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The Role of Parental Leave Policies in Mitigating Child Penalties: Insights from Italy

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Tommaso Nannicini

The Role of Parental Leave Policies in Mitigating Child Penalties: Insights from Italy

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The Role of Parental Leave Policies in Mitigating Child Penalties: Insights from Italy

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Abstract. This study examines child penalties for mothers and fathers in Italy by using novel administrative data. Relying on an event study approach, we find that childbirth affects mothers' earnings negatively, while fathers' earnings remain largely unaffected. However, when leave allowances are included in earnings, the child penalty for women nearly disappears in the year of childbirth and drops by more than half in the following year. Subsequently mothers' earnings quickly return to pre-birth levels, but never catch up to fathers' earnings, which follow an upward trajectory, increasing by approximately 46% seven years after childbirth.

Keywords: Italy, child penalty, event study, gender gap, labour market, welfare
JEL codes: J16, J31, J18

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Il ruolo delle politiche di congedo parentale nel mitigare il Child Penalty: il caso italiano

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Abstract. Questo studio esamina il child penalty per madri e padri in Italia utilizzando dati amministrativi. Adottando un approccio di event study, riscontriamo che il parto influisce negativamente sul reddito delle madri, mentre il reddito dei padri rimane per lo più invariato. Tuttavia, quando le leave allowances vengono incluse nel reddito, il child penalty per le donne quasi scompare nell'anno del parto e diminuisce di oltre la metà nell'anno successivo. Successivamente, il reddito delle madri ritorna rapidamente ai livelli pre-parto, ma non raggiunge mai i redditi dei padri, che seguono una traiettoria ascendente, aumentando di circa il 46% sette anni dopo il parto.

Parole chiave: Italia, child penalty, event study, divario di genere, mercato del lavoro, welfare

JEL codes: J16, J31, J18

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Introduction

We estimate child penalties for mothers and fathers in Italy by using novel administrative data and adopting an event study approach (Angelov et al., 2016; Kleven et al., 2019 (a); Kleven et al., 2019 (b); Kleven et al., 2024). Previous research on the impact of parenthood on labor market outcomes in Italy includes Casarico and Lattanzio (2023), who analyzed income trajectories of mothers compared to non-mothers, focusing on women born between 1945 and 1978.

Our study contributes to the literature in three main ways. First, we are the first to analyze the effects of childbirth on Italian fathers, addressing a significant gap. Second, unlike most previous studies, we account for parental leave compensation (exceptions are due to Sieppi and Pehkonen, 2019, and Andresen and Nix, 2022), providing a more nuanced understanding of the economic consequences of parenthood (see Adams et al., 2024). Third, we focus on a younger cohort of mothers than Casarico and Lattanzio (2023) do, so offering a more contemporary perspective.

1. Data and estimation strategy

We estimate the potential labour market penalty associated with the birth of the first child between 2013 and 2016 for both mothers and fathers employed in the non-agricultural private sector aged between 20 and 45 at childbirth. This cohort includes parents who may be married, cohabiting or separated/divorced.

To identify mothers and fathers, we leverage INPS (the Italian National Social Security Institute) data from the Italian Universal Child Allowance (UCA), introduced in 2022 and targeted at all families with children under the age of 21. Due to the high take-up rate of this allowance (around 95% for children born between 2013 and 2023), this dataset serves as a reliable registry of births in Italy over recent years and enables us to identify both parents as well as each child's year of birth. We merge this information with INPS data on the universe of private sector employer-employee matches and social security payments. We track parents' labour market behaviour for three years before and seven years after the birth of their first child, so constructing an unbalanced panel comprised of approximately 9.8 million observations (over 610 thousand mothers and 640 thousand fathers). Table 1 in Appendix provides descriptives statistics for sample used in our analysis.

