

Supplementary Materials

Combined Effects of Parental and Childhood Physical Activity and Air Pollution on Childhood Asthma and Wheezing

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Table S1. Childhood doctor-diagnosed asthma and wheeze, questions and answer options set in the questionnaire.

Health outcomes	Questions asked	Answer options
(1) Lifetime asthma	Has your child ever been diagnosed with asthma by at least one doctor?	(Yes/no)
(2) First onset time of asthma	At what age was your child first diagnosed with asthma by a doctor?	(1 year/2 years/3 years/4 years/5 years/6 years/≥7 years)
(3) Diurnal pattern of asthma and related symptoms	After your child was diagnosed with asthma by a doctor for the first time, did asthma and related symptoms have a diurnal pattern?	(04:00–07:00/08:00–16:00/17:00–03:00)
(4) Monthly pattern of asthma and related symptoms	After your child was diagnosed with asthma by a doctor, did asthma and related symptoms have a monthly pattern?	(January/February/March/April/May/June/July/August/September/October/November/December)
(5) Previous frequency of asthma attacks	How many times did your child's asthma occur each year before the past year?	(0 time/1 time/2 times/3 times/4 times/5 times/6 times/7 times/≥8 times)
(6) Current frequency of asthma attacks	How many times did your child's asthma occur each year during the past year?	(0 time/1 time/2 times/3 times/4 times/5 times/6 times/7 times/≥8 times)

(7) Ever wheeze	Has your child ever experienced difficulty breathing and made sounds like wheezing?	(Yes/no)
(8) Onset time of wheeze	At what age did your child experience wheezing?	(<1 year/1–2 years/2–3 years/3–4 years/4–5 years/5–6 years/≥6 years)
(9) Current wheeze	Has your child experienced difficulty breathing and made sounds like wheezing during past year?	(Yes/no)
(10) Current wheeze condition	Under what circumstances did your child typically experience wheezing symptoms during the past year?	(Catching a cold/exercising/playing or exercising outdoors/eating certain foods/laughing or crying/contacting with some fur animals/contacting with certain plants and flowers)

Table S2. Descriptions, questions and answer options for paternal exercise during normal days and before pregnancy.

Paternal exercise	Questions
Paternal normal exercise habit	
Degree of preference for sports	(1) Does the father of the child like sports? (Very dislike/dislike/neutral/like/very like)
Frequent sports activities	(2) What sports activities does the father of the child often engage in? (Walking/running/table tennis/badminton/basketball/football/tennis ball/yoga/roller skating/dance/swimming/skipping rope/riding bicycle/taekwondo/other sports)
Paternal exercise habit during preconceptional period	
Weekly exercise frequency	(3) How many days per week does the father of the child exercise before pregnancy? (0 day/1–2 days/3–4 days/5–6 days/7 days)
Daily exercise duration	(4) How long does the father of the child exercise every day before pregnancy? (<30 mins/30–60 mins/1–2 hours/>2 hours)
Exercise intensity	(5) What is the intensity of exercise for the father of the child before pregnancy? (No exercise/mild exercise [such as walking, doing radio exercises, etc.]/low intensity and less intense sports [such as recreational table tennis, jogging, etc.]/moderately intense and long-lasting sports [such as cycling, running, and playing table tennis]/short of breath and sweating a lot of intense non lasting sports [such as play badminton, basketball, tennis, football, etc.]/high intensity and prolonged exercise with rapid breathing and sweating [such as running, aerobics routines, swimming, etc.]
Exercise time	(6) When does the father of a child usually exercise before pregnancy? (05:00–08:00/08:00–12:00/12:00–15:00/15:00–18:00/18:00–21:00/21:00–00:00/00:00–05:00)
Duration of daily meditation	(7) How long does the father of the child meditate every day before pregnancy? (<2 hour/2–4 hours/4–6 hours/6–8 hours/≥8 hours)

Table S3. Descriptions, questions and answer options for maternal exercise before and during pregnancy.

Maternal exercise	Questions
Maternal normal exercise habit	
Degree of preference for sports	(1) Does the mother of the child like sports? (Very dislike/dislike/neutral/like/very like)
Frequent exercise activities	(2) What sports activities does the mother of the child often engage in? (Walking/running/table tennis/badminton/basketball/football/tennis ball/yoga/roller skating/dance/swimming/skipping rope/riding bicycle/taekwondo/other sports)
Maternal exercise habit during preconceptional period	
Weekly exercise frequency	(3) How many days per week does the mother of the child exercise before pregnancy? (0 day/1–2 days/3–4 days/5–6 days/7 days)
Daily exercise duration	(4) How long does the mother of the child exercise every day before pregnancy? (<30 mins/30–60 mins/1–2 hours/>2 hours)
Exercise intensity	(5) What is the intensity of exercise for the mother of the child before pregnancy? (No exercise/mild exercise [such as walking, doing radio exercises, etc.]/low intensity and less intense sports [such as recreational table tennis, jogging, etc.]/moderately intense and long-lasting sports [such as cycling, running, and playing table tennis]/short of breath and sweating a lot of intense non lasting sports [such as play badminton, basketball, tennis, football, etc.]/high intensity and prolonged exercise with rapid breathing and sweating [such as running, aerobics routines, swimming, etc.]
Exercise time	(6) When does the mother of a child usually exercise before pregnancy? (05:00–08:00/08:00–12:00/12:00–15:00/15:00–18:00/18:00–21:00/21:00–00:00/00:00–05:00)
Duration of daily meditation	(7) How long does the mother of the child meditate every day before pregnancy? (<2 hour/2–4 hours/4–6 hours/6–8 hours/≥8 hours)
Maternal exercise habit during pregnancy	
Weekly exercise frequency	(8) How many days per week does the mother of the child exercise during pregnancy? (0 day/1–2 days/3–4 days/5–6 days/7 days)
Daily exercise duration	(9) How long does the mother of the child exercise every day during pregnancy? (<30 mins/30–60 mins/1–2 hours/>2 hours)
Exercise intensity	(10) What is the intensity of exercise for the mother of the child during pregnancy?

(No exercise/mild exercise [such as walking, doing radio exercises, etc.]/low intensity and less intense sports [such as recreational table tennis, jogging, etc.]/moderately intense and long-lasting sports [such as cycling, running, and playing table tennis]/short of breath and sweating a lot of intense non lasting sports [such as play badminton, basketball, tennis, football, etc.]/high intensity and prolonged exercise with rapid breathing and sweating [such as running, aerobics routines, swimming, etc.]

Exercise time

(11) When does the mother of a child usually exercise during pregnancy?

(05:00–08:00/08:00–12:00/12:00–15:00/15:00–18:00/18:00–21:00/21:00–00:00/00:00–05:00)

Duration of daily meditation

(12) How long does the mother of the child meditate every day during pregnancy?

(<2 hour/2–4 hours/4–6 hours/6–8 hours/≥8 hours)

Table S4. Descriptions, questions and answer options for childhood exercise after birth.

Childhood exercise	Questions
Childhood normal exercise habit	
Degree of preference for sports	(1) Does the child like sports? (Very dislike/dislike/neutral/like/very like)
Frequent exercise activities	(2) What sports activities does the child often engage in? (Walking/running/table tennis/badminton/basketball/football/tennis ball/yoga/roller skating/dance/swimming/skipping rope/riding bicycle/taekwondo/other sports)
Childhood exercise habit during postnatal period	
Weekly exercise frequency	(3) How many days per week does the child exercise before pregnancy? (0 day/1–2 days/3–4 days/5–6 days/7 days)
Daily exercise duration	(4) How long does the child exercise every day before pregnancy? (<30 mins/30–60 mins/1–2 hours/>2 hours)
Exercise intensity	(5) What is the intensity of exercise for the child before pregnancy? (No exercise/mild exercise [such as walking, doing radio exercises, etc.]/low intensity and less intense sports [such as recreational table tennis, jogging, etc.]/moderately intense and long-lasting sports [such as cycling, running, and playing table tennis]/short of breath and sweating a lot of intense non lasting sports [such as play badminton, basketball, tennis, football, etc.]/high intensity and prolonged exercise with rapid breathing and sweating [such as running, aerobics routines, swimming, etc.]
Exercise time	(6) When does the child usually exercise before pregnancy? (05:00–08:00/08:00–12:00/12:00–15:00/15:00–18:00/18:00–21:00/21:00–00:00/00:00–05:00)
Duration of daily meditation	(7) How long does the child meditate every day before pregnancy? (<2 hour/2–4 hours/4–6 hours/6–8 hours/≥8 hours)

Table S5. Definitions of time windows for individual exposure to outdoor air pollution and climatic factors.

