

Title:

Risk factors for child physical abuse and neglect among Chinese young mothers

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ABSTRACT (Abstract 248 words)

Although studies have reported a linkage between young pregnancy and child maltreatment risk, it is still unclear about what factors place young mothers at greater risk of maltreating their child in Chinese context. Based on the socio-ecological model, risk factors in 4 domains: family background/ structure, maternal stressors, mother-child interaction, and child behavioral issue in relation to physical assault, neglect, both physical assault and neglect, and either physical assault or neglect among Chinese young mothers in Hong Kong were assessed. 392 young mothers were recruited from an integrated supportive program for young mothers. The mean age of mothers at delivery was 21.8 (SD = 3.0) and 52.3% were married. Individual risk factors and cumulative risk domains related to different child maltreatment groups were examined. Our results show both overlapping and unique risk factors across the domains associated with physical assault and neglect. Further, young families exposed to higher number of risk domains show higher rates for physical assault and neglect, co-occurrence of physical assault and neglect, and either form of maltreatment. In addition, various risk domains were found to be particularly important for different forms of maltreatment: family background/ structure domain was found to be an important risk domain for neglect; mother-child interaction domain for both physical assault and neglect; family background/ structure and maternal stressors domains for either physical assault or neglect. Closer examination of a subgroup of adolescent mothers aged 18 and below shows that family background/ structure was an important risk domain for this group.

Keywords: Young pregnancy, child abuse and neglect, risk factors

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MAIN TEXT (6619 words)

INTRODUCTION

Child maltreatment, defined as violence acts including physical abuse, sexual abuse, neglect, and psychological abuse against children (Pinheiro, 2006), is a prevalent social and public health problem. Yearly, approximately 4-16% children are physically abused and about 10% children are neglected or psychologically abused (Gilbert et al., 2009). In view of well-documented impacts of child maltreatment on children's health, social and behavioral development, these figures translate into serious economic cost to the society (Fang, Brown, Florence, & Mercy, 2012).

Early motherhood, which has been documented to be associated with mental and physical health risks of young mothers, birth complications of the child, and poverty, is also a global health concern (World Health Organization, 2016). In the United States, birth rates for women aged 15-19 and 20-24 were 24.2 and 79 births per 1000 women, respectively (Hamilton, Martin, Osterman, Curtin, & Matthews, 2015). The United Kingdom reported 14.5 births per 1000 women aged under 20, and 58 births per 1000 women aged 20-24 (Office for Official Statistics, 2016). In contrast, China had a far lower birth rate for adolescent girls aged 15-19, at 5.9 births per 1000 women, and birth rate for young women aged 20-24 was more comparable to the figures reported in U.S. and U.K., at 69.5 births per 1000 women (National Bureau of Statistics of China, 2012). Hong Kong showed much lower

birth rates among adolescent and young women, at only 3 births per 1000 women aged 15-19 and 20 births per 1000 women aged 20-24 (Census and Statistics Department, 2015a). Lower birth rates among adolescents and young women in Chinese society may be partly explained by the Chinese culture which is strongly influenced by Confucian ideologies that regard pre-marital sex as immoral and ruining the future of young women. Although study shows that Chinese youths nowadays hold more liberal views toward pre-marital sex (Yip et al., 2013), pregnancy at young age is still socially and culturally disapproved (Yu, 2012). To avoid bringing shame to the family and being blamed by parents, some young pregnant girls resort to poor quality illegal abortion services without informing their parents (Hung, 2010).

From the view of child protection, young pregnancy is an issue of concern because of its linkage with child maltreatment (Lee, 2009; Lounds, Borkowski, & Whitman, 2006). However, previous literature has been conducted mainly in the West, less is known about young mothers and child maltreatment in Chinese context. In Hong Kong, data on prevalence and risks of child maltreatment among children of young mothers were in general lacking. With regard to child maltreatment statistics reported by the Child Protection Registry, statistics stratified by adolescent and young mothers were not available (Social Welfare Department, 2016). Studies on child maltreatment among young mothers therefore rely on self-report and informant-report. However, asking young mothers questions about their child maltreatment acts would be considered very sensitive because of the fear of intervention by

child protective services and legal consequences against them, even though child abuse reporting is not mandatory in Hong Kong. Although Hong Kong is the most westernized city in China, traditional Chinese values still underlie public perception of the issue of child maltreatment. Chinese people tend to keep family matters and violence private because they might bring shame to the family (Chan, 2009). Chinese children also share similar views, as study found that children show hesitation to disclose child maltreatment because of their loyalty to parents (Chan, Lam, & Shae, 2011). In view of these socio-cultural characteristics, coupled with a rapid rising trend of child maltreatment hospitalizations which increased from 31 per 100 000 children in 2001 to 73.4 per 100 000 children in 2010 in Hong Kong (Ip et al., 2016), research on factors that put Chinese young mothers at risk for maltreating their child is much needed.

The ecological model (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006) has long been the dominated framework for understanding child maltreatment. Building on this foundation, Belsky (1993) asserts that child maltreatment is influenced by interrelated factors at three levels: (1) individual characteristics of parents and children; (2) family characteristics such as parent-child interactions; and (3) the boarder socio-cultural context. Along this line of research, numerous child maltreatment risk factors have been identified and summarized in previous meta-analysis (Stith et al., 2009) and reviews (Black, Heyman, & Slep, 2001; Schumacher, Slep, & Heyman, 2001). In particular, Stith et al. (2009) found that parent's