We extend the model largely used in child penalty literature (Kleven et al., 2019) by adding individual fixed effects, which allows us to account for individual heterogeneity. More specifically, we estimate the following individual fixed-effects model separately for mothers and fathers that leverages the variation that occurs at the time of the child's birth:

$$Y^{g}_{ist} = \sum_{j \neq -t} \alpha^{g}_{j} D[j=t] + \sum_{k} \beta^{g}_{k} D[k=age_{ia}] + \sum_{a} \delta^{g}_{a} D[a=s] + \nu^{g}_{i} + \mu^{g}_{ist} \quad (1)$$

where the dependent variable is alternately annual income, weeks worked and weekly wages (adjusted for part-time contracts), for individual *i* of gender *g* at time *t*, which is *s* years from the birth of her\his child. For each parent in our dataset, the year of the first child's birth is designated as the event year (t=0), with all other years indexed relative to this reference point. The independent variables include dummy variables for the year of the child's birth and for each year before and after, age dummies for the individual and year dummies. Since the dummy variable for the year prior to the child's birth is used as the reference category, the relative coefficients of the event-time dummies capture the impact of the child's birth relative to the pre-birth year.

We measure earnings using two distinct approaches: 1) annual earnings received directly from the employer, which reflect the value of the work provided by the employee (these earnings exclude any payments during periods of leave, resulting in zero income for the time spent on leave); 2) annual earnings inclusive of social security payments, which reflect the true income obtained by individuals (Adams et al., 2024).[1]

These measures can differ due to the structure of the Italian system, which provides three primary types of parenthood-related leave:

- Maternity leave: Five months mandatory, with 80% of the average wage covered by social security and an additional 20% covered by the employer if stipulated in collective agreements.
- Paternity leave: One day (2013–2015) or two days (2016–2017), fully compensated by social security.
- Parental optional leave: Up to 10 months shared between parents, with each parent eligible for up to 6 months (extended to 11 months if the father takes at least 3 months). Compensation is 30% of the average wage for a maximum of 6 months (3 months for each parent and 3 months to be used alternatively).[2]

The estimates are conditional on individuals being employed and may therefore be biased by the fact that those who are more committed to their jobs might remain in the labour market after becoming parents. However, this should lead to an underestimation rather than an overestimation of the effects of interest.

2. The impact of childbirth on parents' income with and without welfare support

In Figure 1, we depict the impact of the birth of a child on the log of labour income. In the left panel, we consider annual earnings received from the employer, while we look at the annual earnings including allowances related to maternity/paternity and parental leaves in the right panel. Then, we compare the earnings of mothers and fathers, with and without the public social security coverage, in relation to events that reduce the actual provision of labor. The coefficients indicate the effect in various years relative to the year of the child's birth, with the reference value being the year preceding the birth. In Table 2 of the Appendix, we present the regression results for these models, with results for mothers in columns 1 and 2, and for fathers in columns 5 and 6.

[1] To calculate the social security benefits received by employees during absences for maternity, paternity, parental leave, we rely on the 'Differenze Accredito' dataset, providing information on the remuneration that would have been subject to social security contributions had the employee worked regularly during the period of absence. To estimate the compensation received by the employee, to this we apply the replacement rates specified by Italian legislation.

[2] In 2022 and 2023, the first month of leave was compensated at 80% of the average wage.

As shown in Figure 1,[3] when controlling for workers' age and temporal trends non-parametrically, the annual earnings paid by their employers to mothers and fathers before the year of the birth of their first child evolve in parallel, with both groups showing a slight upward trend. However, with the first child's birth, the annual earnings of the two groups begin to diverge. In the year of childbirth, women experience a decrease in their annual income of about 74 log points; it returns to pre-maternity levels five years after the birth. For men, on the other hand, the birth of a child does not interfere with the upward trend of their wages (5 log points on childbirth year) and their income shows an increase approaching 46 log points seven years after the event.

If we include the leave allowances instead, and, therefore, public protection as explained earlier, the drop in women's earnings is observed to be of 27 log points in the year following the child's birth. This is mainly due to the coverage of maternity leave, which, as explained above, supports women's earnings during pregnancy with (typically) full wage compensation, while women on leave in the subsequent periods receive partial wage replacement. However, the recovery is faster than that observed when only looking at earnings paid by the employer (the coefficient becomes positive starting from the third year after the child's birth).

The inclusion of leave allowances among earnings does not involve any relevant change for men, whose earnings follow the pattern highlighted earlier.