Time window	Sub-time window	Definition
Preconceptional period	4–6 months before pregnancy	Four to six months prior to the mother’s last menstrual date (LMD) at conception
	3 months before pregnancy	Three months prior to the mother’s LMD at conception
	One year before pregnancy	The year prior to the mother’s LMD at conception
Prenatal period	First trimester of pregnancy	The period from the 1 st gestational week to the 12 th gestational week
	Second trimester of pregnancy	The period from the 13 th gestational week to the 27 th gestational week
	Third trimester of pregnancy	The period from the 28 th gestational week to the child’s birth date
	Entire pregnancy	The period from the mother’s LMD at conception to the child’s birth date
Postnatal period	First year of life	The period between the child's birth date and the first birthday
	Past year	The year preceding the completion of the questionnaire
	Entire postnatal period	The period from the child's birth date to the day of questionnaire completion

Table S6. Covariates and their corresponding questions and answer options set in the questionnaire.

Covariates	Questions asked	Answer options
Individual factors		
Gender	What’s the gender of your child?	(Male/female)
Age	What’s the age of your child?	(<1 year/2years/3 years/4 years/5 years/6 years)
Gestational age	What week and day was your child born after pregnancy?	(<37 gestational weeks/≥37 gestational weeks)
Breast feeding duration	How long has your child been breastfed?	(No/<1 month/1–4 months/4–6 months/6–12 months/≥12 months)
Antibiotic use	Has your child ever used antibiotic?	(Yes/no)
Parental factors		
Family gross annual income	What is the total annual income of the parents of the child?	(<50,000 CNY/50,000–100,000 CNY/100,000–200,000 CNY/200,000–500,000 CNY/500,000–1,000,000 CNY/>1,000,000 CNY)
Parents’ highest education level	What is the highest educational level of the child's parents?	(Primary/middle school or high school/vocational school/undergraduate/junior college or master/doctorate)

Parental allergic diseases	Has the child's father and/or mother ever been diagnosed with asthma, allergic rhinitis, or eczema by at least one doctor?	(Yes/no)
Household environmental factors (HEFs)		
Secondhand smoke	Did any of the family member who living with the child together smoke?	(Yes/no)
New furnishings	Did you install the new furniture in your residence during pregnancy till the entire postnatal period?	(Yes/no)
House decoration	Did you (re)decorate your residence during pregnancy till the entire postnatal period?	(Yes/no)
Mildew or damp spots	Did you notice the mold or damp stains on the floor, wall, or ceiling in your residence during pregnancy till the entire postnatal period?	(Yes/no)
Moldy clothing or bedclothes	Did you notice the mold or damp for clothes or bedding during pregnancy till the entire postnatal period?	(Yes/no)

Table S7. Statistics of the number and prevalence of childhood asthma and wheeze in different cities.

Health outcomes	Total	Liangshan	Zhangjiajie	Xiangxi	Changsha	Loudi	<i>p</i> -value
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Lifetime asthma	177 (2.63)	19 (1.56)	4 (2.55)	20 (3.79)	130 (2.86)	4 (1.50)	0.033
Ever wheeze	316 (4.70)	42 (3.44)	3 (1.91)	21 (3.98)	239 (5.25)	11 (4.12)	0.027
Early-transient wheeze	177 (2.63)	22 (1.80)	2 (1.27)	10 (1.89)	137 (3.01)	6 (2.25)	0.084
Late-onset wheeze	119 (1.77)	18 (1.48)	1 (0.64)	6 (1.14)	90 (1.98)	4 (1.50)	0.377
Persistent wheeze	27 (0.40)	2 (0.16)	0 (0.00)	1 (0.19)	23 (0.51)	1 (0.37)	0.382
Current wheeze	168 (2.50)	20 (1.64)	2 (1.27)	11 (2.08)	126 (2.77)	9 (3.37)	0.124

Lifetime asthma: asthma diagnosed at any age; Ever wheeze: wheeze occurred at any age; Early-transient wheeze: wheeze occurred between 0 and 2 years of age and not persisting wheeze later; Late-onset wheeze: wheeze occurred later than 3 years of age and no wheeze occurring earlier than 3 years of age; Persistent wheeze: wheeze occurred between 0 and 2 years of age and persisting later. The *p*-values < 0.05 were indicated as statistical significance in bold.

Table S8. Statistics on paternal exercise habits during normal days and preconceptional period as well as their relationships with childhood doctor-diagnosed asthma and wheeze.

Paternal exercise habits	Total		Asthma		Wheeze	
	Number (n) (%)		Case (n) (%)	<i>p</i> -value	Case (n) (%)	<i>p</i> -value
Paternal normal exercise habit						
Degree of preference for sports						
Very dislike	259 (3.85)		8 (3.09)	0.865	17 (6.56)	0.434
Dislike	1,373 (20.42)		34 (2.48)		69 (5.03)	
Neutral	3,343 (49.72)		92 (2.75)		152 (4.55)	
Like/very like	1,749 (26.01)		43 (2.46)		78 (4.46)	
Very dislike/dislike	1,632 (24.27)		42 (2.57)	0.865	86 (5.27)	0.211
Neutral/like/very like	5,092 (75.73)		135 (2.65)		230 (4.52)	
Paternal frequent sports activities						
Walking						
No	2,212 (32.90)		56 (2.53)	0.718	96 (4.34)	0.329
Yes	4,512 (67.10)		121 (2.68)		220 (4.88)	
Running						
No	4,385 (65.21)		114 (2.60)	0.819	226 (5.15)	0.016
Yes	2,339 (34.79)		63 (2.69)		90 (3.85)	
Ball sports †						
No	4,854 (72.19)		133 (2.74)	0.374	234 (4.82)	0.449
Yes	1,870 (27.81)		44 (2.35)		82 (4.39)	
Other sports ‡						
No	5,398 (80.28)		146 (2.70)	0.455	268 (4.96)	0.038
Yes	1,326 (19.72)		31 (2.34)		48 (3.62)	
Paternal exercise habit during preconceptional period						
Weekly exercise frequency (days)						
0–2	4,945 (73.54)		126 (2.55)	0.749	224 (4.53)	0.547
3–4	1,088 (16.18)		32 (2.94)		56 (5.15)	
≥5	691 (10.28)		19 (2.75)		36 (5.21)	

<3	4,945 (73.54)	126 (2.55)	0.471	224 (4.53)	0.273
≥3	1,779 (26.46)	51 (2.87)		92 (5.17)	
Daily exercise duration (hours)					
<0.5	2,776 (41.28)	78 (2.81)	0.764	138 (4.97)	0.726
0.5–1	3,106 (46.19)	75 (2.41)		139 (4.48)	
1–2	583 (8.67)	16 (2.74)		29 (4.97)	
>2	259 (3.85)	8 (3.09)		10 (3.86)	
<1	5,882 (87.48)	153 (2.60)	0.673	277 (4.71)	0.921
≥1	842 (12.52)	24 (2.85)		39 (4.63)	
Exercise intensity					
Low *	5,083 (75.59)	129 (2.54)	0.613	238 (4.68)	0.304
Middle ξ	833 (12.39)	26 (3.12)		33 (3.96)	
High §	808 (12.02)	22 (2.72)		45 (5.57)	
Low	5,083 (75.59)	129 (2.54)	0.394	238 (4.68)	0.906
High/middle	1,641 (24.41)	48 (2.93)		78 (4.75)	
Exercise in the morning (06:00–12:00)					
No	5,190 (77.19)	139 (2.68)	0.666	248 (4.78)	0.574
Yes	1,534 (22.81)	38 (2.48)		68 (4.43)	
Exercise in the afternoon (12:00–18:00)					
No	6,031 (89.69)	160 (2.65)	0.756	283 (4.69)	0.935
Yes	693 (10.31)	17 (2.45)		33 (4.76)	
Exercise in the daytime (06:00–18:00)					
No	4,497 (66.88)	122 (2.71)	0.558	215 (4.78)	0.654
Yes	2,227 (33.12)	55 (2.47)		101 (4.54)	
Exercise in the nighttime (18:00–06:00)					
No	3,386 (50.36)	86 (2.54)	0.633	158 (4.67)	0.897
Yes	3,338 (49.64)	91 (2.73)		158 (4.73)	
Duration of daily meditation (hours)					
<2	1,844 (27.42)	39 (2.11)	0.140	73 (3.96)	0.069