characteristics and parent-child interaction have larger effect sizes for child neglect whereas parent's characteristics and family relationship have larger effects on child physical abuse. Because young mothers and their children are more vulnerable to health, emotional, social, and financial difficulties (Centers for Disease Control Prevention, 2013), various psychosocial aspects of young mothers are of particular relevance in examining the risk factors for child maltreatment. In terms of child characteristics, young pregnancy is associated with poorer outcomes in children such as pre-term delivery, lower birth weight (Chen et al., 2007) and cognitive delay (Morinis, Carson, & Quigley, 2013). Frustration may arise as taking care of children required additional care and perceiving child as problematic may elevate the risk of child maltreatment (Graham, Weiner, Cobb, & Henderson, 2001). In terms of maternal characteristics, young mothers are more likely to have lower education attainment (Laopaiboon et al., 2014), have lack of social support (Cox et al., 2008), use substances (Gillmore, Gilchrist, Lee, & Oxford, 2006) and have rapid repeated pregnancies (Barr, Simons, Simons, Gibbons, & Gerrard, 2013); these conditions may compromise the quality of care they provide for their children and hence increase the risk of maltreatment. Family background such as poverty (Penman-Aguilar, Carter, Snead, & Kourtis, 2013) and single parenthood (Laopaiboon et al., 2014) are related to lower socioeconomic status of young mothers and go hand in hand with child maltreatment (Sedlak et al., 2010). Although Chinese young mothers may also share some of these risk factors for child maltreatment, the

impact of Chinese culture on young mothers may make their experience unique and different from young mothers in the West. Specifically, Chinese culture values protection of face and family honor (Chan, 2009), young pregnant women may have fear of seeking help from the family during their pregnancy and bear greater stress in parenting. Social stigma may also barricade young mothers from seeking health and social services when in need. This will in turn become another stressor for young mothers and increase the risk for child maltreatment.

Not only examining multiple risks simultaneously is valuable, understanding the effect of accumulation of risks on child maltreatment is crucial. Based on earlier studies finding robust effects of exposure to multiple risks on child developmental outcomes (Rutter, 1979; Sameroff, Seifer, Zax, & Barocas, 1987), the use of cumulative risk approach, which considers the total number of individual risk factors rather than the scores of the factors, has been recognized and applied to understanding etiology of child maltreatment (Appleyard, Berlin, Rosanbalm, & Dodge, 2011; Begle, Dumas, & Hanson, 2010) and health outcomes of exposure to adverse childhood experiences (Anda et al., 1999). This study followed a growing literature examining exposure to risk factors across domains and considering accumulation of risk across multiple domains as much more damaging (Evans, Li, & Whipple, 2013; Thornberry et al., 2014). This approach allowed us to examine various domains of risk simultaneously to show which domain of risk may stand out among other domains.

Against this background, there were two aims of this study. First, this study examined an array of individual risk factors across four socio-ecological domains: parent characteristics (maternal stressors), child characteristic (child's behavioral issue), mother-child interaction, and family background/structure associated with child maltreatment in a sample of Chinese adolescent and young mothers. This study had a focus on child physical abuse and neglect which are the most prevalent forms of child maltreatment among young mothers (Lounds et al., 2006). As it is likely that risk factors of child physical abuse and neglect are both overlapping and distinctive (Manly, Kim, Rogosch, & Cicchetti, 2001; Stith et al., 2009), the analyses were conducted separately for these two types of child maltreatment to address the problem of collapsing them into single category of maltreatment in previous studies. We hypothesized that multiple characteristics across these four domains are associated with physical abuse and neglect perpetrated by young mothers. Second, we examined cumulative risk domains for child maltreatment and we hypothesized that higher cumulative risk domains are related to higher chance of child physical abuse and neglect. Because physical abuse and neglect often co-occur and likely to be more detrimental than experiencing one form of maltreatment (Widom, DuMont, & Czaja, 2007), we conducted subgroup consists of mothers who perpetrated both physical assault and neglect and a subgroup consists of mothers who perpetrated either form of maltreatment. Additional subgroup analyses on adolescent mothers aged 18 and below were also conducted.

METHODS

Study participants

This cross-sectional study involved Hong Kong young mothers who can speak, read and write Chinese and delivered their first child before the age of 24 years, following the definition of adolescence in previous studies (Teal & Sheeder, 2012; Vagi et al., 2013) and definition of youth according to The United Nations (2013). The study was conducted between 1 January and 30 June 2015. During this period, eligible young mothers were identified from a local integrated young mothers supportive program supported by health professionals and social workers (Ip, Chau, Thompson, & Choi, 2015; Leung, Leung, Chan, Lee, & Ip, 2007). Mothers who were not competent to give informed consent (Census and Statistics Department, 2015a), or who were not able to speak, read and write Chinese were excluded from the study.

During the study period, women who met the inclusion criteria were visited by social workers and invited to participate in this study. Participation in the study was solely voluntary and informed consent was obtained from the mothers. Upon obtainment of written informed consent, the mothers were interviewed by trained social worker to complete a self-report questionnaire, which took about 45 minutes to complete. Upon request, the social worker would help clarify the questionnaire items to the mothers. Participating mothers were asked to complete all child-related questionnaire items based on

their first child (index child) so as to eliminate the parity effect for mothers with more than one child. A HKD50 (approximately USD 5.5) supermarket voucher was given to participants as incentive upon completion of the questionnaire.

Measures

This study used a self-administered questionnaire consisted of standardized measurements to collect maternal use of child maltreatment acts, mother-child relationship, and psychosocial characteristics of the mother and her index child. Information about mother's demographic background was also collected.

Measure of child maltreatment

The Parent-Child Conflict Tactics Scale (CTS-PC) (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) was used to measure mothers' perpetration of physical assault and neglect against their index child in the year preceding the study. On the severe physical assault subscale (4 items), mothers reported perpetration of physical assault including slapping the child, hitting the child with hard object, throwing or knocking the child down, and hitting the child with a fist or kicking the child hard; and on the neglect subscale (5 items), mothers reported neglectful acts including leaving the child home alone, withholding food and medical care when the child is in need of them, having problem taking care of the child due to being drunk or high, and not being able to show care to the child due to their own problems. The Chinese version of CTS-PC has been used in local studies (Chan, Brownridge, Yan, Fong,

& Tiwari, 2011) and was found to have satisfactory reliability and validity with Cronbach's alpha ranging from 0.77 to 0.88 (Chan, Brownridge, et al., 2012). In this study, a dichotomous coding ("yes" or "no") was created to indicate whether or not the mothers perpetrated physical assault or neglect in the preceding year. The mothers were considered having perpetrated physical assault or neglect if they indicated 'yes' among any of the corresponding items in the subscale, respectively. The mothers were further grouped into several categories: (1) perpetrated physical assault; (2) neglect; (3) perpetrated both physical assault and neglect; and (4) perpetrated either physical assault or neglect.