When comparing men and women, it is noticeable that there is a male advantage (computed as the vertical distance between male and female curve in the Figure) of 38 log points over the entire period when considering the earnings paid by the employer, which then diminishes to 26.6 log points when including leave allowances. In the latter case, the gap increases significantly in the year following the child's birth, reaching 37.6 log points. In the second year, it diminishes slightly, dropping to around 24 log points, before resuming a slow increase in the following years until the gap reaches approximately 27 log points by the end of the period.

If we restrict the analysis to women who were employed in the private sector in the year of childbirth and the preceding and following years, i.e., those with a stronger attachment to the labour market, we instead observe a 21 log points decline in earnings in the first year after childbirth.

The effects found on the annual earnings paid by the employer may either derive from a change in the amount of time devoted to work activities or a change in the wage earned per unit of time, for instance due to changes in tasks performed or career shifts. Therefore, we have considered two additional outcome variables in order to investigate the role played by each of these factors (Figure 2). As a proxy for time spent working, we have considered the number of weeks worked adjusted for part-time work (see columns 3 and 7 in Table 2 of Appendix. The left-hand panel of Figure 2 reveals a sharp decline in the number of weeks worked during the year of childbirth, with an average reduction of 11 weeks. Recovery is gradual, with pre-childbirth levels only reattained by the seventh year. In contrast, fathers experience a notable increase in the number of weeks worked

[3] When we estimate the impact of childbirth on mothers' annual wages without including individual fixed effects, we find that for t=0, t=1 and t=2 results are similar to those obtained with our main specification. Instead, for all subsequent periods the coefficient is around -0.30 and it is highly statistically significant ($p<0.001$). This indicates that earnings do not recover as observed in the fixed effects model (Figure 1). We interpret this divergence as the influence of unobservable individual factors (e.g., education) that are not accounted for in the model without fixed effects. For fathers, the results of the standard model without individual fixed effects reveal a slightly and smooth negative trend (for t=0, the coefficient is equal to -0.016, for t=3 is -0.049; for t=7 is -0.087).

in the period following the child's birth.[4] Since we do not have information on hourly wages, we consider weekly wages as a proxy for the wage earned per unit of time (columns 4 and 8 in Table 2 of Appendix).[5] We observe a 27 log points decrease for women in the year of childbirth, followed by a 9 log points decline the following year. Weekly wages recover to pre-maternity levels two years after childbirth and exhibit growth in the following years. In contrast, men show a continuous upward trend in weekly wages after childbirth, leading to a wage differential of around 4 log points compared with mothers by the seventh postnatal year. These findings suggest that the overall impact of childbirth on earnings reflects changes in both the hours worked and the wages earned per unit of time