2–4	2,345 (34.88)	58 (2.47)		103 (4.39)	
4–6	1,136 (16.89)	39 (3.43)		59 (5.19)	
≥6	1,399 (20.81)	41 (2.93)		81 (5.79)	
<6	5,325 (79.19)	136 (2.55)	0.434	235 (4.41)	0.030
≥6	1,399 (20.81)	41 (2.93)		81 (5.79)	

† Ball sports: Table tennis, badminton, basketball, football, and tennis ball. ‡ Other sports: Yoga, roller skating, dance, swimming, skipping rope, riding bicycle, taekwondo, and other sports. * Low exercise intensity: No exercise, mild exercise (such as walking, doing radio exercises, etc.), low intensity and less intense sports (such as recreational table tennis, jogging, etc.). † Middle exercise intensity: Moderately intense and long-lasting sports (such as cycling, running, and playing table tennis). § High exercise intensity: Short of breath and sweating a lot of intense non lasting sports (such as play badminton, basketball, tennis, football, etc.), high intensity and prolonged exercise with rapid breathing and sweating (such as running, aerobics routines, swimming, etc.). Statistical significance is denoted in bold when the *p*-value is less than 0.05.

Table S9. Statistics on maternal exercise habits during normal days, preconceptional, and prenatal period as well as their relationships with childhood doctor-diagnosed asthma and wheeze.

Maternal exercise habits	Total		Asthma		Wheeze	
	Number (n)	(%)	Case (n)	(%)	Case (n)	(%)
Maternal normal exercise habit						
Degree of preference for sports						
Very dislike	156	(2.32)	8	(5.13)	12	(7.69)
Dislike	1,087	(16.17)	27	(2.48)	59	(5.43)
Neutral	4,087	(60.78)	107	(2.62)	188	(4.60)
Like/very like	1,394	(20.73)	35	(2.51)	57	(4.09)
Very dislike/dislike	1,243	(18.49)	35	(2.82)	71	(5.71)
Neutral/like/very like	5,481	(81.51)	142	(2.59)	245	(4.47)
Maternal frequent sports activities						
Walking						
No	1,097	(16.31)	39	(3.56)	62	(5.65)
Yes	5,627	(83.69)	138	(2.45)	254	(4.51)
Running						
No	5,155	(76.67)	134	(2.60)	249	(4.83)
Yes	1,569	(23.33)	43	(2.74)	67	(4.27)
Ball sports †						

No	5,658 (84.15)	155 (2.74)	0.206	276 (4.88)	0.111
Yes	1,066 (15.85)	22 (2.06)		40 (3.75)	
Other sports ‡					
No	4,303 (63.99)	112 (2.60)	0.840	212 (4.93)	0.241
Yes	2,421 (36.01)	65 (2.68)		104 (4.30)	
Maternal exercise habit during preconceptional period					
Weekly exercise frequency (days)					
0–2	4,953 (73.66)	134 (2.71)	0.346	231 (4.66)	0.873
3–4	1,084 (16.12)	22 (2.03)		50 (4.61)	
≥5	687 (10.22)	21 (3.06)		35 (5.09)	
<3	4,953 (73.66)	134 (2.71)	0.531	231 (4.66)	0.817
≥3	1,771 (26.34)	43 (2.43)		85 (4.80)	
Daily exercise duration (hours)					
<0.5	3,120 (46.40)	85 (2.72)	0.905	164 (5.26)	0.178
0.5–1	3,032 (45.09)	77 (2.54)		126 (4.16)	
1–2	420 (6.25)	10 (2.38)		21 (5.00)	
≥2	152 (2.26)	5 (3.29)		5 (3.29)	
<1	6,152 (91.49)	162 (2.63)	0.988	290 (4.71)	0.856
≥1	572 (8.51)	15 (2.62)		26 (4.55)	
Exercise intensity					
Low *	6,052 (90.01)	161 (2.66)	0.885	281 (4.64)	0.473
Middle †	399 (5.93)	9 (2.26)		18 (4.51)	
High ‡	273 (4.06)	7 (2.56)		17 (6.23)	
Low	6,052 (90.01)	161 (2.66)	0.668	281 (4.64)	0.511
High/middle	672 (9.99)	16 (2.38)		35 (5.21)	
Exercise in the morning (06:00–12:00)					
No	5,109 (75.98)	132 (2.58)	0.657	245 (4.80)	0.509
Yes	1,615 (24.02)	45 (2.79)		71 (4.40)	
Exercise in the afternoon (12:00–18:00)					

No	6,016 (89.47)	154 (2.56)	0.279	292 (4.85)	0.082
Yes	708 (10.53)	23 (3.25)		24 (3.39)	
Exercise in the daytime (06:00–18:00)					
No	4,844 (72.04)	116 (2.39)	0.051	239 (4.93)	0.145
Yes	1,880 (27.96)	61 (3.24)		77 (4.10)	
Exercise in the nighttime (18:00–06:00)					
No	3,146 (46.79)	100 (3.18)	0.009	143 (4.55)	0.575
Yes	3,578 (53.21)	77 (2.15)		173 (4.84)	
Duration of daily meditation (hours)					
<2	1,804 (26.83)	39 (2.16)	0.233	67 (3.71)	0.015
2–4	2,286 (34.00)	56 (2.45)		108 (4.72)	
4–6	1,154 (17.16)	35 (3.03)		51 (4.42)	
≥6	1,480 (22.01)	47 (3.18)		90 (6.08)	
<6	5,244 (77.99)	130 (2.48)	0.139	226 (4.31)	0.004
≥6	1,480 (22.01)	47 (3.18)		90 (6.08)	
Maternal exercise habit during pregnancy					
Weekly exercise frequency (days)					
0–2	4,600 (68.41)	117 (2.54)	0.712	221 (4.80)	0.801
3–4	1,265 (18.81)	34 (2.69)		58 (4.58)	
≥5	859 (12.78)	26 (3.03)		37 (4.31)	
<3	4,600 (68.41)	117 (2.54)	0.503	221 (4.80)	0.550
≥3	2,124 (31.59)	60 (2.82)		95 (4.47)	
Daily exercise duration (hours)					
<0.5	2,817 (41.89)	74 (2.63)	0.731	149 (5.29)	0.235
0.5–1	3,345 (49.75)	88 (2.63)		140 (4.19)	
1–2	409 (6.08)	9 (2.20)		19 (4.65)	
>2	153 (2.28)	6 (3.92)		8 (5.23)	
<1	6,162 (91.64)	162 (2.63)	0.955	289 (4.69)	0.903
≥1	562 (8.36)	15 (2.67)		27 (4.80)	

Exercise intensity					
Low *	6,026 (89.62)	157 (2.61)	0.456	283 (4.70)	0.707
Middle †	439 (6.53)	15 (3.42)		23 (3.30)	
High ‡	259 (3.85)	5 (1.93)		1 (0.02)	
Low	6,026 (89.62)	157 (2.61)	0.685	283 (64.46)	0.970
High/middle	698 (10.38)	20 (2.87)		33 (12.74)	
Exercise in the morning (06:00–12:00)					
No	5,109 (75.98)	132 (2.58)	0.657	245 (4.80)	0.509
Yes	1,615 (24.02)	45 (2.79)		71 (4.40)	
Exercise in the afternoon (12:00–18:00)					
No	5,942 (88.37)	154 (2.59)	0.566	286 (4.81)	0.225
Yes	782 (11.63)	23 (2.94)		30 (3.84)	
Exercise in the daytime (06:00–18:00)					
No	4,327 (64.35)	109 (2.52)	0.436	215 (4.97)	0.161
Yes	2,397 (35.65)	68 (2.84)		101 (4.21)	
Exercise in the nighttime (18:00–06:00)					
No	3,366 (50.06)	94 (2.79)	0.411	154 (4.58)	0.629
Yes	3,358 (49.94)	83 (2.47)		162 (4.82)	
Duration of daily meditation (hours)					
<2 hours	1,907 (28.36)	44 (2.31)	0.303	72 (3.78)	<0.001
2–4 hours	2,454 (36.50)	59 (2.40)		102 (4.16)	
4–6 hours	1,083 (16.11)	33 (3.05)		54 (4.99)	
≥6 hours	1,280 (19.04)	41 (3.20)		88 (6.88)	
<6 hours	5,444 (80.96)	136 (2.50)	0.156	228 (4.19)	<0.001
≥6 hours	1,280 (19.04)	41 (3.20)		88 (6.88)	

† Ball sports: Table tennis, badminton, basketball, football, and tennis ball. ‡ Other sports: Yoga, roller skating, dance, swimming, skipping rope, riding bicycle, taekwondo, and other sports. * Low exercise intensity: No exercise, mild exercise (such as walking, doing radio exercises, etc.), low intensity and less intense sports (such as recreational table tennis, jogging, etc.). † Middle exercise intensity: Moderately intense and long-lasting sports (such as cycling, running, and playing table tennis). ‡ High exercise intensity: Short of breath and sweating a lot of intense non lasting sports (such as play badminton, basketball, tennis, football, etc.), high intensity and prolonged exercise with rapid breathing and sweating (such as running, aerobics routines, swimming, etc.). Statistical significance is denoted in bold when the *p*-value is less than 0.05.

