at baseline when the children were aged 12. Pearson's correlation coefficients between social support and perceived capacity in each domain ranged from 0.14 to 0.26 (table 2).

### Outcome data

There were 2291 responses regarding the use of physical punishment when the children were 14 years old. There were 1018 mothers (44.4%) who reported 'never' using it; 936 mothers (40.9%) who used it 'rarely'; and 337 mothers (14.7%) who used it 'sometimes or more'.

### Main results

Table 3 presents the results of the ordinal logistic regression analyses conducted on the use of physical punishment. In the adjusted model with social support, a higher



**Table 1** Participants' baseline characteristics (N=2515)

Variable	Response (n)	Mean (SD) or n (%)
<b>Mothers</b>		
Age, years, range 29–57	2384	44.1 (4.2)
Marital status, single mother	2515	108 (4.3)
Annual household income (yen)	2330	
3.99 million or less		213 (9.1)
4–6.99 million		605 (26.0)
7–9.99 million		667 (28.6)
10 million or more		845 (36.3)
Educational attainment	2508	
Junior high school or high school		395 (15.7)
Vocational school or college		1095 (43.7)
University or graduate school		1018 (40.6)
Social support, range 0–54	2502	22.6 (9.7)
<b>Children</b>		
Age, months, range 135–163	2515	146.0 (3.6)
Gender, boy	2515	1333 (53.0)
Sibling and birth order	2515	
No sibling		437 (17.4)
Eldest child among siblings		969 (38.5)
Second or later among siblings		1109 (44.1)
Behavioural difficulties, range 0–40	2508	7.3 (4.8)

Social support was measured using the Japanese version of the Social Support Questionnaire.

Behavioural difficulties were measured using the Japanese version of the Strengths and Difficulties Questionnaire.

perceived capacity in finance and mental well-being at baseline was associated with a less frequent maternal use of physical punishment with 14-year-old children. In the fully adjusted model with maternal social support plus maternal age, marital status, annual household income, educational attainment, child's age, gender, sibling and birth order, and behavioural difficulties, these associations were not meaningfully changed. Social support did not show associations with physical punishment in any model (table 3). In the fully adjusted model, less frequent

**Table 2** Perceived capacity in life at baseline

Domain, range 0–10	Response (n)	Mean (SD)	Pearson's r with maternal social support
Overall	2351	5.0 (2.5)	0.20
Time	2353	4.4 (2.7)	0.14
Finance	2353	4.7 (2.7)	0.15
Physical well-being	2352	4.5 (2.2)	0.22
Mental well-being	2354	5.0 (2.4)	0.26

Maternal social support (range 0–54) was measured using the Japanese version of the Social Support Questionnaire.

use of physical punishment was also found in mothers who were older, who had attained higher educational level, children who were not the eldest among siblings and children with lower behavioural difficulties (online supplemental table 3).

In a sensitivity analysis that excluded individuals with missing data, associations with less frequent use of physical punishment were observed with perceived capacity in mental well-being (OR=0.92, 95% CI 0.87 to 0.97, p=0.003). Perceived capacity in finance (OR=0.95, 95% CI 0.91 to 1.00, p=0.050) and social support (OR=1.00, 95% CI 0.99 to 1.01, p=0.837) did not show associations with physical punishment in the sensitivity analysis.

## DISCUSSION

In this large population-based study, we demonstrated longitudinal associations between higher maternal perceived capacity and reduced risk of physical punishment in 14-year-old children. Importantly, these associations were independent of maternal social support and other risk factors for child maltreatment, including maternal age,<sup>39 40</sup> marital status,<sup>41</sup> annual household income,<sup>40 41</sup> maternal educational attainment,<sup>40 41</sup> child's age,<sup>40 41</sup> gender,<sup>39 41</sup> sibling and birth order,<sup>39</sup> and behavioural difficulties.<sup>39</sup>

This study first indicated that maternal perceived capacity in finance at baseline was associated with less frequent use of physical punishment at the 2-year follow-up. Our results contribute to the literature identifying the psychological protective factors for child maltreatment, such as maternal social support,<sup>45</sup> coping skills,<sup>45 46</sup> self-control<sup>45</sup> and self-efficacy.<sup>45 46</sup> These factors constitute psychological resilience, which can change and be fostered over the course of an intervention.<sup>17 18</sup> Notably, the associations did not change after adjusting for annual household income. This is consistent with previous findings, suggesting that cognitive reframing coping may buffer the impact of economic problems on the risk of child maltreatment.<sup>9</sup> Hence, increasing the maternal sense of capacity in financial management has the potential to reduce the impact of economic problems on the risk of child maltreatment. Mothers' perceptions of financial capacity may be distinct from household income, especially in cases where mothers have limited autonomy in household decision-making around finance. Therefore, social work interventions could be beneficial to increase maternal access to information and resources regarding financial management, followed by an increase in maternal sense of capacity.

