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ABSTRACT

Prior research explored the individual contributions of grandparents, domestic workers, and preschool institutions in supporting maternal employment, yet few have examined them simultaneously. More importantly, the increasing diversity and multiplicity in childcare arrangement throughout different stages of childrearing has been largely overlooked. Utilizing data from the Hong Kong Panel Study of Social Dynamics (HKPSSD), this study examines the effects of diverse childcare combinations on women's labor supply from a life course perspective. Our findings reveal that mothers with younger children are considerably less likely to remain in the workforce and work fewer hours than their childless counterparts. Nevertheless, grandparental co-residence, outsourcing and center-based care can all significantly alleviate such motherhood penalty, albeit to different extents. Notably, during the initial years of motherhood, solely relying on either grandparental care or center-based care yields limited effects, but these options become advantageous for mothers when paired with assistance from domestic workers. These findings highlight the potential for policy interventions that directly subsidize parents for marketized approaches to

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childcare, particularly in societies experiencing a decline in multigenerational households and rising costs for formal childcare.

Introduction

Globally, women's labor supply has experienced prolonged growth over the past decades (International Labour Organization 2018). However, the highly gendered division of childrearing responsibilities continues to drive a significant proportion of mothers out of the workforce. Even among OECD countries with relatively high levels of labor force participation among prime-age women, the gap between employment rates of childless women and mothers with preschool-aged children remains substantial and persistent. Mothers who choose to stay in the labor market also struggle to achieve work-life balance. Many are forced to make employment adjustments, such as reducing working hours or shifting to part-time jobs, resulting in a reduction in their lifetime earnings (Xu et al. 2022). A lack of childcare support is one of the major obstacles to women's labor force participation, undermining women's economic opportunities, and stalling progress toward achieving gender equality.

Families take a variety of approaches to enable women to maintain their careers meanwhile rear children. Three non-parental childcare arrangements are most common. First, utilizing extended family members, primarily grandparents, to provide occasional or regular help with childcare is a widespread practice, particularly in cultures with strong family ties (e.g. Chen, Liu, and Mair 2011). Studies have shown that grandparents play a prominent role in providing informal childcare and supporting maternal employment, especially for families with limited financial resources (Posadas and Vidal-Fernandez 2013). However, the extent of grandparental care is often constrained by grandparents' health conditions, living arrangements, and retirement status (Zhou, Kan, and He 2022).

A second viable option for home-based childcare is outsourcing, which involves hiring a professional caregiver (e.g., domestic helper, babysitter, nanny, childminder) to look after the children. Outsourcing childcare has previously been a practice limited to wealthy families but has recently gained popularity among lower-middle-income families because of an increasing supply of affordable migrant labor (Cortes and Pan 2013, Cheung 2021, 2023). In the Asia-Pacific region, millions of foreign domestic workers (FDWs) from Southeast Asian countries (e.g., the Philippines, Indonesia, Thailand, and Cambodia) have become an

important source of affordable labor for care work in Asia (particularly Hong Kong, Singapore, and Malaysia) (Gallotti and Branch 2015). Previous research has found that hiring FDW improves women's labor supply (Cortes and Pan 2013, Tong and Chiu 2017), primarily by reducing women's time spent on housework and increasing their time spent on paid work (He and Wu 2019, Chen and Zhou 2022). Nevertheless, outsourcing childcare is still viewed with caution by many families, as the idea of an outsider entering a household may create trust problems in regards to privacy, security and even affect the employer's family relationship negatively (Chan 2005), especially when a FDW comes from a different cultural background.

Last, childcare centers and preschools (either public or private) are important formal care providers for pre-primary-age children in wealthy societies. Many developed countries have devoted resources to establishing early childhood education and care (ECEC) systems to meet children's developmental needs and women's labor supply (Naumann et al. 2013). Across OECD countries, an average of 36 percent of children aged 0 to 2 and 87 percent of children aged 3 to 5 are enrolled in ECEC (OECD 2021). However, there are considerable regional variations in the availability and quality of these childcare centers and preschools, resulting in a limited effect on mothers' labor force participation in many places (see Cascio, Haider, and Nielsen 2015 and the corresponding Special Section of Maternal Labor Supply Promotion Policies on Labour Economics). Notably, in places where ECEC is not heavily subsidized by the government, rising costs for formal childcare have generated heavy financial burdens for working parents (OECD 2020).

Recent research indicates a growing trend among parents to utilize a variety of childcare options rather than depending solely on one single form of arrangement (Hepburn 2018, Wheelock and Jones 2002, Brady and Perales 2016). In the United States, the nationally representative ECLS-B study found that 33% of children experienced multiple childcare arrangements at some point in time (Pilarz 2018). There are numerous factors that contribute to the adoption of mixed childcare packages. One reason is the transformation of family structures over time, such as the increase in single-parent families and the decline in multigenerational families, which has presented new constraints on the availability of familial childcare support (Brady 2016). Another reason is that modern families tend to have a wider range of needs and preferences for childcare, taking into account aspects such as quality, cost, flexibility, and accessibility at the same time (Folk and Yi 1994, Scott, London, and Hurst 2005).

Such arrangement diversity and multiplicity bring new challenges for researchers attempting to evaluate their impact, as most studies have focused on one single form of non-parental childcare without considering

the presence of others. Consequently, it is difficult to empirically determine which form (or combination) of childcare is more effective in supporting maternal employment. Furthermore, different stages of child development involve different caring tasks, and thus certain non-parental childcare providers may be more or less helpful during these stages. Yet, most related research have only examined how motherhood itself influences women's labor market outcomes (e.g. Kuhhirt 2012, Kahn, García-Mangano, and Bianchi 2014) and subjective well-being (Craig and Sawrikar 2009) across different childrearing stages. To our knowledge, no prior studies have adopted a life course perspective to concurrently and systematically compare the effectiveness of various combinations of childcare options in enhancing women's labor force participation at different stages of childrearing.

To fill these research gaps, we use data from a representative household panel study in Hong Kong to simultaneously examine the impacts of both formal and informal childcare support on mother's labor supply, focusing on the heterogeneous effects present at different childrearing stages. Hong Kong is a global Chinese city that fuses eastern and western cultures and where the uses of intergenerational support, domestic outsourcing, and center-based services for childcare are all very common. Therefore, the case of Hong Kong offers us a rare opportunity to directly compare the relative impacts of different types of childcare providers on maternal employment.

The impact of motherhood on women's employment decisions

Like many other domestic duties, childrearing responsibilities disproportionately fall on women (Zhou and Kan 2019). Even in cultural contexts that place high value on shared responsibilities, such as in Scandinavian countries, couples continue to report disparities in time spent on childcaregiving (Aboim 2010). Childcare responsibilities therefore frequently result in mothers, rather than fathers, making career sacrifices. When non-parental childcare options are not available, mothers are often forced to reduce their working hours or to leave the workforce altogether (Kahn, García-Mangano, and Bianchi 2014).