Measures of risk factors

Based on the socio-ecological framework (Bronfenbrenner & Morris, 2006), risk factors for child maltreatment are grouped into 4 domains: family background/structure, maternal stressors, mother-child interaction, and child behavioral issue. Following the cumulative risk approach, all the risk factors were dichotomized by either the naturally occurring breakpoints (e.g. having rapid repeated pregnancies or not, employed or unemployed) or, for continuous variables, comparing the riskiest quartile of the population against the lower three quartiles. Dichotomization of risk factors can facilitate the comparison on the strength of the odds ratios among different risk factors and can also ease the analysis on cumulative risks.

Family background/structure

Family socioeconomic status and demographic characteristics. Maternal and child demographic information including age and gender of the child, maternal education level, current marital status and employment status were obtained. Moreover, two major family variables were included to reflect the maternal socioeconomic status, namely family monthly income adjusted for household size and whether the participants received social security. Family with monthly income lower than the household-size-adjusted poverty line suggested by the Hong Kong Government was deemed to have low family income (Census and Statistics Department, 2015b).

Rapid repeated pregnancies. Rapid repeated pregnancy (RRP) defined as any pregnancy outcomes occurring within 24 months of previous pregnancy (Mott, 1986) was used as the indicator of mothers' rapid repeated pregnancies.

Maternal stressors

Maternal physical wellbeing. Maternal physical wellbeing was evaluated using the 12-Item Short-Form Health Survey (SF-12v2). The SF-12v2 has been widely adopted in assessing the functional quality of life of an individual with subscales of physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role emotional and mental health (Ware Jr, Kosinski, & Keller, 1996). The Chinese (HK) specified SF-12v2 has been demonstrated by previous studies to have satisfactory validity, and reliability (Fong et al., 2010). In our study, Physical Component Summary scores (range from 0 to 100) were

generated to reflect the mother's overall physical wellbeing.

Maternal negative emotional states. Maternal negative emotional states were examined by using the Chinese version of 21-item self-report Depression Anxiety Stress Scale (DASS) (Lovibond & Lovibond, 1995). DASS has been widely used in research and clinical setting. It has three subscales with each consists of 7 items assessing the severity (normal, mild, moderate, and severe) of core symptoms of depression (e.g., pessimistic about the future, unable to experience enjoyment), anxiety (e.g., worried about performance, trembly) and stress (e.g., tense, irritable) in the past 30 days. The score of each subscale ranges from 0 to 21, with higher the score indicates higher level of severity of the corresponding negative emotional state. The Chinese version of the DASS adopted in this study has been validated among Chinese-speaking populations and confirmatory factor analysis supported a three-factor latent structure for DASS (depression, anxiety, and stress) in previous studies (Chan, Xu, et al., 2012; Taouk, Lovibond, & Laube, 2001).

Family environment perceived by the mother. The family cohesion subscale of the Family Environment Scale (FES) (Moos & Moos, 1994) was used to measure the mother's own perception of her family environment, in particular the extent of concern, commitment and support by the mother's family members. This subscale consists of 9 items measured by a 6-point Likert scale, with the score ranging from 9 to 54. The Chinese version of the subscale has been used in a previous local adolescent study with a Cronbach alpha coefficient of 0.86,

showing good internal consistency (Lee, Wong, Chow, & McBride-Chang, 2006).

Social support perceived by mothers. The Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988) was adopted to measure perceived social support from family members, friends and significant others. This scale consists of 12 items measured by a 7-point Likert scale, with the score ranging from 12 to 84. The Chinese version of MSPSS has been validated in a previous study and shown excellent internal consistency (Chou, 2000).

Maternal risky behaviors. Participating mothers were asked on whether they have used substance or engaged in binge drinking in the past 30 days. Maternal substance use is a binary measure of whether the mother reported having any substance use in the past 30 days. Meanwhile, binge drinking is a binary measure of whether the mother reported having at least 4 or more drinks in single occasion in the past 30 days, according to the definition by the National Institute of Alcohol Abuse and Alcoholism (2004).

Mother-child interaction

Parenting distress. The parental distress subscale of the Parenting Stress Index – Short Form (PSI-SF) was adopted to measure the extent of stress experienced by the mother. This subscale consists of 12 items with a 5-point Likert scale and measures the mother's perception of their competence as a parent, stresses associated with restrictions placed on her due to the child, conflict with the child's other parent, and the level of social support received. The

subscale scores range from 5 to 60, with higher the score indicates higher distress. The Chinese version of the PSI-SF has been validated in Hong Kong with a high level of internal consistency (Cronbach's alpha = 0.89) (Lam, 1999).

Dysfunctional parent-child interaction. The parent-child interaction subscale of the PSI-SF was used to examine the extent to which the mother perceives the interaction with the child as dysfunctional. This subscale indicates the mother's perception that that the child does not meet expectations and that interactions with the child are not rewarding. This subscale contains 12 items measured by a 5-point Likert scale, with the score ranging from 5 to 60.

Child behavioral issue

Difficult child. The difficult child subscale of the PSI-SF was used to determine the mother's perceived difficulty of taking care of the child. This subscale consists of 12 items measured by a 5-point Likert scale, reflects the child's temperament, defiance, noncompliance, and demandingness. This subscale scored from 5 to 60.

Ethics approval

The ethics committee of the Institutional Review Board of Hospital Authority Hong Kong West Cluster approved the study and consent procedures stated in the protocol (Ref no.: UW 15-028).