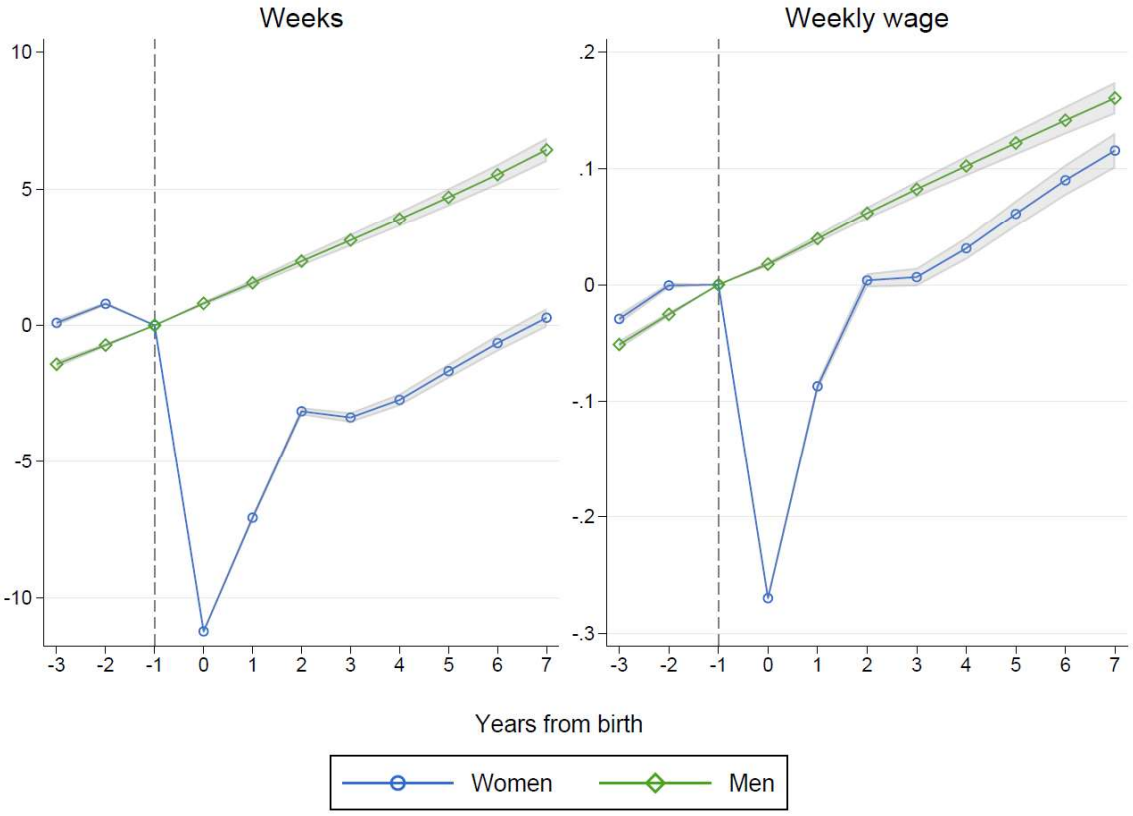
Figure 1: Child penalty for women and men: annual wage and annual wage adjusted for leave entitlements

Notes: The shaded 95 percent confidence intervals are based on robust standard errors.

[4] As additional outcomes, we considered the probability of full-time employment and the probability of permanent employment (results are available upon request). We find that the probability of full time-employment collapses for women in the first year after childbirth (-0.08) and it never recovers in subsequent periods (around -0.15 two years after childbirth, -0.22 seven years after childbirth). On the contrary, for men this outcome is substantially unaffected by childbirth. On the other hand, the probability of being under a permanent contract has an upward trend for both genders. For women, it peaks at the year of the child's birth (0.03) and then decreases (-0.02 two years after birth, and zero seven year after), while for men, the trend is always upward.

[5] For this outcome, we exclude "leave entitlements" since we want to detect changes in wages per time unit.