The negative impacts of childcare on women's careers have been identified in numerous studies (e.g. Budig and England 2001, Aisenbrey, Evertsson, and Grunow 2009, Correll, Benard, and Paik 2007, Zhou 2017). The *motherhood penalty* describes the (unexplained) lower wages of mothers compared to childless women. However, we can also observe such "penalties" for mothers regarding other labor market outcomes, such as hiring (Correll, Benard, and Paik 2007), promotion (Fuegen et al. 2004), occupational status (Abendroth, Huffman, and Treas 2014), and perhaps first

and foremost, whether and to what extent mothers can participate in the labor force. As discussed by Kahn, García-Manglano, and Bianchi (2014), most existing studies have only focused on the motherhood penalty in the workplace while neglecting women's selectivity into employment, particularly the influence of motherhood on their employment decisions. Such decisions range from whether to stay in or re-enter the labor market after childbirth to how many hours can be spent in paid work if employed. An important factor that influences these decisions is the age of the children.

The burdens of motherhood are highly contingent on childrearing stages. Infants and toddlers usually require much more intensive mothering and caring, especially when the mother is still breastfeeding. At this stage, non-parental childcare arrangements may complement but not substitute for a mother's childrearing responsibilities. Adopting a life course perspective on work-family conflict, Nomaguchi and Fetto (2019) found that when children are younger, mothers work fewer hours, experience more job pressure, enjoy fewer career opportunities, and are provided with less supervisor support. Similarly, Budig (2003) identified that the number of preschool children of the mother reduced her probability of being a full-time employee but older children was found to encourage mother's full-time employment while discouraging part-time employment. However, little prior research has used panel data to examine whether the career penalties experienced by mothers change as the demands of childrearing decline, and even less is known about the changing roles played by different childcare providers throughout this process.

Three approaches to non-parental childcare

Methods for childcare provisions vary substantially across social and cultural contexts. Support from extended family members (e.g., grandparents) has long been recognized as the most reliable source of childcare in societies that value kinship ties (Chen, Liu, and Mair 2011), while privatized and marketized approaches to childcare are more widely accepted in neoliberal societies that emphasize individualism, and the role and responsibility of the state in the delivery of childcare services is more prominent in welfare states (e.g., Nordic social democracies) and societies with a socialist tradition (Gornick 2003). These associations between mothers' labor force participation and formal and informal child care provision and usage diverge across countries with different institutional models within the European Union (Cebrián et al. 2019). In the following section, we specifically discuss each of these three approaches to non-parental childcare and their implications for maternal employment.

Grandparenting

A variety of research done in different countries has focused on grandparents' roles as informal caregivers for children and the implications for women's employment (Aassve, Arpino, and Goisis 2012, Kanji 2018, Posadas and Vidal-Fernandez 2013, Kan and Zhou 2022). For instance, grandparenting has been found to enhance mothers' labor supply in the United Kingdom (Kanji 2018). In the United States, Posadas and Vidal-Fernandez (2013) found that this impact is more significant among minority groups (such as Blacks and Hispanics) and single and never-married mothers. Studies have also revealed important cross-national variations in the prevalence and intensity of grandparental care and the extent to which grandparents may reduce mothers' child-caring burdens (Hank and Buber 2009). For example, Aassve, Arpino, and Goisis (2012) conducted a comparative analysis of seven European countries, finding that the positive association between grandparenting and maternal employment is insignificant in some countries when controlling for family types (i.e., modern families, traditional families, and mixed families), which are constructed based on the cultural values of the mother and the grandmother.

Grandparenting is often the most affordable childcare option because it is largely a voluntary behavior and usually does not incur extra costs. Moreover, unlike the rigid operation hours of the center-based childcare service provider which may not be matched with the employed mothers' working hours, the duration of childcare offered by the grandparents can be adjusted according to the needs. Therefore, as found by Brandon and Hofferth (2003), full-time employed mothers are more likely than the part-time employed mothers to use relatives for childcare rather than the school-based childcare programs. However, the availability of grandparental care is often constrained by independent conditions. First, grandparents who perform childcare tasks must have sound cognitive, mental, and physical health (Xu 2019). Child-rearing, especially for young children, is mentally and physically demanding and requires a large amount of energy from the caregiver. Older grandparents often experience physical declines that make them more likely to be the receiver rather than the provider of family care. This may generate a dual burden of eldercare and childcare on mothers, further discouraging them from fully engaging in paid work (Zhou, Kan, and He 2022). Moreover, living arrangements and geographic proximity also help determine the level of involvement grandparents may have with their grandchildren (Chan and Ermisch 2015). Drawing on longitudinal data from China, Yu and Xie (2018) found that the motherhood wage penalty is completely offset for women co-residing with their own parents. Finally, as governments work to encourage active aging as a solution to labor shortage problems, increases in retirement ages may prevent grandparents from exiting the formal labor market and offering childcare support (Posadas and Vidal-Fernandez 2013).

Outsourcing

Outsourcing childcare duties to the market has become an increasingly popular family strategy for working parents in some developed societies (Adamson and Brennan 2017). The concept of outsourcing originally refers to the business practice of hiring a third party outside a company to perform services or functions traditionally performed in-house (Harbach 2012). In recent years, this practice has extended from firms to families as more and more dual-earner households choose to hire an outsider (e.g., nanny or domestic worker) to share women's childcare and housework duties, allowing women to fully engage in paid work.

Most studies on the effects of domestic outsourcing have focused on the gender gap in time spent on housework, especially among married couples. For example, research in the U.S. has found that among dual-earner married couples, outsourcing only generated small reductions in the time that female partners spent on cooking and cleaning (Killewald 2011). Similarly, using data from matched dual-earner couples in Australia, Craig and Baxter (2016) found no evidence that domestic outsourcing substituted for time spent on household tasks or narrowed gender gaps in domestic labor. However, new evidence based on longitudinal data has suggested the opposite that outsourcing does in fact reduce housework time, narrow gender gaps, and lower women's time commitments (Craig et al. 2016). A recent study on married couples in Hong Kong suggested that hiring FDWs significantly reduces the time that wives spend on domestic work and increase their time spent on paid work, leading to a more equal division of labor within the family (Chen and Zhou 2022). Nevertheless, Cheung and Lui (2022) suggested that there might exist a time-displacement effect, that the reduction in housework time is accompanied by spending extra time managing the task accomplished by the live-in domestic worker and paying more attention to the quality of the parent-child relationship and their children's development.

Although dual-earner households with young children are among the most likely households to outsource (Sevilla-Sanz, Gimenez-Nadal, and Fernández 2010, Van der Lippe, Tijdens, and De Ruijter 2004), the extent to which outsourcing childcare actually boosts mothers' labor force participation remains understudied. A handful of empirical studies have been conducted on this topic, mainly in Hong Kong and Singapore, two societies with large numbers of female FDWs. For example, Cortes and Pan (2013) found that hiring foreign domestic workers boosted the labor force participation of mothers with a young child by between 10 percent and 14 percent. Moreover, the impact of outsourcing varied based on socioeconomic status, with the effect highest among those households with upper-secondary education, those living in subsidized housing, and those where the husband earns a relatively low income (He and Wu 2019).

In spite of the low pay of FDWs, the live-in rule imposed by the Hong Kong government¹ still hinders low-income households from employing them, as these families typically suffer from limited living spaces. Low-income mothers often experienced stronger work-family demands. Even though they experienced intense financial strain, they had to postpone their working plans until their children grew older both because of their inability to find decently paying work and a lack of support from husbands, relatives, and domestic workers. Furthermore, policies often require the employer to provide lodging to domestic workers, which may be unappealing for the employer or unrealistic because of the size of the apartment, especially in densely populated cities like Hong Kong. This type of policy may create another barrier for a family to employ domestic workers for childcare.