Statistical Analyses

To facilitate the comparison between individual risk factors, all variables were

dichotomized to values of 0 or 1. All the risk factors were compared between mothers who used the maltreatment act corresponding to the subgroup (physical assault, neglect, both physical assault and neglect, and either physical assault or neglect) and those who did not, using chi-square test, independent t-test or other non-parametric tests whichever appropriate. A series of logistic regression models were then fit to determine the extent to which these risk factors contributed to physical assault, neglect, both forms, and either form individually.

To examine how the cumulative effects of risk factors affect the maternal engagement of physical assault, neglect, both forms, and either form, all risk factors were categorized into four domains, namely family background, maternal stressors, mother-child interaction and child behavioral issue. The number of risk factors each mother has in each domain was then counted, in which participants with the number of risk factors in each domain higher than the mean number of the whole population were coded as 1 in that particular domain. Logistic regression analyses were performed to estimate the odds of physical assault, neglect, both forms, and either form by the four domains. To examine the impact of specific risk domain on physical assault, neglect, both forms, and either form, a multivariate regression model was also conducted by including all four domains into the same model. To further investigate the effects of co-occurrence of multiple risk domains, logistic regression analyses were conducted to predict the odds of physical assault, neglect, both forms, and either form by the number of risk domains each mother has. Multicollinearity among variables was checked

with no indication found. Same set of analyses were performed separately on a subgroup of teenage mothers aged 18 and below to examine the risk factors in relation to mother's perpetration of either physical assault or neglect.

Adjusted model was constructed for each of the individual-level risk factor and domain with age and gender of the child included as covariates. Statistical significance at the above analyses was determined by two-tailed tests with the p-value less than 0.05 deemed significant. As most of the variables have missing data of 1-5%, listwise deletion was adopted to deal with missing data. All the analyses were computed by using the Statistical Package for Social Sciences (SPSS, version 19.0) (IBM Corp, 2010).

RESULTS

Sample characteristics

Among the 459 eligible subjects in the integrated supportive program for young mothers, 392 participants agreed to participate in this study. The response rate was 85.4%. Altogether, 31.1% (n=122) and 40.1% (n=157) of the young mothers have reported physically assaulted and neglected their child in the preceding year, respectively. Also, 19.4% (n=76) mothers reported using both physical assault and neglectful acts in the preceding year.

The mothers' age at delivery ranged from 13 to 23 and the mean age was 18.64 (SD = 2.3), as shown in Table 1. Among the mothers, 82.4% reported the pregnancy was unplanned, around 50% just completed junior high school, and only 6.9% attained tertiary education.

Only 21.2% (n = 83) of participants were employed full-time and more than 60% of them were full time housewife. Monthly family income, after adjusted for household size, was HKD \$ 3730 (approximately USD \$478), with 70 of them (18.2%) receiving social security. Moreover, in the month preceding the interview, 5% of them used substance and more than 20% of mothers had the problem of binge drinking.

Mothers perpetrated physical assault, compared to those who did not, were more likely to have rapid repeated pregnancies, higher level of stress, poorer family cohesion, less social support, and poorer interaction with their child. The index child of mothers perpetrated physical assault was more likely to be a boy and of older age. Meanwhile, when compared to non-neglectful mothers, neglectful mothers were more likely to have rapid repeated pregnancies, be divorced or single, have higher levels of depression, anxiety, and stress, poorer family cohesion, more likely to receive social security, and used drugs. They also reported higher parental distress, poorer mother-child interaction and perceiving child as difficult. Mothers perpetrated both physical assault and neglectful acts were more likely to have an older child, rapid repeated pregnancies, higher level of negative states (depression and stress), less social support, poorer family cohesion, and higher parenting distress including parental distress, poorer mother-child interaction, and perceiving child as difficult. For mothers perpetrated either physical assault or neglect, they were more likely to have an older child, rapid repeated pregnancy, living on social security, used drugs, had negative

emotional states, poorer family cohesion and parenting distress.

Individual-level risk factors for child maltreatment

As we found that the age and gender of the index child were highly correlated with the risk of physical assault and neglect, we further examined the risk factors individually in an adjusted regression model with child's age and gender included as covariates. The effects of individual risk factors were represented by odd ratio, which is a measure of odds that the outcome (physical assault, neglect, both forms, and either form) will occur with the presence of particular risk factor. As hypothesized, multiple characteristics across all four domains were significantly associated with increased risk of physical assault and neglect. As Table 2 indicates, two family background/structure risk factors [rapid repeated pregnancies (aOR = 2.15, $p < .01$), large family size (aOR = 1.96, $p < .01$)], one maternal stressor [poorer family cohesion (aOR = 1.95, $p < .01$)], one parenting risk factor [poorer parent-child interaction (aOR = 1.88, $p < .05$)] and one child behavioral risk factor [difficult child as perceived by mothers (aOR = 2.07, $p < .05$)] were associated with elevated maternal risk of physical assault. Meanwhile, three family background/structure risk factors [rapid repeated pregnancies (aOR = 1.75, $p < .05$), mother divorced or never married (aOR = 1.59, $p < .05$), and mother receiving social security (aOR = 2.13, $p < .01$)], three maternal stressors [maternal depression (aOR = 1.79, $p < .05$), poor family cohesion (aOR = 1.78, $p < .05$), maternal drug use (aOR = 4.82, $p < .01$)], and one parenting risk factor [poor parent-child

interaction (aOR = 1.92, $p < .05$)] were found to be associated with increased maternal risk of child neglect. Further, rapid repeated pregnancies (aOR = 2.31, $p < .001$), large family size (aOR = 1.77, $p < .05$), poor family cohesion (aOR = 2.03, $p < .05$), and poor parent-child interaction (aOR = 2.54, $p < .001$) were found to be associated with elevated risk of occurrence of both physical assault and neglect. Interestingly, when we compared the results of the risk of either form of maltreatment for the teenage mothers group and the whole sample, poverty (aOR = 2.08, $p < .05$), divorced or never married (aOR = 1.83, $p < .05$), and poor parent-child interaction (aOR = 3.76, $p < .01$) were the unique risk factors for the teenage mothers group.