Table S10. Statistics on childhood exercise habits during normal days and preconceptional period as well as their relationships with childhood doctor-diagnosed asthma and wheeze.

Childhood exercise habits	Total		Asthma		Wheeze	
	Number (n) (%)		Case (n) (%)	<i>p</i> -value	Case (n) (%)	<i>p</i> -value
Childhood normal exercise habit						
Degree of preference for sports						
Very dislike	123 (1.83)		9 (7.32)	0.009	9 (7.32)	0.017
Dislike	196 (2.91)		5 (2.55)		16 (8.16)	
Neutral	2,260 (33.61)		63 (2.79)		116 (5.13)	
Like/very like	4,145 (61.64)		100 (2.41)		175 (4.22)	
Very dislike/dislike	319 (4.74)		14 (4.39)	0.045	25 (7.84)	0.007
Neutral/like/very like	6,405 (95.26)		163 (2.54)		291 (4.54)	
Childhood frequent sports activities						
Walking						
No	3,462 (51.49)		101 (2.92)	0.133	170 (4.91)	0.400
Yes	3,262 (48.51)		76 (2.33)		146 (4.48)	
Running						
No	3,467 (51.56)		102 (2.94)	0.102	171 (4.93)	0.352
Yes	3,257 (48.44)		75 (2.30)		145 (4.45)	
Ball sports †						
No	4,629 (68.84)		120 (2.59)	0.761	205 (4.43)	0.119
Yes	2,095 (31.16)		57 (2.72)		111 (5.30)	
Other sports ‡						
No	1,595 (23.72)		48 (3.01)	0.282	92 (5.77)	0.021
Yes	5,129 (76.28)		129 (2.52)		224 (4.37)	
Childhood exercise habit during postnatal period						
Weekly exercise frequency (days)						
0–2	4,249 (63.19)		105 (2.47)	0.431	193 (4.54)	0.290
3–4	1,606 (23.88)		44 (2.74)		73 (4.55)	
≥5	860 (12.79)		28 (3.26)		50 (5.75)	

<3	4,249 (63.19)	105 (2.47)	0.279	193 (4.54)	0.424
≥3	2,475 (36.81)	72 (2.91)		123 (4.97)	
Daily exercise duration (hours)					
<0.5	1,740 (25.88)	44 (2.53)	0.109	77 (4.43)	0.581
0.5–1	3,613 (53.73)	108 (2.99)		174 (4.82)	
1–2	1,099 (16.34)	22 (2.00)		56 (5.10)	
≥2	272 (4.05)	3 (1.10)		9 (3.31)	
<1	5,353 (79.61)	152 (2.84)	0.036	251 (4.69)	0.935
≥1	1,371 (20.39)	25 (1.82)		65 (4.74)	
Exercise intensity					
Low *	4,795 (71.31)	124 (2.59)	0.159	209 (4.36)	0.035
Middle ξ	1,446 (21.51)	34 (2.35)		74 (5.12)	
High §	483 (7.18)	19 (3.93)		33 (6.83)	
Low	4,795 (71.31)	124 (2.59)	0.708	209 (4.36)	0.037
High/middle	1,929 (28.69)	53 (2.75)		107 (5.55)	
Exercise in the morning (06:00–12:00)					
No	4,913 (73.07)	132 (2.69)	0.646	233 (4.74)	0.784
Yes	1,811 (26.93)	45 (2.48)		83 (4.58)	
Exercise in the afternoon (12:00–18:00)					
No	5,363 (79.76)	145 (2.70)	0.468	270 (5.03)	0.010
Yes	1,361 (20.24)	32 (2.35)		46 (3.38)	
Exercise in the daytime (06:00–18:00)					
No	3,552 (52.83)	100 (2.82)	0.321	187 (5.26)	0.021
Yes	3,172 (47.17)	77 (2.43)		129 (4.07)	
Exercise in the nighttime (18:00–06:00)					
No	3,172 (47.17)	77 (2.43)	0.321	129 (4.07)	0.021
Yes	3,552 (52.83)	100 (2.82)		187 (5.26)	
Duration of daily meditation (hours)					
<2	1,084 (16.12)	28 (2.58)	0.893	47 (4.34)	0.374

2–4	2,430 (36.14)	60 (2.47)	106 (4.36)		
4–6	1,206 (17.94)	32 (2.65)	55 (4.56)		
≥6	2,004 (29.80)	57 (2.84)	108 (5.39)		
<6	4,720 (70.20)	120 (2.54)	208 (4.41)	0.479	0.082
≥6	2,004 (29.80)	57 (2.84)	108 (5.39)		

† Ball sports: Table tennis, badminton, basketball, football, and tennis ball. ‡ Other sports: Yoga, roller skating, dance, swimming, skipping rope, riding bicycle, taekwondo, and other sports. * Low exercise intensity: No exercise, mild exercise (such as walking, doing radio exercises, etc.), low intensity and less intense sports (such as recreational table tennis, jogging, etc.). † Middle exercise intensity: Moderately intense and long-lasting sports (such as cycling, running, and playing table tennis). § High exercise intensity: Short of breath and sweating a lot of intense non lasting sports (such as play badminton, basketball, tennis, football, etc.), high intensity and prolonged exercise with rapid breathing and sweating (such as running, aerobics routines, swimming, etc.). Statistical significance is denoted in bold when the *p*-value is less than 0.05.

Table S11. Statistical description of individual exposures to outdoor air pollution, temperature and relative humidity (RH) as well as the differences in exposure level between cases and controls for childhood asthma and wheeze.

	Total						Asthma			Wheeze		
	Mean	SD	25th	50th	75th	IQR	Yes	No	<i>p</i>	Yes	No	<i>p</i>
Fourth to sixth month before pregnancy												
PM _{2.5}	44.70	19.21	28.58	40.50	58.49	29.91	47.61	44.62	0.042	45.77	44.64	0.308
PM _{2.5–10}	23.73	6.92	19.25	23.66	28.66	9.42	24.95	23.70	0.019	24.49	23.70	0.045
PM ₁₀	65.73	20.29	49.42	66.99	82.16	32.74	70.11	65.61	0.004	67.90	65.62	0.052
SO ₂	14.26	5.90	11.19	13.77	16.08	4.89	14.08	14.26	0.687	14.26	14.26	0.996
NO ₂	31.47	11.96	21.56	29.74	40.88	19.32	33.83	31.40	0.008	33.13	31.38	0.012
CO	0.91	0.21	0.77	0.88	1.03	0.26	0.90	0.91	0.501	0.90	0.92	0.309
O ₃	57.29	16.77	43.71	58.92	69.50	25.79	54.91	57.36	0.057	56.48	57.33	0.381
T	17.70	6.78	11.47	18.15	23.45	11.98	17.33	17.71	0.469	17.80	17.69	0.788
RH	76.88	9.16	75.59	78.57	82.07	6.48	78.24	76.84	0.046	77.85	76.83	0.054
Three months before pregnancy												
PM _{2.5}	44.22	19.76	27.61	38.36	60.29	32.68	47.02	44.14	0.057	46.52	44.10	0.034
PM _{2.5–10}	23.07	6.89	18.48	22.80	27.90	9.42	24.15	23.05	0.036	23.47	23.05	0.297
PM ₁₀	64.16	20.67	47.60	62.64	81.18	33.58	67.23	64.08	0.046	66.41	64.05	0.048
SO ₂	13.64	5.75	10.01	13.24	15.79	15.78	13.41	13.65	0.592	13.55	13.64	0.773