Center-based childcare

Center-based childcare services, such as childcare/daycare centers and kindergartens, are another method for alleviating mothers' childcare burdens. Depending on a government's economic policies, these center-based childcare services may be mainly operated or subsidized by the government, the private sector, non-profit service providers, or through a combination of these types of operation (OECD 2020). Regardless of the type of operation, empirical research has demonstrated the positive effect of center-based childcare services on mothers' labor force participation.

For instance, Asai, Kambayashi, and Yamaguchi (2015) used panel data from 1990 to 2010 and found that increases in childcare center availability boosted women's employment rate by two percentage points in both large and small prefectures in Japan. Young (2019) found that Canadian parents with child under six who viewed the availability of childcare services as "excellent" encountered less work-family conflict than their counterparts with lower perceived levels of childcare availability. However, the impact of the availability of childcare services varied according to the household structure and individual characteristics. Asai, Kambayashi, and Yamaguchi (2015) found that mothers' employment rate in nuclear households increased with childcare center availability, but the employment rate of mothers in three-generation households did not. Similarly, Chen, Liu, and Mair (2011) considered the availability of daycare centers as an alternative source of childcare support and found their impact on the time spent by grandparents on childcare to be insignificant. Regarding individual characteristics, Nollenberger and Rodríguez-Planas (2015) found that the positive effect of full-time public childcare provision on mothers' employment was the most prominent for women ages 30 or above and for women with two or more children.

The effectiveness of center-based childcare services on enhancing mothers' employment also greatly depends on the format of the services,

including the times of operation, costs, and locations. For instance, using 10 years of cross-sectional data, Ruppanner, Moller, and Sayer (2019) found that mothers engaged in less full-time employment and more part-time employment in the United States where childcare services were expensive and school days were shorter. Landivar et al. (2022) also identified a negative association between the employment of lower educated mothers with multiple children and the childcare costs. This implies that childcare service must be affordable and operate for longer periods throughout the day to improve mothers' labor force participation. Indeed, Givord and Marbot (2015) found that an increase in childcare subsidies in France increased the usage of paid childcare services, while Haeck, Lefebvre, and Merrigan (2015) found that the low costs for childcare facilities in Quebec, Canada resulted in a significant increase in mothers' labor market participation. The quality of center-based childcare service makes a difference. For instance, mothers who used the center-based childcare service which had an adequate children-teacher-ratio increased their actual and contractual working hours than those who used the childcare center with lower quality (Stahl and Schober 2020). These studies demonstrate the importance of financial considerations and institutional care quality on mothers' labor force participation.

The case of Hong Kong

Like many other societies, married women in Hong Kong, especially those with young children, are significantly less likely than men to participate in the labor force. As seen in [Figure 1](#), although the relative labor force participation for married women of prime working age (25 to 54) has increased steadily over time, progress for mothers has largely stagnated over the past two decades. Notably, the ratio of female to male labor force participation rate for married people with a youngest child below 6 years old is around 4:10, indicating a substantial gender gap. From a comparative perspective, the labor force participation rate of prime-age women in Hong Kong (72.7 percent in 2017) fell far behind many OECD economies that implemented more pro-family and flexible workplace policies (81.0 percent in the U.K., 82.5 percent in Germany, 82.9 percent in Canada, 83.6 percent in Finland, and 88.7 percent in Sweden) (Research Office Legislative Council Secretariat 2019). By analyzing the Hong Kong census and by-census data from 1991 to 2011, Tong and Chiu (2017) found that the rising labor force participation rate among married women was still constrained by their childrearing responsibilities. However, both hiring a FDW and having younger grandparents living with the family had a positive influence on women remaining in the labor market.

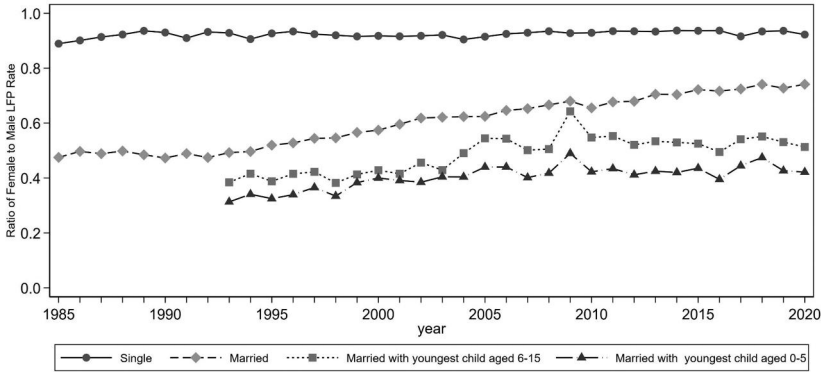


Figure 1. The Ratio of Female to Male Labor Force Participation Rate in Hong Kong Population Aged 25–54, GHS 1985–2020.

In the Chinese tradition, it is common for the parents of married couples to provide childcare support (Li 2017, Chen, Liu, and Mair 2011). Over 90 percent of Hong Kong's population is ethnic Han Chinese, and traditional Confucian values form the basis of Hong Kong's cultural practices. Strong family ties are emphasized, and intergenerational transfer of resources is highly valued. Grandparenting, which ranges from occasional care by non-co-resident grandparents to full-time care by co-resident grandparents, is widely considered to be the most reliable and trustworthy parental care substitute in Hong Kong (Leung and Fung 2014).

Outsourcing childcare duties to the market is also a long-established practice in Hong Kong, from the *muijai* (a type of bondservant) in the past to FDWs from Southeast Asian countries in the modern era (Constable 1996). The preference of employing FDW over grandparenting and childcare centers can also be attributed to the grandparents' ability and childcare providers' quality (Tam 2003). With the gradual decline of multigenerational households and the increasing supply of cheap migrant labor,² an increasing number of married couples in Hong Kong rely on FDWs rather than their elderly parents for housework and childcare (Chen and Zhou 2022). The number of FDWs in Hong Kong reached 400,000 in 2019, representing 10.1 percent of the total workforce (Census and Statistics Department 2020), and covering 12.3 percent of local households (Census and Statistics Department 2021). Specifically, the coverage ratio of these foreign domestic helpers on the nuclear families with working mothers had increased from 23% to 44% from 1995 to 2016 (Research Office of Legislative Council Secretariat 2017). Women with FDW in 2001 were more likely to participate in the labor force comparing to those in 1981 when the FDW was first introduced to Hong Kong (Chan 2006) implying that the presence of FDWs becomes a major

contributor, in addition to expansion of education, to the considerable increase in women's labor supply in Hong Kong over the past decades (Tong and Chiu 2017).

Center-based childcare services are the third type of child-caring in Hong Kong. Unlike many countries where the childcare and early education services are primarily publicly managed and financed (OECD Social Policy Division 2016), childcare services in Hong Kong are provided by private institutions and NGOs subsidized by the government (Hong Kong Social Welfare Department 2020). Even though center-based childcare service is available in Hong Kong, its cost, availability, accessibility and operational hour are unideal to help mothers reduce the childcare burden. For instance, there was a shortage of general childcare services in 2016, with one CCC quota for every 61 children below two years old and every 2 children between two and three years old (Department of Social Work and Social Administration of The University of Hong Kong 2018). The half-day operations of a significant number of kindergarten and childcare centers also impacts mothers' childcare burdens given the time commitments of dropping off and picking up their children.