Cumulative risk for child maltreatment

To investigate the association between presence of multiple risk factors and the risk of child maltreatment, four risk domains were established to examine how each of broader domains can affect the likelihood of child maltreatment. Table 3 represents associations between each categorized domain and child maltreatment. As shown, the domain of poorer family background or structure (aOR = 1.57, $p < .05$), more maternal stressors (aOR = 1.60, $p < .05$), poor mother-child interaction (aOR = 1.85, $p < .05$) and more child behavioral issues (aOR = 2.07, $p < .05$) were associated with physical assault. For neglect, poorer family background or structure (aOR = 2.09, $p < .01$), more maternal stressors (aOR = 1.73, $p < .05$), and poor mother-child interaction (aOR = 1.96, $p < .05$) were significant risk domains.

Meanwhile, poor mother-child interaction (aOR = 2.55, $p < .01$) was found to be the only risk domain significantly increased the risk for perpetrating both physically assault and neglect. While all risk domains were significantly associated with either physical assault or neglect for the whole sample, only poorer family background or structure (aOR = 3.19, $p < .001$) and poor mother-child interaction (aOR = 2.68, $p < .05$) were the unique risk domains associated with the teenage mothers group.

To further examine the effect of each specific domain on child maltreatment while controlling for the influence of other domains, Table 4 presents a multivariate regression model in which all domains were included in the model as predictors for child maltreatment. Only family background or structure remained a significant risk domain for neglect while controlling other risk domains. Meanwhile, poor mother-child interaction was the only significant risk domain for co-occurrence of physical assault and neglect. No significant risk domain was observed for physical assault. It is noteworthy that whereas poorer family background/ structure and more maternal stressors remained significant risk domains holding others constant for either form of maltreatment for the whole sample, only the domain of poorer family background/ structure stands out from other domains for the teenage mother subgroup.

The findings support our second hypothesis of “piling up” effect of exposure to multiple risk domains on child maltreatment risk. Figure 1 shows an increasing trend in child

maltreatment risk over the number of risk domains the mother was exposed to. For mothers who had zero risk domain, 23.3% of mothers reported physical assault, 26.7% reported child neglect, 12.9% reported both physical assault and neglect, and 37.1% reported either form of maltreatment. However, when mothers were exposed to three or more risk domains, there were two- to threefold increase in the percentage of mothers perpetrated physical assault (49.0%), neglect (57.1%), both physical assault and neglect (36.7%), and either physical assault or neglect (72.7%). The logistic regression results as shown in Table 5 represent corresponding results in Figure 1. When compared to mothers with zero risk factor domain, mothers who were exposed to three to more risk domains were 3.39 times more likely to engage in physical abuse ($p < .01$). Meanwhile for neglect, compared with mothers with zero risk factor domain, the maternal risk for neglect increased from 3.11 times if exposed to two risk domains ($p < .001$) to 4.22 times if exposed to three or more risk domains ($p < .001$). Further, comparing with mothers without exposure to any risk domain, maternal risk of perpetrating both physical assault and neglect elevated to 4.18 times for those having three or more risk domains ($p < .01$). Interestingly, while similar piling up effects of risk domains were observed for either form of maltreatment for the whole sample and teenage mothers subgroup, stronger effect was found for the teenage mothers group, with the risk of child maltreatment inflated to 5.05 times when the mothers exposed to three or more risk domains.

DISCUSSION

As the socio-ecological model would suggest, a combination of characteristics at different socio-ecological levels were related to physical assault and neglect in this study. Our findings show both overlapping and unique risk factors for physical assault and neglect. Specifically, young mothers' essential relationships with the family and the child were important factors shared by both physical assault and neglect. Interesting patterns of risk factors emerged when we looked at risk factors uniquely associated with specific type of child maltreatment. In particular, young mothers who used substance, had depressive symptoms, and lower socioeconomic background were at higher risk for neglect. This may be explained by that maternal substance use and depressive symptoms impaired awareness of and sensitivity to environmental and child cues (Mayes & Truman, 2002) and impeded mothers' capacity to monitor and protect their children (Widom & Hiller-Sturmhofel, 2001), hence elevated the risk for neglect. For physical assault, larger family size and perceiving child as difficult were distinctive risk factors, which are consistent with previous studies finding larger family size (Zuravin, 1991) and perceiving child as problematic (Graham et al., 2001) as salient risk factors for child physical abuse in the West. As Hong Kong families usually need to cope with tight living spaces, larger family size may easily trigger conflict among family members including parent-child conflict. Applying the attribution theory (Weiner, 1986) to understanding physical assault against children, mothers who perceive their child as difficult will hold the child responsible for the problem behaviors, thereby eliciting

physical disciplinary tactics.

There is an exposure-response relationship between risk domains and child maltreatment risk, meaning that the more the exposure to risk domains, the higher the risk for physical assault and neglect. In particular, the mothers exposed to two and three or more risk domains are at significant risk for perpetration of physical assault, neglect, both forms, and either form of maltreatment. This observation could be explained by the diathesis-stress model (Falconer, 1965) that when young mothers' exposure to risk domains (i.e., the environmental stressors) accumulate to the extent exceeding their capacity to cope (i.e., the individual's vulnerabilities), they may resort physical disciplinary tactics or show deficits in meeting the child's basic needs.

Interestingly, the domain of family background/structure stands out from other domains as the only domain significantly associated with child neglect when other domains were taken into consideration. This finding is in contrary to the ecological model that asserts domains most proximal to child maltreatment, such as parent-child interaction and characteristics of the parent and child are more influential. This suggests young mother's family background that forms the child's rearing environment may be particularly important in understanding child neglect in young Chinese families. In fact, Chan (2015) argues that family disruption and adversities are especially important in families with children because such situation would impair parental functioning and set the stage for family violence and child

maltreatment. This concept echoes with Wolfe (2011) stating that distal domains that shape the child's growing up environment such as poverty and stress are of special importance in studying child maltreatment, yet understudied in previous literature. When all domains were considered together as predictors of physical assault, none of the domains emerged as significant, suggesting that there might be interaction between risk domains and it is important to consider these inter-related risk domains simultaneously when examining physical assault. Effort to further understanding how these domains of risk are associated with physical assault is warranted.