NO ₂	31.11	12.05	21.27	28.94	40.34	19.07	32.95	31.07	0.041	33.08	31.02	0.003
CO	0.92	0.22	0.76	0.88	1.03	0.27	0.91	0.92	0.717	0.90	0.92	0.216
O ₃	57.10	17.45	43.01	58.56	69.95	26.94	54.78	57.16	0.075	56.76	57.12	0.722
T	17.51	6.98	11.04	17.69	23.50	12.46	17.34	17.51	0.748	17.53	17.51	0.953
RH	76.57	9.23	75.48	78.17	81.63	6.15	77.14	76.56	0.405	76.98	76.55	0.421
1 year before pregnancy												
PM _{2.5}	45.45	11.59	38.79	51.04	53.07	14.28	47.44	45.39	0.021	47.35	45.35	0.003
PM _{2.5-10}	23.61	5.40	21.10	24.49	26.88	5.78	24.78	23.58	0.004	24.12	23.59	0.087
PM ₁₀	66.07	14.70	61.32	70.27	76.34	15.02	69.25	65.99	0.004	68.29	65.96	0.006
SO ₂	14.75	5.43	11.70	13.93	16.34	4.64	14.26	14.76	0.227	14.74	14.75	0.972
NO ₂	31.71	9.27	22.30	34.83	38.53	16.23	33.21	31.67	0.030	33.47	31.62	0.001
CO	0.92	0.16	0.86	0.90	0.96	0.10	0.91	0.92	0.158	0.91	0.92	0.331
O ₃	55.99	7.94	51.47	55.39	61.43	9.93	54.01	56.04	0.001	55.27	56.02	0.101
T	17.48	1.08	17.40	17.67	17.95	0.55	17.52	17.47	0.585	17.56	17.47	0.181
RH	76.97	7.54	76.03	79.47	82.65	6.62	78.43	76.93	0.009	77.85	76.93	0.033
1 st trimester												
PM _{2.5}	43.69	19.64	27.53	38.54	57.86	30.33	44.57	43.66	0.544	46.08	43.57	0.027
PM _{2.5-10}	22.67	7.27	17.64	21.87	27.44	9.80	24.45	22.63	0.001	22.96	22.66	0.473
PM ₁₀	62.15	20.05	47.30	58.81	78.01	30.71	64.94	62.08	0.061	63.72	62.07	0.156
SO ₂	12.88	5.44	9.34	12.62	15.26	5.92	12.72	12.88	0.702	12.90	12.88	0.945
NO ₂	30.82	11.89	21.25	28.98	39.59	18.34	32.21	30.78	0.117	32.64	30.73	0.005
CO	0.92	0.24	0.76	0.86	1.03	0.27	0.89	0.92	0.070	0.92	0.92	0.981
O ₃	57.27	17.60	43.30	58.42	70.39	27.09	55.51	57.32	0.180	55.69	57.35	0.103
T	17.30	7.03	10.99	17.30	23.31	12.32	17.86	17.29	0.287	17.28	17.30	0.962
RH	76.46	9.78	75.74	78.30	81.80	6.06	77.83	76.43	0.061	77.29	76.42	0.124
2 nd trimester												
PM _{2.5}	42.59	18.48	27.74	37.16	57.09	29.35	44.73	42.53	0.120	44.68	42.49	0.040
PM _{2.5-10}	21.89	6.70	16.84	21.38	26.43	9.59	23.18	21.85	0.010	22.77	21.84	0.017
PM ₁₀	59.51	17.88	47.60	56.70	72.46	24.86	63.04	59.41	0.008	62.16	59.38	0.007
SO ₂	12.08	5.25	8.61	11.84	14.70	6.09	11.47	12.09	0.120	11.95	12.08	0.661

NO ₂	29.82	10.98	20.93	28.74	37.37	16.44	30.79	29.79	0.236	31.25	29.75	0.018
CO	0.92	0.23	0.76	0.85	1.02	0.26	0.88	0.92	0.022	0.91	0.92	0.383
O ₃	57.64	16.96	43.50	58.69	70.13	26.63	56.30	57.68	0.289	57.02	57.67	0.507
T	17.45	6.83	11.29	17.71	23.67	12.38	17.73	17.44	0.579	17.56	17.44	0.771
RH	76.62	9.94	75.60	78.83	82.30	6.70	77.93	76.59	0.076	77.47	76.58	0.120
3 rd trimester												
PM _{2.5}	42.19	19.35	26.11	36.93	56.67	30.56	44.88	42.12	0.067	43.64	42.12	0.181
PM _{2.5-10}	21.35	6.78	16.48	20.70	25.32	8.84	23.10	21.31	0.001	22.44	21.30	0.004
PM ₁₀	58.47	18.48	45.40	55.53	72.20	26.80	62.80	58.35	0.002	61.28	58.33	0.007
SO ₂	11.45	5.14	7.80	11.04	14.39	6.59	10.68	11.47	0.048	11.35	11.45	0.738
NO ₂	29.53	11.36	20.51	28.44	37.24	16.73	31.37	29.48	0.033	30.81	29.47	0.045
CO	0.92	0.24	0.76	0.85	1.01	0.25	0.90	0.92	0.324	0.89	0.92	0.053
O ₃	58.01	18.11	42.74	59.39	71.55	28.81	55.61	58.08	0.081	58.07	58.01	0.955
T	17.56	6.92	11.32	18.17	23.43	12.11	17.16	17.57	0.449	17.75	17.55	0.617
RH	76.49	10.17	75.33	78.72	82.48	7.15	78.01	76.45	0.049	77.29	76.45	0.160
Entire pregnancy												
PM _{2.5}	42.92	12.27	34.98	45.74	52.16	17.18	44.67	42.87	0.059	44.85	42.82	0.005
PM _{2.5-10}	22.07	5.82	17.91	22.63	25.97	8.06	23.65	22.03	<0.001	22.75	22.04	0.035
PM ₁₀	60.00	14.93	51.36	61.12	72.05	20.69	63.37	59.91	0.003	62.19	59.89	0.008
SO ₂	12.13	4.91	8.72	11.98	14.84	6.12	11.58	12.15	0.135	12.03	12.14	0.691
NO ₂	30.11	9.22	21.50	31.88	36.67	15.17	31.45	30.07	0.054	31.58	30.03	0.004
CO	0.92	0.15	0.83	0.89	0.99	0.16	0.90	0.92	0.019	0.91	0.92	0.113
O ₃	57.59	9.45	51.22	57.59	64.39	13.17	55.94	57.63	0.021	56.69	57.63	0.089
T	17.41	2.58	15.39	17.34	19.50	4.11	17.66	17.40	0.190	17.50	17.40	0.523
RH	76.54	8.24	75.59	78.85	81.88	6.29	77.82	76.50	0.040	77.44	76.49	0.050
First year												
PM _{2.5}	40.25	10.84	32.84	43.72	47.98	15.14	42.28	40.19	0.012	42.14	40.15	0.001
PM _{2.5-10}	20.18	4.95	16.61	20.19	23.76	7.15	21.27	20.15	0.003	20.81	20.15	0.021
PM ₁₀	54.97	12.49	49.74	55.67	63.96	14.22	57.50	54.91	0.006	56.70	54.89	0.012
SO ₂	9.88	3.57	7.21	8.84	12.28	5.07	9.28	9.90	0.025	9.75	9.89	0.501