Data, variables, and methods

Data

This study draws on five waves of data from the Hong Kong Panel Study of Social Dynamics (HKPSSD). As the first representative household panel dataset in Hong Kong, the HKPSSD is designed to collect data at the household and individual levels to track economic and social changes and their effects on individuals' lives (Wu 2016). The baseline sample (3,214 households, including 7,218 adults and 958 children) was first interviewed in 2011 and re-interviewed in 2013. A refreshment sample (1,007 households, including 1,960 adults and 145 children) was added in 2014, which, together with the baseline sample, formed the sample for the subsequent two waves of survey in 2015 and 2017–2018.

Given that our study has several research purposes, we apply different sample restrictions at various analytical stages based on the women's age and motherhood status at the time of the survey, resulting in three distinct analytical samples. Firstly, we restrict the sample to women aged 25 to 54 who never gave birth or had at least one child under 18 years old (3,945 year-observations) to examine the impact of childrearing responsibility on women's labor supply. We exclude mothers who only had adult children from the analysis as their labor supply decision is more likely to be influenced by other age-related factors (such as their health status) rather than childcare responsibilities. Then, we exclude childless women

who had not experienced the motherhood penalty and did not require non-parental childcare providers, which allows us to investigate the effectiveness of non-parental childcare providers in mitigating the motherhood penalty on labor supply. As a result, we obtain 2,123 year-observations of mothers who had at least one child who had not reached adulthood. Lastly, we focus on mothers with children aged 0–6 (599 year-observations) to explore the potential impact of institutional childcare.

Variables

The outcome variables are labor force participation and working hours per week. Labor force participation is a dichotomous variable that equals 1 if a woman was in the labor market at the time of the survey, and otherwise 0. Working hours per week is a continuous variable based on respondents' self-reported weekly working hours.

Childrearing stage, also referred to as developmental stage of the youngest child, is the first key independent variable of interest. To construct this variable, we incorporate information on the youngest child's educational stage and age. For children who have not yet started formal education, we classify those aged 0 to 2 as infants/toddlers, and those aged 3 to 6 as pre-schoolers. For children engaged in formal education, we categorize those in primary school as grade-schoolers, and those in secondary school as teens. In this way, we obtain a variable with five categories: (1) women without children, (2) women whose youngest child was infant/toddler (aged 0 to 2), (3) women whose youngest child was pre-schooler (mainly aged 3–6), (4) women whose youngest child was aged grade-schooler (mainly aged 7 to 12), and (5) women whose youngest child was teen (mainly aged 13 to 17).

Another key independent variable is the combination of childcare provider(s). In the second-stage analysis with the entire sample of mothers, we classify this variable into four categories: (1) mothers without any childcare providers (none), (2) mothers who solely relied on grandparental co-residence as the potential childcare provider³ (GP), (3) mothers who solely relied on assistance from foreign domestic worker (DW), (4) mothers who combined potential grandparental care and assistance from foreign domestic worker (GP and DW). In the third-stage analysis, which exclusively involves mothers with pre-school children aged 0–6, we incorporate preschool institution attendance (PSI) into the combinations and obtain eight categories: (1) none, (2) GP, (3) DW, (4) PSI, (5) GP and DW, (6) GP and PSI, (7) DW and PSI, and (8) GP, DW and PSI.

We also control for a series of individual and family characteristics. Individual-level controls include age, age squared, immigrant status (mainland immigrant = 1), marital status (never married = 1,

cohabitated/married = 2, separated/divorced/widowed = 3), and educational attainment (primary school or below = 1, lower secondary = 2, upper secondary = 3, tertiary = 4). At the family level, we take into account certain factors that may affect both the decision to outsource childcare and women's labor force participation. These factors include housing type (public housing = 1), home ownership (homeowner = 1) and logged monthly family income per capita.⁴ Additionally, we consider the number of rooms within the household as a control variable, as having sufficient living space is important for hiring foreign domestic workers in Hong Kong. To gauge women's bargaining power within the household, we also include the partner's educational attainment in relation to the respondent's (higher = 1, same = 2, lower = 3, missing = 4). Lastly, we control for the number of children in the family to capture the overall childcare workload.

Empirical specification

In this study, we use pooled logit and Tobit models to estimate the determinants of probability of labor force participation and working hours per week, respectively. We choose these models rather than fixed effect models when analyzing panel data from the HKPSSD, for two reasons. Firstly, our primary interest is in estimating the average effects of childcare providers across individuals rather than within-individual changes over time, and pooling all waves of data together can increase the sample size and improves the efficiency of estimation. More importantly, as most families' childcare arrangements are relatively stable (e.g., only 5.89% of mothers have experienced changes in grandparental co-residence status, and 10.51% have experienced changes in domestic workers hiring), fixed effect models may struggle to provide precise estimates given little within-individual variation over time (Allison 2009). We prefer Tobit model over ordinary least squares (OLS) model to estimate the equation with working hours as dependent variables, because the observed working hours for non-workers are cluster at zero (Moffitt 1982). It should be noted that Tobit models present two types of marginal effects. The unconditional marginal effects are the coefficients directly presented in the Tobit model tables, estimated for all observations without limitations. By contrast, the conditional marginal effects are specifically applicable to outcome variables that meet certain limitations (positive working hours in our case), which slightly differ from the coefficients reported in the tables (Moffitt 1982).⁵ In our research context, we opt to report the conditional marginal effects rather than the coefficients in the tables (i.e. unconditional marginal effects), as the decision not to work has already been estimated by the first outcome variable, labor force participation. Moreover, we apply

variance adjustments for individual-level clustering, which allows us to account for the potential bias caused by repeated observations in pooled panel data (Froot 1989, Williams 2000).

In the first-step analysis, with the all-women sample, we include child-rearing stage as the key independent variables in the models to examine the impact of childrearing responsibilities on women's labor supply. In the second-step analysis, using the all-mother sample, we further include various combinations of non-parental childcare providers to test whether these combinations can potentially alleviate the adverse effects of child-rearing responsibilities on mothers' labor supply, if any. Moreover, interactions between the combinations of non-parental childcare providers and childrearing stages are added in this step to assess how the buffering impacts of different combinations vary among mothers in different stages of motherhood. In the third-step analysis, as mentioned in the *Variable* section, we incorporate institutional childcare into the combinations of non-parental childcare providers to investigate the effectiveness of these combinations among mothers with at least one child who has not yet entered formal education (typically younger than 7 years old).