Figure 2: Child penalty for women and men: weeks worked and weekly wage



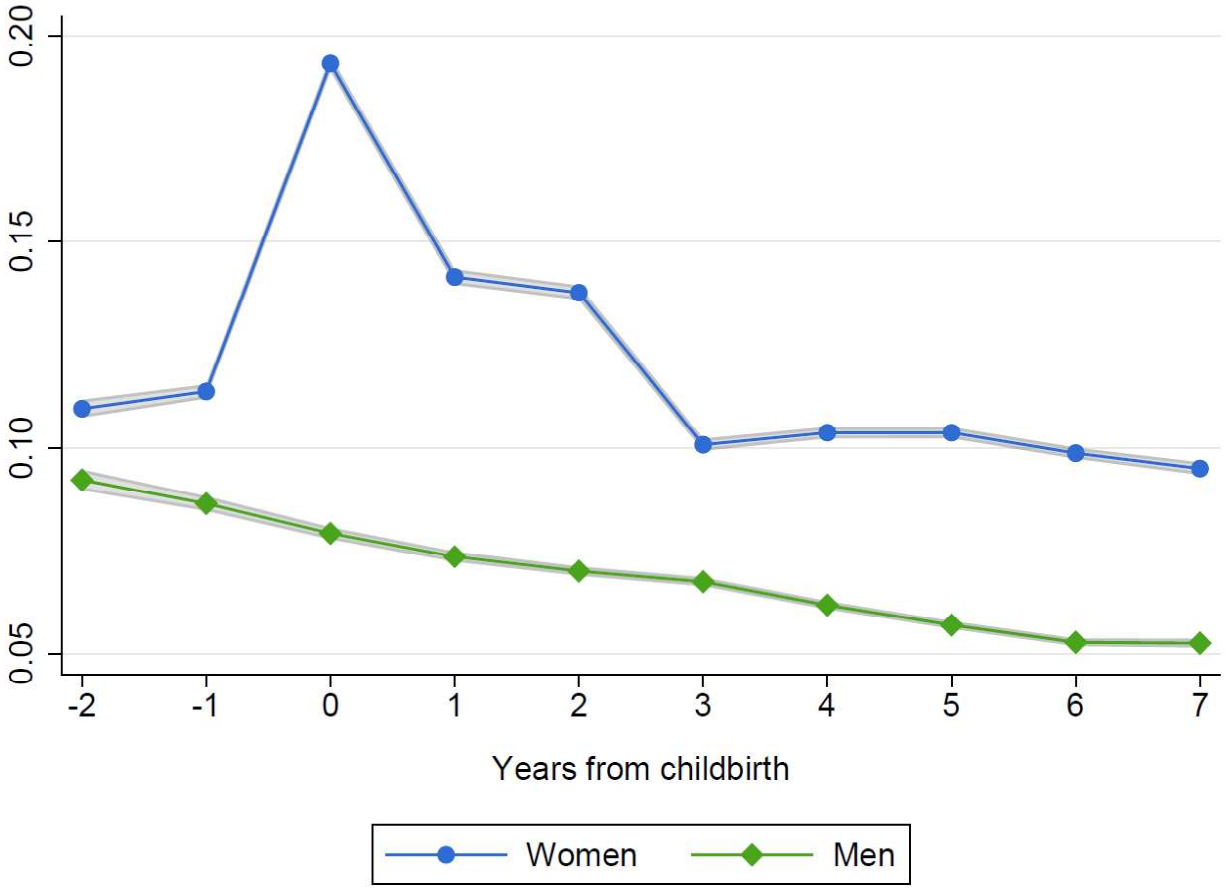
Notes: The shaded 95 percent confidence intervals are based on robust standard errors.

3. The impact of childbirth on the probability of leaving the job

The estimates discussed so far are conditional on employment, potentially biasing results as individuals with weaker labor market attachment often exit the workforce after becoming parents. To better understand this phenomenon, we estimated the impact of childbirth on the probability of leaving a job in the private sector. While we acknowledge that workers leaving the private sector may find a new job in another sector (mainly in the public sector), which our data cannot track, these transitions were limited during the study period due to hiring freezes in the public sector (INPS report 2023).

Therefore, using the same sample of mothers and fathers of previous analysis, for each period starting from the third year before the child's birth, we estimated the probability that an individual would no longer be part of the private-sector workforce in the following year. Our estimates (Figure 3) show an exit probability in the years before childbirth of about 11-11.4% for women and about 9% for men. No substantial differences between the two groups are observed; however, in the year of childbirth, there is a significant increase for women, whose probability of exiting the sector rises from 11% to 19%, while this probability decreases from 9% to around 8% for men. Up to two years after childbirth, the probability of exit for women is around 14%, returning to pre-birth levels from the third period onward. For men, the declining trend continues until the last time window considered (i.e., from six to seven years after childbirth).

Figure 3: Impact of childbirth on probability of exit from private sector



Notes: The shaded 95 percent confidence intervals are based on robust standard errors.

Concluding remarks

Our findings reveal that childbirth has a significant and negative impact on mothers' earnings, while fathers' earning trajectories remain largely unaffected by the arrival of a child. However, when earnings are adjusted to include leave allowances, the child penalty faced by women decreases considerably.

These findings highlight the critical role of leave policies in mitigating the economic impact of motherhood. Nevertheless, despite these mitigating effects, a substantial gap remains between mothers and fathers which reflects broader structural and cultural factors that perpetuate gender inequality in the workplace.