The domain of parent-child interaction stands out as the only significant risk domain for perpetration of both physical assault and neglect. This finding suggests that when essential interaction between the young mother and the child becomes dysfunctional, the mothers' risk of using multiple forms of child maltreatment elevates. Pregnancy at young age is often unplanned. Young parents who are not prepared for parenthood may hold misconceptions of the child's abilities and unrealistic expectation of child's compliance (McHugh, Kvernland, & Palusci, 2015). Daily parent-child interaction could be very stressful for young mothers if they are challenged by parenting difficulties and lack of social support. This is especially true if they are reluctant to seek help when in need because of the fear of social stigma attached to teenage and young mothers in Chinese society. They may therefore bear additional stress and resort to more serious physical disciplinary tactics and neglectful acts.

While two risk domains, poorer family background/structure and more maternal stressors significantly associated with perpetration of either physical assault or neglect among all young mothers. A closer examination into the subgroup of teenage mothers showed intriguing results that converged to only risk domain, that is, poorer family background (including living in poverty and being single or divorced) was the stand-alone significant domain associated with risk of perpetration of either physical assault or neglect. Due to the social norms that disapprove teenage pregnancy in Chinese society, teenage mothers who feel shameful may avoid seeking social and public support when in need. Teenage single mothers, often depicted as promiscuous, irresponsible, and immoral in Chinese society, may be even more stigmatized (Lit, 2015). Social stigma may be an added strain to the life of teenage mothers living in poverty and thereby elevating their risk for perpetrating physical assault or neglect.

Implications

Based on these findings, implications in practical, research, policy terms are suggested for child protection and support for young Chinese families:

Practice

Given the significance of multiple risks associated with child maltreatment among young mothers, formal support provided by public services and informal social support provided by family members may be effective for this special population. In terms of formal

support, families-at-risk in Hong Kong are identified and monitored by the Comprehensive Child Development Service (CCDS), a government-funded, hospital-based early intervention program targeting the children of such families. As CCDS does not reach out to at-risk families, access to the service is heavily dependent on parents' active participation, which may be challenging for parents who also suffer from difficult life circumstances such as teenage pregnancy. Although evidence has shown that nurse-led home visitation programs successfully promote maternal, child, and family outcomes (e.g., Armstrong, Fraser, Dadds, & Morris, 1999; Bagner, Rodríguez, Blake, & Rosa-Olivares, 2013; Olds, Kitzman, Cole, & Robinson, 1997), implementing these programs in Hong Kong is difficult due to chronic shortage of medical professionals. To address the difficulty of engaging high-risk parents in supportive program, some intervention programs have begun to target grandparents as complementary childcare providers to help at-risk children (McLaughlin, Ryder, & Taylor, 2016). Support provided by grandparents is culturally relevant because of the high proportion of grandparents living with or close to their grandchildren in the Asian context (Mehta & Thang, 2011), and the potential benefits of grandparenting and informal social control for family functioning in Chinese context (Emery, Thapa, Do, & Chan, 2015; McLaughlin et al., 2016).

Research

Although it can be overwhelming for taking on parenting role during adolescence stage,

many young mothers transit well into their parenthood. Further studies could examine what factors contribute to positive parenting by young mothers and well-being of their children. In addition, further studies could examine the role of father-related factors in child maltreatment. While the findings suggest that support should be provided for young mothers to buffer their difficult life circumstances, further research is needed to examine whether formal social support or informal social support are more effective for this special population.

Policy

Even though Hong Kong is the most westernized city in China, sex education at both school and family level is far lagged behind compared with the western counterparts. In the United States, teenage pregnancy has gone down in the past 20 years alongside with the abortion rate and such decreasing trend is thought to be attributable to the increased contraceptive use (Baldwin & Edelman, 2013). Sex education, including promotion of the use of contraceptive among sexually active Chinese adolescents should further be examined.

Limitations

This study is limited by the reliance on single informant (mother-report) for sensitive questions such as child maltreatment acts and substance use and may prone to reporting bias due to social desirability. We attempted to minimize this effect by having trained social workers to administer the survey and confidentiality was ensured. Similarly, mother-report of child characteristics and parent-child interaction may also be subject to bias. In the future,

researchers might include other informants to collect relevant data. In addition, we dichotomized the mothers into maltreatment group or not according to the mothers' self-report of any physical assault or neglectful acts. This categorization is less stringent as compared to child maltreatment acts substantiated by child protective services (CPS) or by professionals, yet, harsh disciplinary acts or neglectful parenting not requiring intervention by CPS can be harmful to children. Also, physical punishment is associated with more severe physical abuse (Straus, 2000) and may even escalate into substantiated child maltreatment. This way of categorization is deemed appropriate for this study as it aimed to inform preventive efforts that target any physical assault and neglectful acts against children at an earlier stage. Second, as with many other cross-sectional studies, this study cannot confirm causal relationship of the risk factors for child maltreatment. Further research with longitudinal design is needed to establish causal direction. Moreover, participants in this study were recruited based on service target of local social service program, which compromise the generalizability of our findings to the general child-bearing women in Chinese context. Nonetheless, this study reflected the situation of a rather unique and understudied population of teenage and young mothers experiencing various risk factors. Another limitation of this study is the dichotomization of risk variables that we could not take into consideration of the strengths of individual risk factors. However, this simple way of categorization would potentially be an easy and practical way for health care and helping

professionals to screen for cases prone to child maltreatment. Moreover, although the use of cumulative risk approach in this study found potential interactions among risk domains, it was unable to address how these domains interact with each other. Further study to examine interactions among risk factors and risk domains is needed. Furthermore, this study focused on examining factors that put young mothers at risk for child maltreatment, not much is known about the protective factors. Yet, the risk factors examined in this study such as negative parent-child interaction and poor family cohesion provide insights into child maltreatment preventive measures targeting these areas.