Results

Descriptive statistics

Table 1 shows the descriptive statistics for selected variables by childrearing stage. Women without children had the highest labor force participation rate (87.1 percent) and the longest working time (39.9 hours per week) among all groups. Among mothers, the labor force participation rate increased as children grew older, from 47.9 percent for mothers with infant or toddler children to 61.8 percent for mothers with teen children. Trends in mothers' work time mirrored the trends in labor force participation. Mothers worked approximately 20 to 21 hours per week before their youngest children entered secondary school, and it increased to 27.4 hours after this stage. Meanwhile, mothers received more childcare support when children were younger. The proportion of mothers receiving assistance from either their children's grandparents or domestic workers was 50.4 percent during the infant and toddler stage, gradually decreasing to 10.6 percent as their children reached their teenage years. The combination of the above two forms of childcare providers was not prevalent among mothers across all groups, with fewer than 5 percent of mothers opting for this approach. Regarding preschool institutions, they played a significant role for mothers with children aged 2 to 6. Specifically, 51.5 percent of mothers relied solely on preschool institutions, while 22.7 percent and 13.2 percent adopted a combination

Table 1. Descriptive statistics for selected variables by the developmental stage of the youngest child, HKPSSD 2011–2018.

	The Developmental stage of the youngest child				
	No children	Infant/ Toddler (0–2)	Pre-schooler (3–6)	Grade-schooler (7–12)	Teen (13–18)
Women's labor supply					
Labor force participation	87.1%	47.9%	49.0%	51.2%	61.8%
Working hours per week ^a	39.926 (18.040)	20.209 (22.937)	21.277 (23.503)	20.560 (22.791)	26.905 (23.994)
The combinations of non-parental childcare provider(s)					
The combinations of GP ^b and DW ^c					
None	–	49.6%	57.0%	78.3%	89.4%
GP	–	25.2%	15.1%	7.9%	3.3%
DW	–	21.8%	23.8%	12.4%	7.2%
GP and DW	–	3.4%	4.1%	1.3%	0.1%
The combinations of GP, DW and PSI ^d					
None	–	47.0%	5.5%	–	–
GP	–	23.5%	1.9%	–	–
DW	–	20.5%	1.1%	–	–
PSI	–	2.6%	51.5%	–	–
GP and DW	–	3.0%	0.0%	–	–
GP and PSI	–	1.7%	13.2%	–	–
DW and PSI	–	1.3%	22.7%	–	–
DW, GP and PSI	–	0.4%	4.1%	–	–
Individual-level controls					
Age	35.875 (8.539)	33.701 (4.560)	36.266 (5.051)	41.311 (5.126)	46.178 (4.492)
Immigrant status (mainland immigrant = 1)	15.7%	41.0%	47.1%	50.7%	48.0%
Educational attainment					
Lower secondary	10.8%	22.2%	28.5%	43.8%	50.7%
Upper secondary	45.2%	45.3%	41.1%	38.7%	39.1%
Tertiary (associate/sub-degree)	12.1%	9.4%	9.9%	6.8%	4.4%
Tertiary (degree) or above	31.9%	23.1%	20.5%	10.7%	5.9%
Marital status					
Never married	65.4%	0.4%	0.5%	0.2%	0.1%
Cohabited/married	32.5%	97.4%	97.0%	94.7%	89.1%
Separated/divorced/ widowed	2.0%	2.1%	2.5%	5.1%	10.8%
Family-level controls					
Housing type (public housing = 1)	54.1%	50.0%	45.8%	58.5%	61.6%
Home ownership (homeowner = 1)	52.3%	53.4%	53.7%	50.6%	49.2%
Number of rooms	1.991 (0.884)	2.235 (0.741)	2.192 (0.865)	2.169 (0.806)	2.112 (0.858)
Logged monthly family income (2010 HKD)	3.818 (2.174)	4.913 (1.282)	4.847 (1.294)	4.564 (1.562)	4.308 (1.696)
Partner's relative educational attainment (only available for cohabited/married women)					
Higher than the respondent	16.3%	17.5%	16.7%	19.0%	16.6%
Same as the respondent	47.7%	53.9%	57.9%	56.4%	60.2%

(continued)

Table 1. Continued.

	The Developmental stage of the youngest child				
	No children	Infant/ Toddler (0–2)	Pre-schooler (3–6)	Grade-schooler (7–12)	Teen (13–18)
Lower than the respondent	13.5%	17.9%	16.7%	16.6%	15.3%
Partner's information is missing	22.5%	10.6%	8.8%	8.0%	8.0%
Number of children	–	1.470 (0.808)	1.608 (0.728)	1.760 (0.755)	1.753 (0.736)
Number of observations	1822	234	365	605	919

Note: Standard deviation in parentheses;

^aEqual to zero if not currently working.

^bRepresents currently living with grandparent(s) who aged 75 or below.

^cRepresents currently hiring a foreign domestic worker, and

^dRepresents the child is currently enrolled in a preschool institution.

approach, involving domestic worker hiring and grandparental co-residence, respectively.

For individual characteristics, the average age for women without children was 36 years old with a relatively large standard deviation, which suggests a higher degree of heterogeneity in terms of age. In contrast, ages were more concentrated within the mother groups with the youngest child in a certain age range. Additionally, compared to childless women, mothers were more likely to have been born in mainland China, to be married, and to have a lower level of educational attainment. In terms of family characteristics, women with younger children tended to have better family financial conditions, such as a higher likelihood of being an owner-occupier and living in private housing, having a greater number of rooms in their housing units and reporting higher monthly family income levels. The distribution of partner's relative educational attainment, utilized as a proxy for women's relative power within the household, was consistent across different groups. Moreover, there were no significant differences among mother groups regarding the total number of children.

The effect of childrearing on women's labor supply

Table 2 presents the associations of childrearing responsibilities on women's labor supply. Overall, mothers, especially those with preschool-aged children, were less likely to participate in the labor market and work fewer hours per week than childless women. Specifically, holding other variables constant, compared to that for childless women, the odds of labor force participation for mothers with infants or toddlers, preschooler and grade-schooler were 75.7 percent ($1-e^{-1.415}$), 71.7 percent ($1-e^{-1.262}$), and 58.4 percent ($1-e^{-0.876}$) lower, respectively (Model 2). Likewise, among women active in labor market, those with infants or

Table 2. Logit/Tobit Models Predicting the Effect of Childrearing on Women's Labor Supply, HKPSSD 2011–2018.

	DV: Labor force participation ^a		DV: Working hours per week ^b	
	Model 1	Model 2	Model 3	Model 4
The developmental stage of the youngest child (ref. no children)				
Infant/Toddler (0–2)	–1.996*** (0.172)	–1.415*** (0.225)	–28.271*** (2.892)	–19.487*** (3.435)
Pre–schooler (3–6)	–1.948*** (0.147)	–1.262*** (0.214)	–26.746*** (2.366)	–16.344*** (3.233)
Grade–schooler (7–12)	–1.860*** (0.130)	–0.876*** (0.212)	–27.087*** (1.886)	–13.339*** (3.140)
Teen (13–18)	–1.429*** (0.119)	–0.148 (0.212)	–17.763*** (1.513)	–1.217 (3.027)
Individual-level controls				
Age		0.105 (0.069)		1.265 ⁺ (0.725)
Age squared		–0.002* (0.001)		–0.021* (0.009)
Immigrant status (mainland immigrant = 1)		–0.338** (0.118)		–4.193** (1.595)
Education attainment (ref. lower secondary)				
Upper secondary		0.534*** (0.137)		7.389*** (2.005)
Tertiary (associate/sub-degree)		1.337*** (0.253)		13.202*** (2.606)
Tertiary (degree) or above		1.574*** (0.203)		13.612*** (2.266)
Marital status (ref. never married)				
Cohabitated/married		–0.764*** (0.229)		–6.898* (2.735)
Separated/divorced/widowed		–1.173*** (0.284)		–7.139* (3.318)
Family-level controls				
Housing type (public housing = 1)		0.119 (0.114)		1.198 (1.300)
Home ownership (homeowner = 1)		0.297** (0.113)		3.399** (1.306)
Logged monthly family income (2010 HKD)		–0.391*** (0.043)		–3.010*** (0.256)
Number of rooms		0.147* (0.065)		1.161 (0.731)
Partner's relative educational attainment (ref. higher than the respondent)				
Same as the respondent		0.156 (0.160)		4.295 ⁺ (2.526)
Lower than the respondent		–0.065 (0.220)		3.176 (3.224)

(continued)

Table 2. Continued.