NO ₂	28.20	8.39	19.22	30.77	33.74	14.52	29.68	28.16	0.018	29.65	28.12	0.002
CO	0.91	0.12	0.83	0.90	0.97	0.14	0.91	0.91	0.921	0.92	0.91	0.165
O ₃	59.28	7.71	56.66	60.55	64.19	7.53	57.60	59.33	0.003	58.98	59.30	0.470
T	17.55	1.11	17.34	17.74	18.11	0.77	17.56	17.55	0.932	17.59	17.55	0.570
RH	75.60	7.95	76.15	77.88	80.51	4.36	77.10	75.56	0.011	76.60	75.55	0.022
Past year												
PM _{2.5}	33.94	7.70	23.63	38.38	39.37	15.74	34.97	33.91	0.073	35.34	33.87	0.001
PM _{2.5-10}	14.05	2.36	12.44	14.07	15.41	2.97	13.81	14.06	0.172	13.89	14.06	0.201
PM ₁₀	41.50	6.30	37.54	39.94	44.22	6.68	41.70	41.50	0.667	41.75	41.49	0.474
SO ₂	7.12	1.46	6.22	6.71	7.40	1.18	6.89	7.13	0.032	6.99	7.13	0.091
NO ₂	20.58	5.14	14.81	23.41	24.46	9.65	21.20	20.57	0.108	21.53	20.54	0.001
CO	0.65	0.06	0.63	0.66	0.68	0.05	0.64	0.65	0.048	0.65	0.65	0.772
O ₃	62.93	4.06	62.41	63.72	65.07	2.66	62.25	62.95	0.024	62.98	62.93	0.809
T	18.06	1.12	18.17	18.22	18.41	0.24	18.18	18.06	0.163	18.16	18.05	0.097
RH	72.52	6.48	72.96	75.79	76.49	3.53	73.66	72.49	0.018	73.42	72.48	0.012
Entire postnatal												
PM _{2.5}	36.89	9.02	26.59	41.53	43.53	16.94	38.28	36.85	0.039	38.56	36.81	0.001
PM _{2.5-10}	17.36	2.44	15.94	17.56	19.09	3.15	17.75	17.35	0.035	17.70	17.35	0.012
PM ₁₀	47.58	7.06	44.11	49.13	52.68	8.57	48.76	47.54	0.025	48.76	47.52	0.002
SO ₂	8.08	2.07	6.97	7.46	8.40	1.43	7.69	8.09	0.010	7.95	8.09	0.253
NO ₂	24.57	6.70	17.32	27.69	29.64	12.32	25.59	24.54	0.041	25.85	24.50	<0.001
CO	0.80	0.07	0.75	0.81	0.84	0.09	0.80	0.80	0.419	0.81	0.80	0.002
O ₃	59.44	5.76	58.36	60.32	62.75	4.39	58.29	59.47	0.007	59.45	59.44	0.973
T	18.03	11.11	17.70	17.99	18.40	0.70	17.90	18.03	0.872	17.90	18.04	0.832
RH	74.72	7.40	76.93	77.62	77.96	1.03	75.98	74.68	0.022	75.53	74.68	0.045

PM_{2.5} (µg/m³) = particulate matter ≤2.5 µm in aerodynamic, PM_{2.5-10} (µg/m³) = particulate matter between 2.5 µm and ≤10 µm in aerodynamic, PM₁₀ (µg/m³) = particulate matter ≤10 µm in aerodynamic, SO₂ (µg/m³) = sulphur dioxide, NO₂ (µg/m³) = nitrogen dioxide, CO (mg/m³) = carbon monoxide, O₃ (µg/m³) = ozone. T (°C) = temperature, RH (%) = relative humidity; SD = standard deviation, IQR: Inter quartile range. *p* value < 0.05 was indicated as statistically significant.

Table S12. Pearson correlation between individual exposures to outdoor air pollution during different time widows.

	PM _{2.5}	PM _{2.5-10}	PM ₁₀	SO ₂	NO ₂	CO	O ₃
Fourth to sixth month before pregnancy							
PM _{2.5}	1.000	0.405 **	0.909 **	-0.010	0.823 **	0.361 **	-0.712 **
PM _{2.5-10}		1.000	0.725 **	-0.314 **	0.343 **	-0.032 **	-0.239 **
PM ₁₀			1.000	-0.112 **	0.749 **	0.265 **	-0.632 **
SO ₂				1.000	0.103 **	0.278 **	-0.037 **
NO ₂					1.000	0.289 **	-0.517 **
CO						1.000	-0.333 **
O ₃							1.000
Three months before pregnancy							
PM _{2.5}	1.000	0.404 **	0.900 **	0.069 **	0.833 **	0.420 **	-0.726 **
PM _{2.5-10}		1.000	0.728 **	-0.236 **	0.345 **	0.009	-0.230 **
PM ₁₀			1.000	-0.005	0.757 **	0.309 **	-0.632 **
SO ₂				1.000	0.169 **	0.276 **	-0.088 **
NO ₂					1.000	0.310 **	-0.537 **
CO						1.000	-0.393 **
O ₃							1.000
1 year before pregnancy							
PM _{2.5}	1.000	0.931 **	0.690 **	-0.333 **	0.771 **	-0.028 *	-0.573 **
PM _{2.5-10}		1.000	0.883 **	-0.364 **	0.658 **	-0.023	-0.726 **
PM ₁₀			1.000	-0.452 **	0.417 **	-0.084 **	-0.741 **
SO ₂				1.000	-0.058 **	0.249 **	0.373 **
NO ₂					1.000	-0.023	-0.259 **
CO						1.000	0.278 **
O ₃							1.000
1st trimester							
PM _{2.5}	1.000	0.331 **	0.826 **	-0.002	0.815 **	0.479 **	-0.717 **
PM _{2.5-10}		1.000	0.748 **	-0.182 **	0.326 **	-0.037 **	-0.146 **

PM ₁₀			1.000	-0.013	0.731 **	0.235 **	-0.531 **
SO ₂				1.000	0.153 **	0.155 **	0.029 *
NO ₂					1.000	0.303 **	-0.505 **
CO						1.000	-0.434 **
O ₃							1.000
2 nd trimester							
PM _{2.5}	1.000	0.267 **	0.785 **	-0.105 **	0.821 **	0.517 **	-0.727 **
PM _{2.5-10}		1.000	0.743 **	-0.220 **	0.289 **	-0.071 **	-0.106 **
PM ₁₀			1.000	-0.090 **	0.724 **	0.209 **	-0.504 **
SO ₂				1.000	0.091 **	0.060 **	0.120 **
NO ₂					1.000	0.301 **	-0.490 **
CO						1.000	-0.489 **
O ₃							1.000
3 rd trimester							
PM _{2.5}	1.000	0.280 **	0.788 **	-0.004	0.828 **	0.548 **	-0.717 **
PM _{2.5-10}		1.000	0.746 **	-0.175 **	0.315 **	-0.041 **	-0.084 **
PM ₁₀			1.000	-0.001	0.746 **	0.241 **	-0.486 **
SO ₂				1.000	0.153 **	0.092 **	0.023
NO ₂					1.000	0.313 **	-0.500 **
CO						1.000	-0.501 **
O ₃							1.000
Entire pregnancy							
PM _{2.5}	1.000	0.549 **	0.828 **	-0.272 **	0.818 **	0.199 **	-0.537 **
PM _{2.5-10}		1.000	0.878 **	-0.272 **	0.403 **	0.026 *	-0.434 **
PM ₁₀			1.000	-0.178 **	0.680 **	0.083 **	-0.535 **
SO ₂				1.000	0.041 **	0.037 **	0.350 **
NO ₂					1.000	0.082 **	-0.283 **
CO						1.000	-0.026 *
O ₃							1.000

First year							
PM _{2.5}	1.000	0.670 **	0.878 **	-0.276 **	0.879 **	0.334 **	-0.255 **
PM _{2.5-10}		1.000	0.910 **	-0.221 **	0.495 **	0.277 **	-0.455 **
PM ₁₀			1.000	-0.203 **	0.732 **	0.264 **	-0.425 **
SO ₂				1.000	0.012	-0.176 **	0.465 **
NO ₂					1.000	0.244 **	-0.037 **
CO						1.000	0.165 **
O ₃							1.000
Past year							
PM _{2.5}	1.000	0.043 **	0.595 **	-0.599 **	0.913 **	-0.089 **	0.255 **
PM _{2.5-10}		1.000	0.727 **	0.115 **	0.079 **	0.167 **	0.357 **
PM ₁₀			1.000	-0.333 **	0.478 **	-0.042 **	0.242 **
SO ₂				1.000	-0.379 **	0.675 **	0.277 **
NO ₂					1.000	0.073 **	0.417 **
CO						1.000	0.330 **
O ₃							1.000
Entire postnatal							
PM _{2.5}	1.000	0.657 **	0.890 **	-0.491 **	0.945 **	0.736 **	0.019
PM _{2.5-10}		1.000	0.905 **	-0.363 **	0.585 **	0.620 **	-0.176 **
PM ₁₀			1.000	-0.465 **	0.803 **	0.745 **	-0.147 **
SO ₂				1.000	-0.277 **	-0.164 **	0.589 **
NO ₂					1.000	0.664 **	0.186 **
CO						1.000	0.184 **
O ₃							1.000