CONCLUSION

Child maltreatment and adolescent pregnancy are both important social and public health concerns in many countries and regions, including Hong Kong. This study adds on to the limited literature on young pregnancy and child maltreatment in Chinese context and informs child maltreatment preventive efforts for this special population. Social support, particularly informal social support provided by grandparents may be helpful for Chinese young mothers to alleviate their stress due to parenting and own life difficulties, and ultimately prevent child maltreatment.

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Table 1. Descriptive and inferential statistics for all study variables.^a

	Total sample (N=392)	Physical assault (n=122)		Neglect (n=157)		Both (n=76)		Either (ALL) (n=203)	
	n (%) / M (SD)	n (%) / M (SD)	<i>p</i>	n (%) / M (SD)	<i>p</i>	n (%) / M (SD)	<i>p</i>	n (%) / M (SD)	<i>p</i>
Child gender			**						
Boy	202 (51.50%)	75 (61.50%)		83 (52.90%)		45 (59.21%)		113 (55.67%)	
Child age	2.70 (2.34)	3.58 (1.98)	***	3.50 (2.53)	***	3.69 (1.96)	***	3.48 (2.41)	***
Maternal delivery age	18.64 (2.29)	18.70 (2.53)		18.62 (2.41)		18.55 (2.58)		18.69 (2.42)	
Maternal marital status					*				
Married	205 (52.30%)	64 (52.50%)		72 (45.90%)		35 (46.05%)		101 (49.75%)	
Divorced or never married	187 (47.70%)	58 (47.50%)		85 (54.10%)		41 (53.95%)		102 (50.25%)	
Maternal education level									
Completed high school or higher	194 (49.60%)	64 (52.50%)		74 (47.10%)		40 (52.63%)		98 (48.28%)	
Rapid repeat pregnancy	137 (34.90%)	59 (48.40%)	***	70 (44.60%)	**	40 (52.63%)	***	89 (43.84%)	***
Receiving social security	70 (18.20%)	26 (21.50%)		40 (26.10%)	**	18 (24.00%)		48 (24.12%)	**
Maternal employment status									
Employed	83 (21.20%)	27 (22.10%)		29 (18.50%)		15 (19.74%)		41 (20.20%)	
Family income adjusted by household size ('000 HKD)	3.73 (2.50)	3.55 (2.30)		3.57 (2.43)		3.25 (2.04)		3.64 (2.48)	
Maternal binge drinking in past 30-day	77 (20.02%)	27 (22.70%)		37 (24.70%)		18 (24.32%)		46 (23.59%)	
Maternal current drug use	16 (5.00%)	6 (5.90%)		12 (9.10%)	**	5 (7.94%)		13 (7.60%)	*
Maternal negative states									
Depression	4.93 (4.54)	5.30 (4.51)		5.55 (4.70)	*	5.89 (4.52)	*	5.28 (4.6)	
Anxiety	5.13 (4.38)	5.72 (4.68)		5.86 (4.36)	**	6.21 (4.52)		5.64 (4.46)	*
Stress	7.69 (5.04)	8.54 (5.02)	*	8.86 (4.88)	***	9.28 (4.95)	**	8.43 (4.95)	**
Maternal physical wellbeing	49.12 (7.50)	48.92 (8.06)		48.26 (7.83)		48.60 (8.19)		48.52 (7.83)	
Social support	61.47 (16.67)	58.75 (17.02)	*	59.44 (16.22)		57.03 (15.59)	**	59.96 (16.84)	
Family cohesion	37.31 (8.20)	35.56 (8.70)	**	35.57 (8.23)	**	34.17 (8.09)	***	36.46 (8.58)	*
Parenting stress									
Parental distress	37.45 (8.75)	37.91 (9.58)		39.17 (7.67)	**	40.00 (7.71)	**	38.3 (8.42)	
Mother-child interaction	29.74 (6.85)	31.30 (6.78)	**	31.82 (6.42)	***	32.85 (6.51)	**	30.97 (6.89)	***
Difficult child	32.12 (9.20)	34.83 (9.40)	***	34.63 (8.80)	***	36.34 (8.37)	***	34.1 (9.25)	***

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2. Relationship between individual risk factors and child maltreatment.