	DV: Labor force participation ^a		DV: Working hours per week ^b	
	Model 1	Model 2	Model 3	Model 4
Missing		-0.225 (0.208)		0.600 (3.163)
Number of children		-0.048 (0.082)		-1.435 (1.396)
Survey year dummies	Yes	Yes	Yes	Yes
Constant	1.910*** (0.088)	1.369 (1.344)	38.195*** (0.683)	20.729 (13.885)
Pseudo R-squared	0.11	0.21	0.02	0.03
Number of observations	3945	3945	3945	3945

Note: Standard errors in parentheses; ⁺ $p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$; adjusted for individual clustering effect; ^alogit models are used here to estimate working status; ^bTobit models are used here to estimate Working hours.

toddlers, pre-schooler and grade-schoolers worked 11.01, 9.49, and 7.94 hours fewer per week, respectively, than childless women (Model 4). Yet, as children grew to teenagers, there is no statistically significant difference in probability of working and working time between mothers and women that never gave birth (Model 2 and Model 4).

To summarize, child-rearing decreased the probability of women working as well as their weekly time spent on paid work. As children grew older and the mothers' child-rearing burdens decreased, the "motherhood penalty" on labor force outcomes also faded out. These findings are consistent with our observations that once children begin their formal education, they spend more time in schools and on extracurricular activities.

The Buffering effect of childcare providers

Analysis based on sample including all mothers

Table 3 reports the estimated association of different combinations of childcare provider(s) on mothers' labor force participation and weekly working hours, as well as how these association varied between different groups of mothers. The findings from the baseline models that exclude the sample without children are consistent with those in the first-step analysis, in which mothers whose children had not yet entered secondary school had a lower probability of working (Model 1) and spent less time on paid work per week (Model 4) than mothers with older children.

Childcare support has been shown to have a positive relationship with women's labor supply. Specifically, grandparental co-residence was associated with a 76.3 percent ($e^{0.567} - 1$) increase in the odds of mothers working (Model 2) and a 5.6-hour increase in their weekly working hours (Model 5). Moreover, assistance from domestic workers demonstrated a


Table 3. Logit/Tobit Models Predicting the Buffering Effect of Childcare Providers on Improving Mothers' Labor Supply, HKPSSD 2011–2018.

	DV: Labor force participation ^a			DV: Working hours per week ^b		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
The developmental stage of the youngest child (ref. teen (13–18))						
Infant/Toddler (0–2)	–0.798** (0.247)	–1.080*** (0.249)	–1.204*** (0.296)	–14.960** (4.829)	–20.198*** (4.719)	–24.594*** (6.039)
Pre-schooler (3–6)	–0.755*** (0.202)	–1.037*** (0.207)	–1.259*** (0.231)	–12.974*** (3.797)	–18.228*** (3.751)	–24.840*** (4.520)
Grade-schooler (7–12)	–0.575*** (0.141)	–0.655*** (0.144)	–0.693*** (0.149)	–12.056*** (2.579)	–13.577*** (2.582)	–14.974*** (2.801)
The combinations of non-parental childcare provider(s) (ref. none)						
GP		0.567** (0.206)	1.114* (0.473)		12.219** (3.826)	13.788* (5.598)
DW		1.315*** (0.202)	0.097 (0.325)		22.016*** (2.884)	1.839 (4.797)
GP and DW		1.851*** (0.550)	1.513 (0.967)		27.530*** (5.567)	20.803*** (4.766)
Interaction terms						
GP*Infant/Toddler (0–2)			–0.697 (0.600)			–2.722 (9.615)
GP*Pre-schooler (3–6)			–0.497 (0.586)			1.216 (9.005)
GP*Grade-schooler (7–12)			–0.503 (0.632)			1.582 (8.436)
DW*Infant/Toddler (0–2)			1.803*** (0.527)			31.186*** (7.782)
DW*Pre-schooler (3–6)			1.925*** (0.473)			33.650*** (6.638)
DW*Grade-schooler (7–12)			1.122** (0.420)			19.712*** (5.830)
GP and DW*Infant/Toddler (0–2)			–0.113 (1.199)			5.353 (11.426)

	GP and DW*Pre-schooler (3–6)	GP and DW*Grade-schooler (7–12)					
Individual-level controls							
Family-level controls							
Survey year dummies							
Constant	0.844 (0.813)	–	Yes	Yes	Yes	Yes	20.690* (8.375)
			Yes	Yes	Yes	Yes	–7.816 (8.972)
			Yes	Yes	Yes	Yes	Yes
	–1.205 (2.368)		–0.917 (2.438)	–0.218 (2.512)	–25.859 (43.175)	–18.584 (42.909)	–3.579 (43.295)
Pseudo R-squared	0.10		0.12	0.13	0.02	0.03	0.03
Number of observations	2123		2123	2122 ^c	2123	2123	2123

Note: Standard errors in parentheses; ⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Adjusted for individual clustering effect; ^a logit models are used here to estimate current working status; ^b Tobit models are used here to estimate Working hours. ^c GP and DW * teen (13–18) in Model 3 predicts the outcome variables perfectly, and thus one observation is not used.

much more association with labor supply, resulting in a 2.7-fold ($e^{1.315}-1$) increase in the odds of maternal employment (Model 2) and a 10.8-hour increase in their weekly working hours (Model 5). Notably, mothers that combined those two childcare strategies experienced the most significant benefits. Their odds of labor force participation were 5.4 times ($e^{1.851}-1$) higher (Model 2), and they worked 14.1 hours more per week (Model 5).

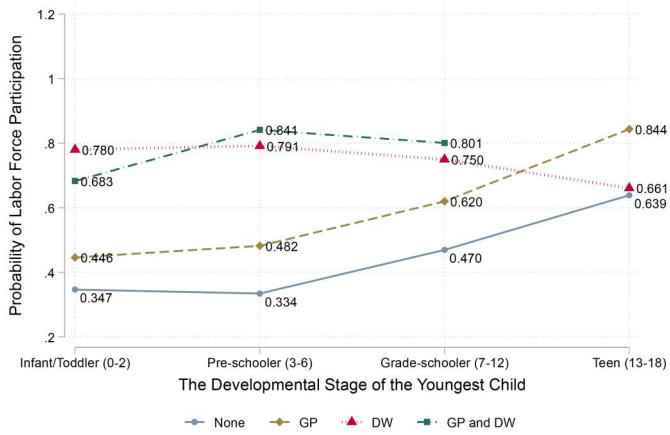
The impact of living with children's grandparent(s) appears to be consistent for mothers across different childrearing stages, while the benefits of assistance from domestic workers were more pronounced for mothers with younger children. For instance, the association between hiring domestic workers and labor force participation was significantly stronger for mothers with infants or toddlers, as well as those with children at preschool and primary ages. Specifically, their odds of working increased 5.1 times ($e^{1.803}-1$), 5.9 times ($e^{1.925}-1$), and 2.1 times ($e^{1.122}-1$) larger, respectively, than those of mothers with teenagers (Model 3). Moreover, there seems to be no significant association between assistance from domestic workers and the weekly working hours of mothers with teenagers. By contrast, such assistance led to more considerable increases for mothers with infants or toddlers, and mothers with preschool-aged, and primary-aged children, with 14.4 hours, 15.7 hours, and 9.9 hours longer compared to mothers with teenagers, respectively (Model 6). No pronounced heterogeneous effects are observed for the sole grandparental co-residence and the combination of two childcare providers, except for mothers with preschool-aged children who benefited more from the latter one compared to other groups (Models 3 and Model 6).