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

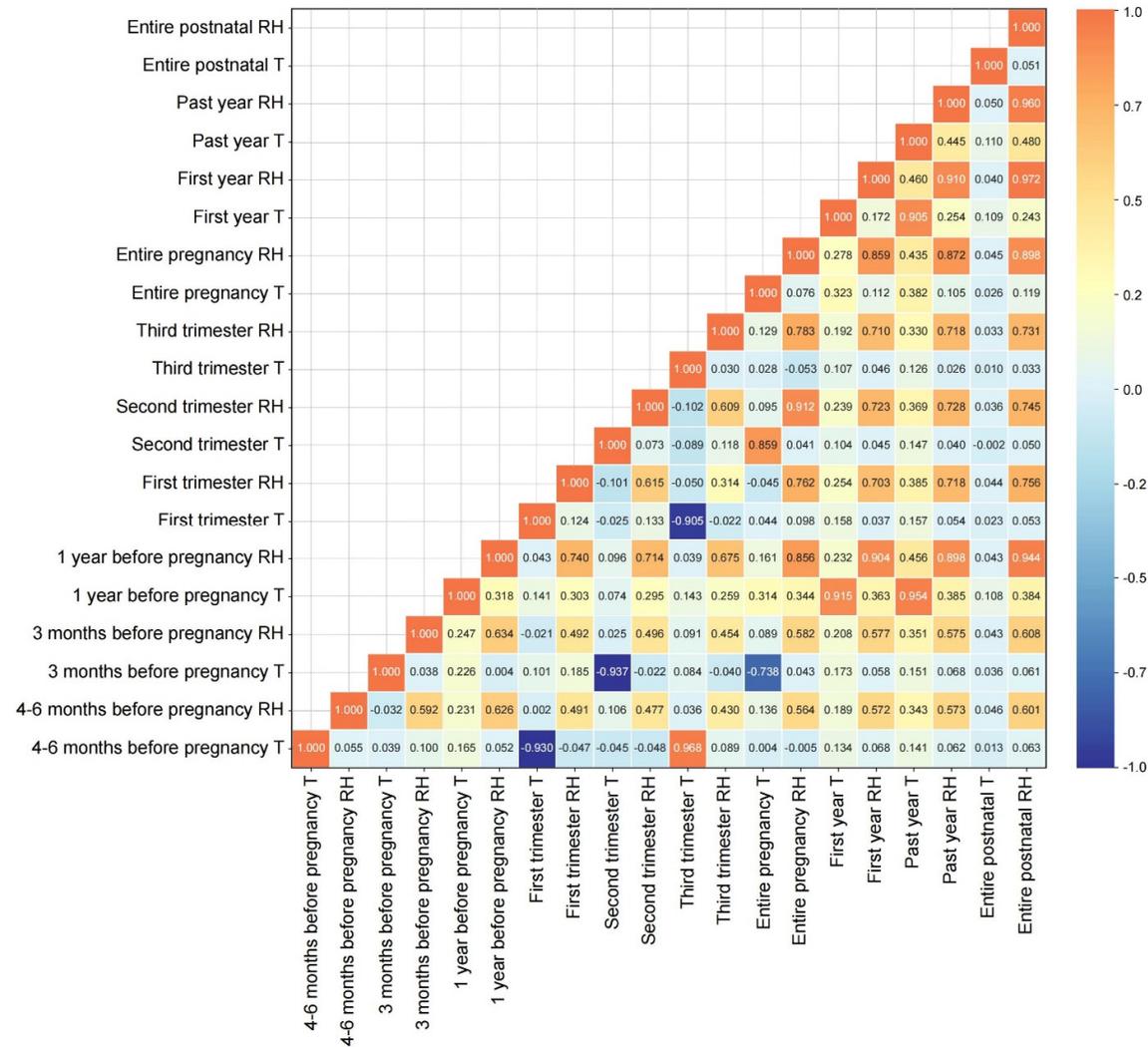


Figure S1. Pearson correlation coefficients between individual exposure to outdoor temperature and relative humidity across different time windows.

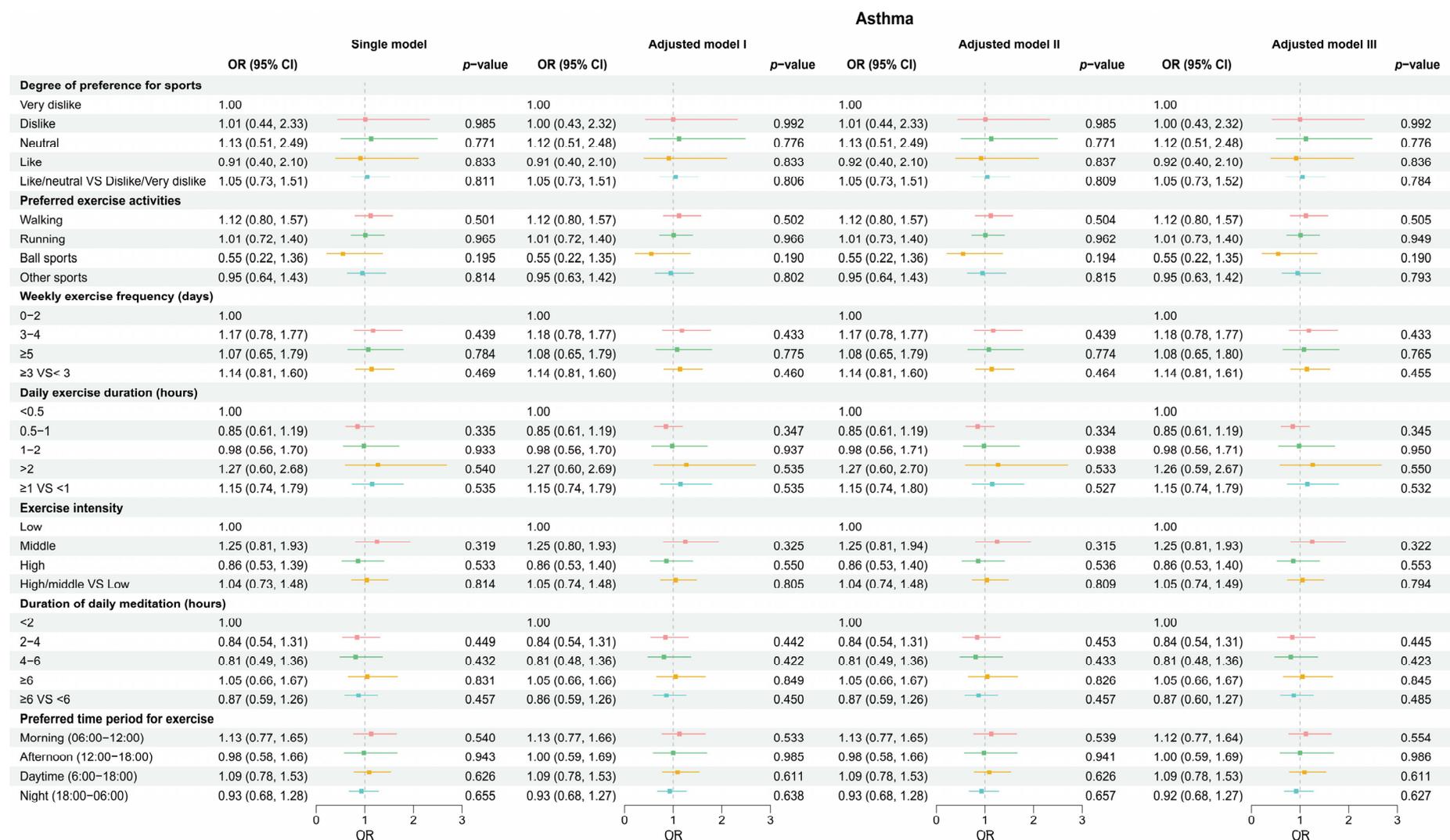


Figure S2a. Associations between paternal exercise prior to conception and children’s physician-diagnosed asthma. The single model presents odds ratios (ORs) and 95% confidence intervals (CIs) adjusted for the studied covariates. Adjusted Model I further accounts for individual exposure to ambient temperature during the preconception period. Adjusted Model II additionally adjusts for individual exposure to ambient nitrogen dioxide (NO₂) within the preconception period. Finally, Adjusted Model III includes adjustments for individual exposures to both ambient NO₂ and temperature during the postnatal period. A *p*-value less than 0.05 is considered statistically significant.