Risk factors	Physical assault		Neglect		Both physical assault or neglect		Either physical assault or neglect (whole sample)		Either physical assault or neglect (Aged 18 or below)	
	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI
Family background/ structure										
Rapid repeat pregnancy	2.15	** 1.35 - 3.42	1.75	* 1.12 - 2.71	2.31	*** 1.36 - 3.90	1.96	** 1.24 - 3.10	1.55	0.82 - 2.91
Mother Not High School graduated	0.85	0.54 - 1.32	1.19	0.78 - 1.81	0.84	0.50 - 1.41	1.17	0.76 - 1.79	0.80	0.45 - 1.43
Poverty-level income	1.08	0.68 - 1.71	1.52	0.98 - 2.37	1.28	0.75 - 2.20	1.38	0.89 - 2.14	2.08	* 1.12 - 3.89
Mother Divorced or Never married	0.98	0.63 - 1.53	1.59	* 1.04 - 2.43	1.38	0.82 - 2.30	1.25	0.82 - 1.92	1.83	* 1.03 - 3.27
Large family size	1.96	** 1.19 - 3.24	1.20	0.74 - 1.94	1.77	* 1.01 - 3.10	1.48	0.9 - 2.42	1.61	0.84 - 3.09
Receiving social security	1.13	0.64 - 2.01	2.13	** 1.23 - 3.69	1.33	0.71 - 2.51	2.06	* 1.15 - 3.71	3.74	** 1.68 - 8.30
Maternal unemployment	0.58	0.21 - 1.61	1.47	0.66 - 3.31	0.59	0.17 - 2.06	1.31	0.58 - 2.98	1.37	0.51 - 3.69
Maternal Stressors										
Poor Maternal physical health	0.97	0.59 - 1.66	1.58	0.97 - 2.56	1.23	0.69 - 2.20	1.37	0.83 - 2.26	1.49	0.76 - 2.92
Maternal depression	1.51	0.89 - 2.55	1.79	* 1.09 - 2.94	1.60	0.89 - 2.90	1.92	* 1.15 - 3.20	2.26	* 1.13 - 4.52
Maternal anxiety	1.42	0.84 - 2.38	1.34	0.81 - 2.20	1.39	0.77 - 2.50	1.48	0.89 - 2.46	1.25	0.63 - 2.47
Maternal stress	1.41	0.83 - 2.39	1.44	0.87 - 2.37	1.75	0.98 - 3.12	1.34	0.8 - 2.23	0.97	0.49 - 1.93
Poor family cohesion	1.95	** 1.19 - 3.20	1.78	* 1.10 - 2.89	2.03	* 1.17 - 3.53	2.03	** 1.23 - 3.36	2.58	** 1.28 - 5.21
Social isolation	1.53	0.93 - 2.51	1.21	0.75 - 1.95	1.62	0.93 - 2.83	1.26	0.77 - 2.06	0.93	0.48 - 1.78
Maternal binge drinking	1.11	0.63 - 1.96	1.31	0.77 - 2.24	1.16	0.61 - 2.20	1.33	0.76 - 2.32	1.33	0.64 - 2.75
Maternal drug use	1.32	0.45 - 3.92	4.82	** 1.48 - 15.75	1.96	0.64 - 5.99	4.49	* 1.19 - 17.00	4.43	0.49 - 40.39
Mother-Child interaction										
Parental distress	1.91	0.91 - 4.01	1.55	0.76 - 3.19	1.92	0.87 - 4.24	1.82	0.85 - 3.89	2.25	0.64 - 7.86
Poor parent-child interaction	1.88	* 1.03 - 3.43	1.92	* 1.06 - 3.48	2.54	*** 1.35 - 4.78	1.73	0.92 - 3.26	3.76	** 1.4 - 10.07
Child behavioural issue										
Difficult child	2.07	* 1.08 - 3.98	1.82	0.96 - 3.48	1.80	0.88 - 3.67	2.50	* 1.23 - 5.10	1.59	0.61 - 4.16

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 3. Association between each risk factor domains and child maltreatment.

Risk factor domain+	Child maltreatment										
	Physical assault		Neglect		Both physical assault or neglect		Either physical assault or neglect (ALL)		Either physical assault or neglect (Aged 18 or below)		
	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	
Poorer family background/structure	1.57	* 1.00 - 2.46	2.09	** 1.36 - 3.21	1.63	0.97 - 2.74	2.28	*** 1.47 - 3.52	3.19	*** 1.73 - 5.88	
More maternal stressors	1.60	* 1.02 - 2.51	1.73	* 1.13 - 2.66	1.59	0.95 - 2.67	1.97	** 1.27 - 3.06	1.34	0.75 - 2.38	
Poor mother-child interaction	1.85	* 1.08 - 3.16	1.96	* 1.17 - 3.30	2.55	** 1.43 - 4.55	1.78	* 1.03 - 3.06	2.68	* 1.17 - 6.13	
More child behavioral issue	2.07	* 1.08 - 3.98	1.82	0.96 - 3.48	1.80	0.88 - 3.67	2.50	* 1.23 - 5.10	1.59	0.61 - 4.16	

#All adjusted for child gender and age

+Participants with number of risk factors present in each domain higher than the mean number of the whole population were deemed in the high risk end

Table 4. Multivariate association between the risk factor domains and child maltreatment.

Risk factor domain+	Child maltreatment									
	Physical assault		Neglect		Both physical assault or neglect		Either physical assault or neglect (ALL)		Either physical assault or neglect (Aged 18 or below)	
	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI
Poorer family background/structure	1.43	0.89 - 2.28	1.79 *	1.14 - 2.81	1.49	0.86 - 2.56	1.90 **	1.20 - 2.99	2.75 **	1.45 - 5.20
More maternal stressors	1.30	0.80 - 2.12	1.47	0.92 - 2.34	1.27	0.73 - 2.23	1.62 *	1.01 - 2.61	1.10	0.58 - 2.08
Poor mother-child interaction	1.59	0.90 - 2.82	1.55	0.89 - 2.71	2.20 *	1.19 - 4.07	1.34	0.74 - 2.41	2.22	0.94 - 5.24
More child behavioral issue	1.68	0.85 - 2.82	1.42	0.72 - 2.79	1.34	0.63 - 4.07	1.97	0.94 - 4.14	1.35	0.49 - 3.69

#All adjusted for child gender and age

Table 5. Association between number of risk factor domain and child maltreatment.

No. of risk factor domain at high risk end	Child maltreatment									
	Physical assault		Neglect		Both physical assault or neglect		Either physical assault or neglect (ALL)		Either physical assault or neglect (Aged 18 or below)	
	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI	aOR#	95% CI
0	REF	REF	REF	REF	REF	REF	REF	REF	REF	REF
1	1.30	0.71 - 2.38	1.69	0.95 - 3.00	1.30	0.62 - 2.72	1.57	0.94 - 2.62	1.23	0.58 - 2.60
2	1.75	0.94 - 3.26	3.11 ***	1.71 - 5.64	1.88	0.90 - 3.93	3.150 ***	1.81 - 5.51	3.02 **	1.36 - 6.69
>=3	3.39 **	1.62 - 7.10	4.22 ***	2.03 - 8.77	4.18 **	1.84 - 9.46	3.850 ***	1.88 - 7.87	5.05 **	1.63 - 15.65

#All adjusted for child gender and age

Figure 1. Percentage of children maltreated by presence of number of significant risk domains.