In a word, the findings show that all childcare combinations had a positive relationship with mothers' labor force participation as well as their working time. Particularly, a combination of grandparental co-residence and hiring domestic workers proves to be the most beneficial for mothers, followed by sole assistance from domestic workers, and finally grandparental co-residence. In addition, the heterogeneity across groups is also observed, as shown in [Figure 2](#). The domestic worker assistance significantly boosted labor supply of mothers with younger, while the combined support from grandparents and domestic workers seems particular advantageous for mothers whose youngest children were at the preschool age stage. After children entered formal education, grandparents and domestic workers could still assist with household tasks and transportation, but their role in childcare became less critical and they might be less involved in day-to-day care.

Analysis based on sample including mothers with children aged 0–6

Table 4 presents the estimated effects of different childcare combinations (grandparents, domestic workers, and preschool institutions) on the labor

Panel A. DV: Labor force participation



Panel B. DV: Working hours

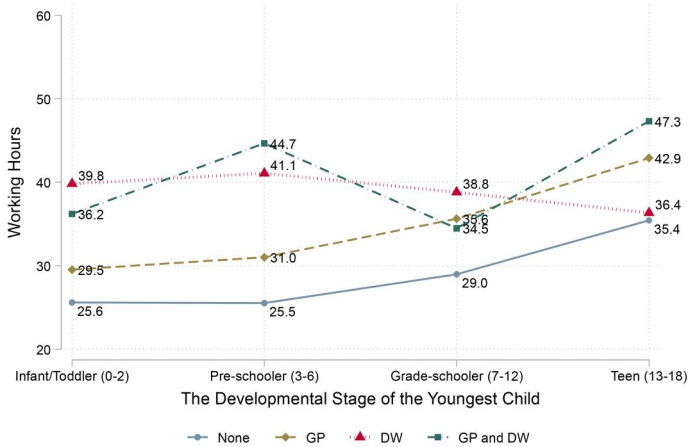


Figure 2. The Buffering Effect of Various Combinations of Childcare Provider(s) on Improving Mothers' Labor Supply, HKPSSD 2011–2018.

Panel A. DV: Labor force participation.

Notes: Results are predicted from Model 3, Table 3.

Panel B. DV: Working hours.

Notes: Results are predicted from Model 6, Table 3.

supply of mothers with children aged 0–6 who had significant caring responsibilities. The results show that the combinations of multiple childcare providers simultaneously were generally more effective than relying on single providers alone.

Specifically, solely relying on grandparental co-residence or preschool institutions did not lead to a notable improvement in mothers' labor supply. However, a significant benefit was observed when these two

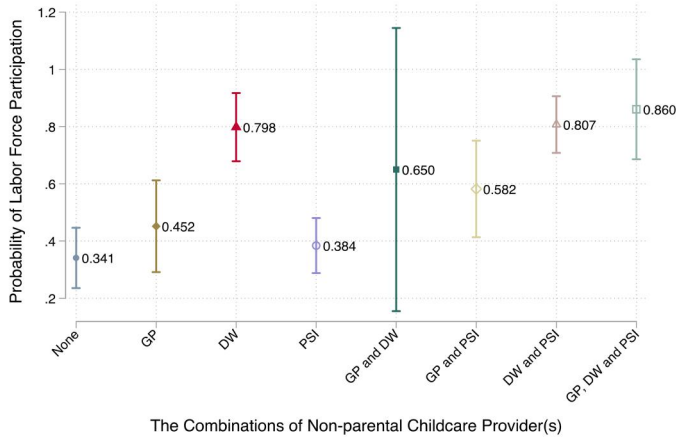
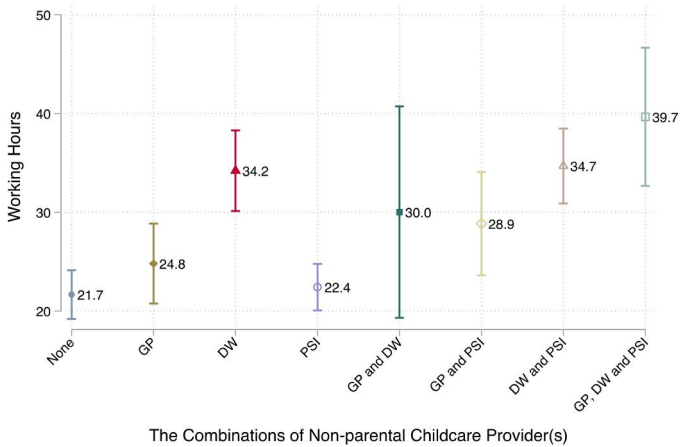
Table 4. Models Predicting the Buffering Effect of Complementary Childcare Providers to Improve Mothers' Labor Supply, Mothers with Children Aged 0–6, HKPSSD 2011–2018.

	DV: Labor force participation ^a Model 1	DV: Working hours per week ^b Model 2
The combinations of non-parental childcare provider(s) (ref. none)		
GP	0.465 (0.392)	5.367 (3.609)
DW	2.032*** (0.439)	18.406*** (3.261)
PSI	0.186 (0.279)	1.360 (2.381)
GP and DW	1.276 (1.129)	13.002 ⁺ (7.673)
GP and PSI	0.989* (0.421)	11.391** (4.185)
DW and PSI	2.090*** (0.401)	19.000*** (3.257)
DW, GP and PSI	2.476** (0.788)	24.824*** (4.687)
Individual-level controls	Yes	Yes
Family-level controls	Yes	Yes
Survey year dummies	Yes	Yes
Constant	14.650*** (4.394)	43.376 (39.722)
Pseudo R-squared	0.25	0.04
Number of observations	599	599

Note: Standard errors in parentheses; ⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; adjusted for individual clustering effect; ^alogit models are used here to estimate current working status; ^bTobit models are used here to estimate Working hours.

childcare providers were combined, resulting in a 1.7-fold ($e^{0.989}-1$) increase in the odds of maternal employment (Model 1) and a 7.1-hour increase in their weekly working time (Model 2). Moreover, mothers who received assistance from domestic workers had their odds of working (Model 1) increased by 6.6 times ($e^{2.032}-1$) and extended their weekly working time by 12.4 hours (Model 2). Notably, the simultaneous utilization of preschool institutions and domestic worker assistance also showed similar impacts rather than more substantial ones (Model 1 and Model 2). Furthermore, the combination of domestic worker assistance and grand-parental co-residence demonstrated a positive relationship with women's labor supply, though the coefficients were not statistically significant due to the limited sample size. Finally, the combination of all three childcare providers was found to be the most effective approach. Mothers with all three childcare providers had a 10.9-fold ($e^{2.476}-1$) increase in their odds of labor force participation (Model 1) and a 17.8-hour increase in their weekly working time (Model 2), compared to those without any non-parental childcare providers.