Higher perceived capacity in mental well-being also demonstrated an association with less frequent use of physical punishment in the fully adjusted model. A higher maternal capacity in mental well-being may have meant some healthy emotional distance between mothers and their children, which could help prevent child maltreatment.<sup>20</sup> As being the eldest child among siblings and younger maternal age were also associated with

**Table 3** Ordinal logistic regression analysis of frequent use of physical punishment when the child was 14 years old

	Adjusted with social support		Fully adjusted	
	OR (95% CI)	P value	OR (95% CI)	P value
Perceived capacity (range 0–10)				
Overall	1.02 (0.96 to 1.08)	0.632	1.01 (0.95 to 1.08)	0.655
Time	1.02 (0.98 to 1.07)	0.333	1.02 (0.97 to 1.06)	0.503
Finance	0.96 (0.92 to 0.997)	0.034	0.95 (0.90 to 0.99)	0.026
Physical well-being	1.04 (0.99 to 1.09)	0.172	1.03 (0.98 to 1.09)	0.193
Mental well-being	0.89 (0.84 to 0.94)	<0.001	0.93 (0.88 to 0.98)	0.005
Maternal social support (range 0–54)	0.998 (0.99 to 1.01)	0.605	1.00 (0.99 to 1.01)	0.819

The use of physical punishment was rated as ‘never (1)’, ‘rarely (2)’ and ‘sometimes/often/always (3)’.

Maternal social support was measured using the Japanese version of the Social Support Questionnaire.

The fully adjusted model included the following baseline covariates plus social support: maternal age, marital status, annual household income, educational attainment, child’s age, gender, sibling and birth order, and behavioural difficulties.

more frequent use of physical punishment in our study, first-time and young mothers may tend to experience a feeling of isolation and loss of autonomy,<sup>39 40</sup> which would challenge healthy emotional distance. Thus, mothers’ own psychological needs should also be a focus of child maltreatment prevention interventions. Although carer strategies have acknowledged the needs of family carers who care for older adults and adults with special needs,<sup>47</sup> child welfare systems sometimes challenge the collaboration and integration between child protection and parental mental health support.<sup>48 49</sup> Furthermore, as the COVID-19 pandemic has imposed both economic adversities and psychological distress on mothers,<sup>6 9 10</sup> maternal perceived capacity in such domains should be further examined under long-term restrictions.

In this study, maternal social support was not associated with risk of physical punishment. This is inconsistent with previous studies which have suggested that adequate social support can attenuate the risk of child maltreatment among mothers with low educational attainment.<sup>45 50</sup> Our participants included mothers who had above-average educational attainment; 40.6% graduated from university or graduate school (compared with 11.8% in a national census),<sup>51</sup> which could lead to an underestimation of the effect of social support. Furthermore, our measurement of maternal social support could not classify the support functions and sources. Previous research indicates that support from relatives and instrumental support are associated with low risk of child maltreatment among mothers, whereas non-relatives and psychological support are not.<sup>52</sup> Future research should examine which functions and sources of maternal social support would be beneficial to prevent child maltreatment.

### Strengths and limitations of this study

The primary strength of the study lies in its longitudinal examination of maternal perceived capacity at baseline and mothers’ use of physical punishment with their children at 2-year follow-up. Other strengths also include its generalisability as the study used data from a large population-based

cohort. The use of a full information maximum likelihood estimation enabled us to include participants with missing data in the logistic regression analyses. This study took the first crucial step towards the identification of priorities for future interventions for child maltreatment prevention and the selection of outcome measures to evaluate them. However, the analyses were subject to limitations associated with the primary caregivers’ TTC data. The results are based on data from Japanese individuals so that they could not be generalised to populations in other countries. As an instrument to assess perceived capacity was developed for this study, reliability and validity need to be examined. The data did not provide information regarding maternal adverse childhood experiences<sup>16</sup> and partner relationship quality,<sup>43 44</sup> which are also risk or protective factors for child maltreatment. Use of physical punishment was based on self-reported frequency, which may have led to an underestimation of its prevalence. Although 85.4% of mothers enrolled in the TTC wave 1 survey were included in our study, the attrition could have led to biases and our sample may have a better perceived capacity in life. Reports of physical punishment were collected when the child was 14 years old, while the use of physical punishment would be more frequent in younger children. The data also lacked other types of child maltreatment and adversities children may have experienced during the survey period.

### CONCLUSION AND POLICY IMPLICATIONS

Mothers with self-perceived high capacity in finance and mental well-being were less likely to use physical punishment with their 14-year-old children at 2-year follow-up. Targeting the maternal sense of capacity in financial management and mental health promotion may be beneficial in child maltreatment prevention through mothers’ empowerment.

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**Contributors** MN, SY and AN conceived and designed the study. MN, SY and KE analysed the data and performed the analyses. JN, NN, DS, KB, NO, MH, SA, MH-H, KK and AN interpreted the results. MN drafted the article. All authors contributed to writing the final version of the manuscript. AN is the guarantor of this study.

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**Competing interests** None declared.

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**Patient consent for publication** Not required.

**Ethics approval** This study involves human participants and was approved by the ethics committees of the Tokyo Metropolitan Institute of Medical Science (number: 12-35), University of Tokyo (number: 10057) and SOKENDAI (The Graduate University for Advanced Studies; number: 2012002). Participants gave informed consent to participate in the study before taking part.

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**Data availability statement** Data are available upon reasonable request. The data that support the findings of this study are available from the Tokyo Teen Cohort study, but restrictions apply to the availability of these data, which were used under licence for the current study and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission from the Tokyo Teen Cohort study.

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