APPENDIX

Table 1: Descriptive statistics

	Mothers				
	Observations	Mean	Std. dev.	Min	Max
Age at first child	4,266,608	31.89	5.01	20.00	45.00
Annual wage	4,266,609	9.31	1.03	5.01	11.23
Annual wage with entitlments	4,266,609	9.44	0.98	5.01	14.12
Weeks	4,266,609	30.81	16.45	1.00	52.00
Weekly wage	4,266,609	6.10	0.54	1.11	10.49
	Fathers				
	Observations	Mean	Std. dev.	Min	Max
Age at first child	5,354,320	33.65	5.27	20.00	45.00
Annual wage	5,354,320	9.90	0.88	5.66	11.66
Annual wage with entitlments	5,354,320	9.90	0.88	5.66	20.52
Weeks	5,354,320	41.19	15.09	1.00	52.00
Weekly wage	5,354,320	6.31	0.44	2.03	10.56

Table 2: Child penalty for mothers and fathers

	MOTHERS				FATHERS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Annual wage (log)	Annual wage with leave entitlements (log)	Weeks	Weekly wage (log)	Annual wage (log)	Annual wage with leave entitlements (log)	Weeks	Weekly wage (log)
t=-3	-0.0499***	-0.100***	0.0899*	-0.0294***	-0.113***	-0.114***	-1.419***	-0.0514***
	(0.00372)	(0.00370)	(0.0527)	(0.00207)	(0.00384)	(0.00384)	(0.0605)	(0.00182)
t=-2	0.0121***	-0.0428***	0.786***	-0.000693	-0.0570***	-0.0571***	-0.721***	-0.0255***
	(0.00210)	(0.00208)	(0.0319)	(0.00114)	(0.00211)	(0.00211)	(0.0347)	(0.000973)
t=0	-0.735***	-0.111***	-11.22***	-0.270***	0.0540***	0.0559***	0.803***	0.0177***
	(0.00225)	(0.00207)	(0.0341)	(0.00134)	(0.00210)	(0.00210)	(0.0344)	(0.000964)
t=1	-0.386***	-0.265***	-7.064***	-0.0873***	0.110***	0.111***	1.551***	0.0395***
	(0.00380)	(0.00371)	(0.0537)	(0.00213)	(0.00383)	(0.00383)	(0.0603)	(0.00181)
t=2	-0.111***	-0.0709***	-3.144***	0.00368	0.168***	0.170***	2.347***	0.0620***
	(0.00540)	(0.00535)	(0.0732)	(0.00305)	(0.00561)	(0.00561)	(0.0870)	(0.00267)
t=3	-0.105***	-0.0358***	-3.370***	0.00648	0.224***	0.226***	3.119***	0.0826***
	(0.00705)	(0.00700)	(0.0937)	(0.00399)	(0.00739)	(0.00739)	(0.114)	(0.00353)
t=4	-0.0441***	0.0108	-2.725***	0.0313***	0.280***	0.282***	3.902***	0.102***
	(0.00869)	(0.00865)	(0.114)	(0.00492)	(0.00918)	(0.00918)	(0.141)	(0.00438)
t=5	0.0386***	0.0671***	-1.672***	0.0614***	0.336***	0.338***	4.703***	0.122***
	(0.0103)	(0.0103)	(0.134)	(0.00584)	(0.0110)	(0.0110)	(0.168)	(0.00524)
t=6	0.124***	0.129***	-0.649***	0.0903***	0.394***	0.396***	5.534***	0.142***
	(0.0119)	(0.0120)	(0.154)	(0.00677)	(0.0128)	(0.0128)	(0.194)	(0.00610)
t=7	0.200***	0.187***	0.276	0.116***	0.455***	0.458***	6.437***	0.161***
	(0.0136)	(0.0136)	(0.175)	(0.00770)	(0.0146)	(0.0146)	(0.222)	(0.00696)
Constant	8.702***	8.735***	24.51***	5.874***	9.071***	9.072***	30.34***	6.006***
	(0.0340)	(0.0342)	(0.411)	(0.0194)	(0.0348)	(0.0348)	(0.527)	(0.0167)
Age dummies	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,266,609	4,266,609	4,266,609	4,266,609	5,354,320	5,354,320	5,354,320	5,354,320
R-squared	0.120	0.033	0.115	0.062	0.055	0.056	0.025	0.076
Number of idL	609,993	609,993	609,993	609,993	639,349	639,349	639,349	639,349

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT to enhance the clarity and fluency of the English language. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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