Figure 3 provides an intuitive overview. Mothers who hired foreign domestic workers exhibited a comparatively high likelihood of labor force

Panel A. DV: Labor force participation*Panel B. DV: Working hours'***Figure 3.** The Buffering Effect of Complementary Childcare Provider(s) on Improving Mothers' Labor Supply.

Panel A. DV: Labor force participation.

Notes: Results are predicted from Model 1, Table 4.

Panel B. DV: Working hours'

Notes: Results are predicted from Model 2, Table 4.

participation and longer working hours, which can be attributed to the full-day assistance these workers provide. The individual impact of grandparental co-residence was rather limited, likely due to the fact that older grandparents could only contribute to a portion of child-caring duties. Similarly, solely utilizing preschool institutions also showed insignificant effect, possibly because the prevalent half-day sessions made it challenging

for mothers to secure full-time employment. By contrast, the simultaneous utilization of grandparental co-residence and preschool institutions showed potential to enhance mothers' labor supply. These two forms of support complemented each other, releasing mothers from childrearing duties and enabling them to participate more actively in the workforce.

Conclusions and discussion

Women's labor supply is often constrained by their childrearing responsibilities. Globally, working families increasingly adopt a variety of formal or informal childcare arrangements to release mothers from childcare tasks and promote their economic opportunities. Extending previous research conducted across cultures on the impact of different types of childcare providers on maternal employment, this study contributes to the literature by investigating various combinations of non-parental childcare providers—grandparents, foreign domestic workers and childcare centers, on facilitating mothers' labor supply. More importantly, we adopt a life course perspective in the analysis to account for the varying intensity and tasks of childrearing duties across children's developmental trajectories. Hong Kong is chosen as an ideal case for study for examining these dynamics in the 21st century due to its unique position at the crossroads of eastern and western cultures.

Using pooled longitudinal data from a representative household survey in Hong Kong (the HKPSSD), we investigate whether there is a "motherhood penalty" on women's labor supply (labor force participation and time spent on paid work) and then compare the effectiveness of different combinations of non-parental childcare providers (grandparents, domestic workers, and preschool institutions) to mitigate such disadvantages, paying special attention to the heterogeneous effects at different childrearing stages. The empirical analysis reveals three key findings. Firstly, there is a significant "motherhood penalty" on women's labor force participation and working hours in Hong Kong, especially for mothers with preschool-aged children. Secondly, both living with grandparents and hiring domestic workers are found to be beneficial for maternal employment, with the latter being particularly effective for mothers⁶. Thirdly, for mothers with children under 6 years old, domestic workers are particularly helpful, while the support from co-residing grandparents and preschool institutions became effective only when used in combination.

The findings presented here offer concrete evidence supporting the idea that various non-parental childcare providers can deliver diverse levels and forms of support to working mothers, contingent upon the child's age and developmental requirements. During the early years of a child's

life, grandparents can be quite helpful in providing childcare because they often have flexible schedules and are familiar with the family's values and traditions. They can provide a nurturing and stable environment for infants and toddlers, while also offering invaluable emotional support for the mother. However, as the child grows and requires more structured learning and social interactions, grandparents may not have the necessary expertise or capacity to meet these needs. In contrast, domestic workers can provide more consistent support for working mothers during various childrearing stages, as they are typically hired to assist with childcare and household tasks on a full-time basis. They can be particularly beneficial for mothers with demanding work schedules or those with multiple children, as they can provide one-on-one care and attention while managing household chores. However, such market-oriented childcare assistance might be inaccessible for impoverished families.

For pre-school age children, childcare centers can employ trained and qualified staff to offer a range of educational programs and resources designed to foster cognitive, emotional, and social development in children. However, many children in Hong Kong participate in half-day programs, which might not fully accommodate the schedules of working parents. Consequently, these parents must continue to rely on grandparents or domestic workers for drop-off and pick-up services, as well as childcare during the remaining hours of the day. This may potentially explain the limited value of preschool institutions *alone* in relieving women from childcare duties.

The findings discussed above have significant implications for policy interventions that aim to meet the diverse needs of working parents across different childrearing stages. Particularly in many societies like Hong Kong, where multigenerational households are declining and the costs of formal childcare are increasing, policymakers should focus on expanding affordable and high-quality full-day programs in childcare centers or provide direct financial support to parents who choose to outsource childcare through marketized approaches. Our implications align with the recent evidence from Belgium, where the introduction of a heavily state-subsidized outsourcing option substantially increased women's employment rates, especially among the highly educated (Raz-Yurovich and Marx 2019).

The endogeneity issue is a concern of this study, as some unobservable individual characteristics might influence the independent and outcome variables simultaneously leading to estimation bias. Career-oriented women may be more engaged with paid work, or less likely to have children, or more likely to utilize childcare support when they do have children.

Despite the limitations, the study contributes to better understanding the dynamics of childcare and women's labor force participation, highlighting the life course perspective, different types of non-parental

childcaring arrangement in relation to women's labor force participation. The study further highlights the significant role that live-in domestic worker plays in supporting women's labor force participation in Hong Kong especially in early childhood years, and the complementarity of caring arrangements, in part reflecting the East-West milieu evident in Hong Kong during the 2010s.

Acknowledgement

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Notes

1. According to the requirement of Labor Department of Hong Kong, employers of foreign domestic worker need to provide them with suitable accommodation and with reasonable privacy (Labour Department 2022).
2. The Minimum Allowable Wage for FDHs in Hong Kong is HKD 4,630 (about USD 594) per month, which is significantly below the local wage in Hong Kong but well above the average wage in the sending countries.
3. Here, we only consider relatively young grandparents (those who aged 75 or below) as they are much more likely to be the provider rather than the receiver of family care.
4. We calculate monthly family income per capita as the monthly family income minus the respondent's monthly wage income divided by the number of household members.
5. The formula for conditional marginal effect calculation is as follows:

$$\frac{\partial E(Y|Y > 0, X)}{\partial X_j} = \beta_j \left(1 - \lambda \left(\frac{\beta X}{\sigma} \right) \left[\frac{\beta X}{\sigma} + \lambda \left(\frac{\beta X}{\sigma} \right) \right] \right)$$

where ϕ is standard normal cumulative density function, λ is the ratio between the standard normal probability density function and cumulative density function, and σ is the standard error of the error term.

6. The impact of various childcare support options on women's labor supply may vary by mothers' socioeconomic status (He and Wu 2019). Our supplementary analysis indicates that the sole assistance provided by co-residing grandparents had a more significant impact on the labor supply of mothers with less than an upper secondary education. By contrast, mothers

who had completed upper secondary or tertiary education saw greater benefits in terms of their labor supply from hiring domestic workers, regardless of whether they lived with their children's grandparents. Due to space constraints, the results are not included here but can be provided upon request.

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