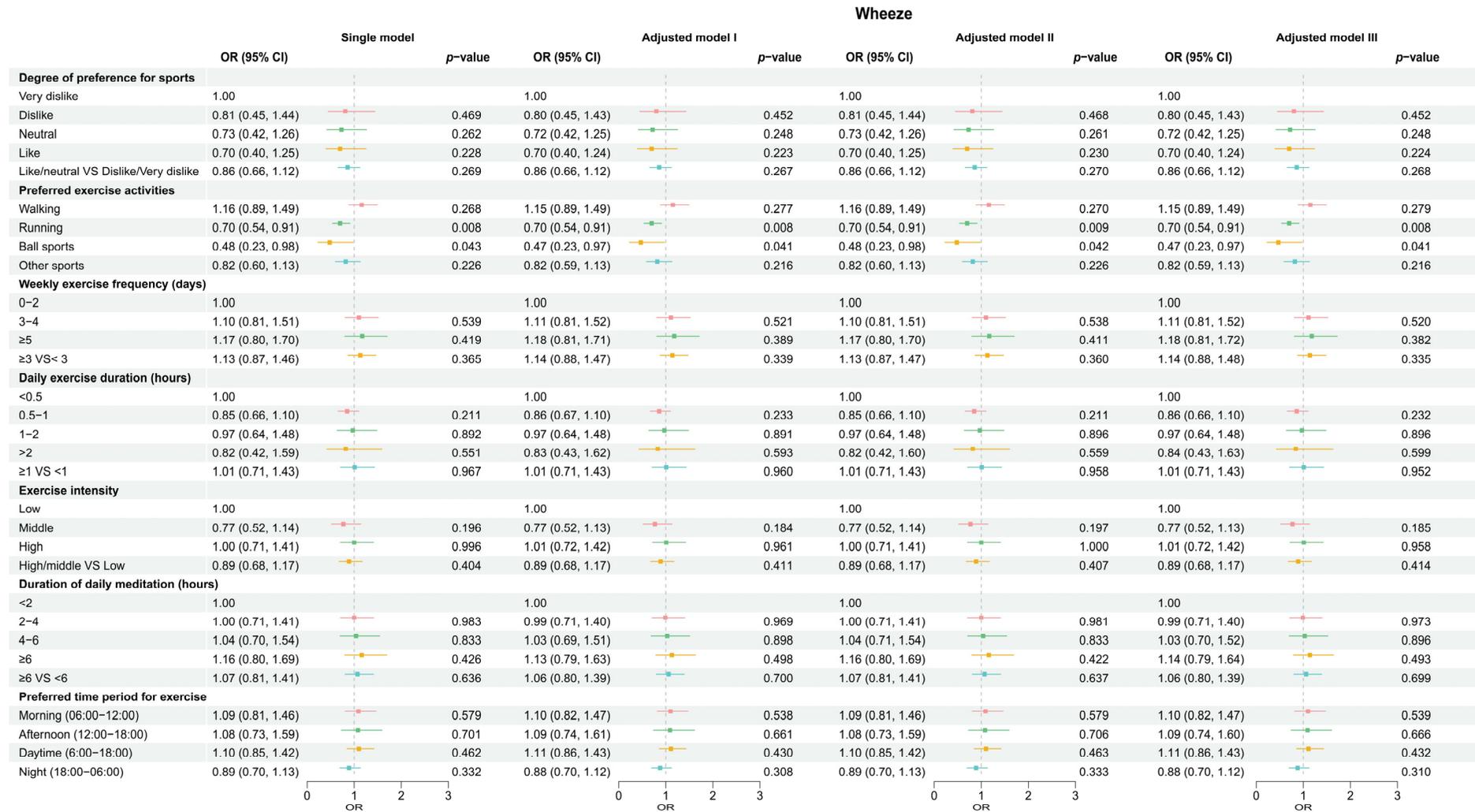


Figure S2b. Associations between paternal exercise prior to conception and children’s physician-diagnosed wheeze. The single model presents odds ratios (ORs) and 95% confidence intervals (CIs) adjusted for the studied covariates. Adjusted Model I further accounts for individual exposure to ambient temperature during the preconception period. Adjusted Model II additionally adjusts for individual exposure to ambient nitrogen dioxide (NO₂) within the preconception period. Finally, Adjusted Model III includes adjustments for individual exposures to both ambient NO₂ and temperature during the postnatal period. A *p*-value less than 0.05 is considered statistically significant.

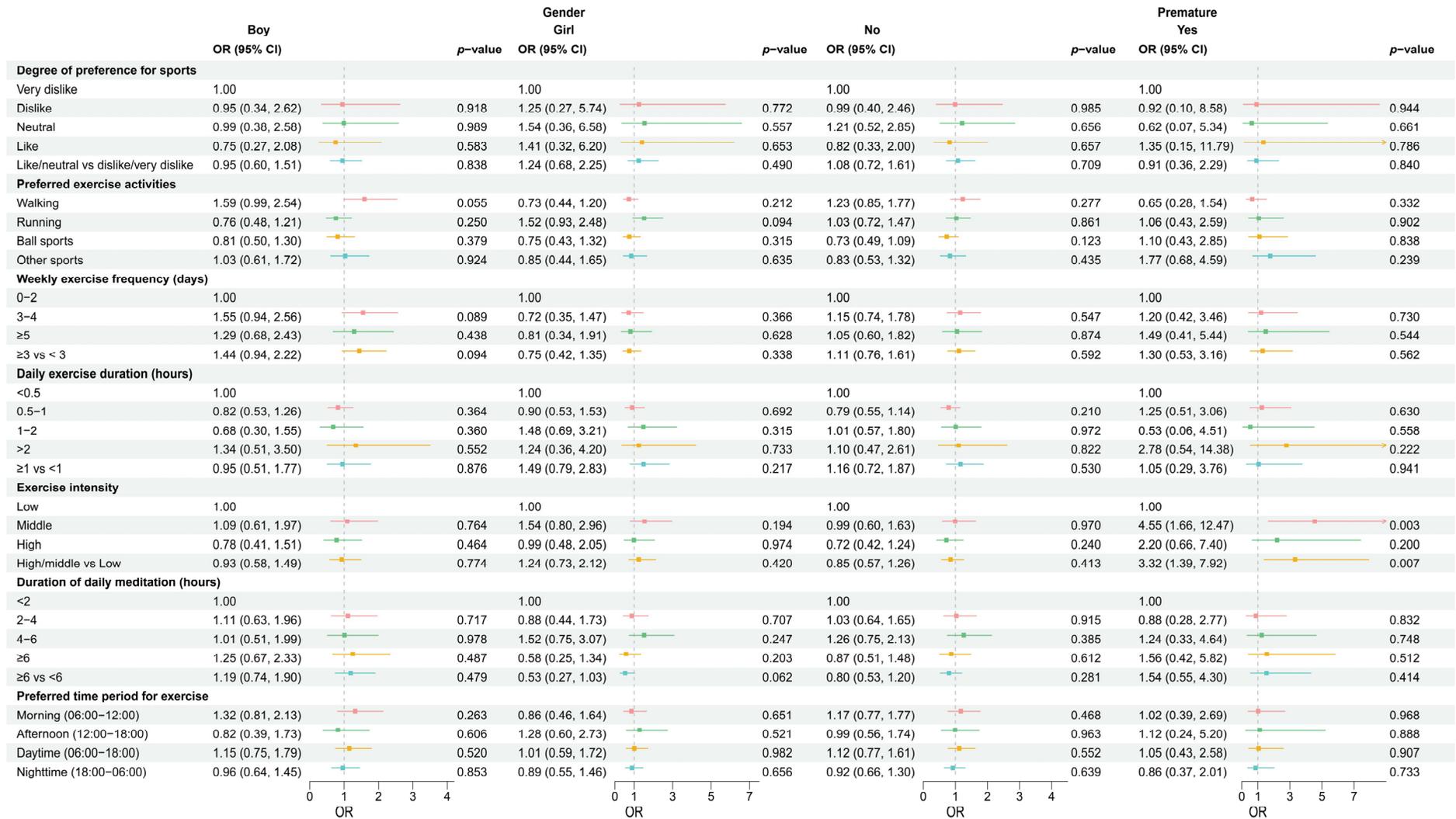


Figure S3a. Odds ratio (95% CI) of children’s physician-diagnosed asthma for paternal exercise during normal days and before pregnancy, stratified by gender and premature. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

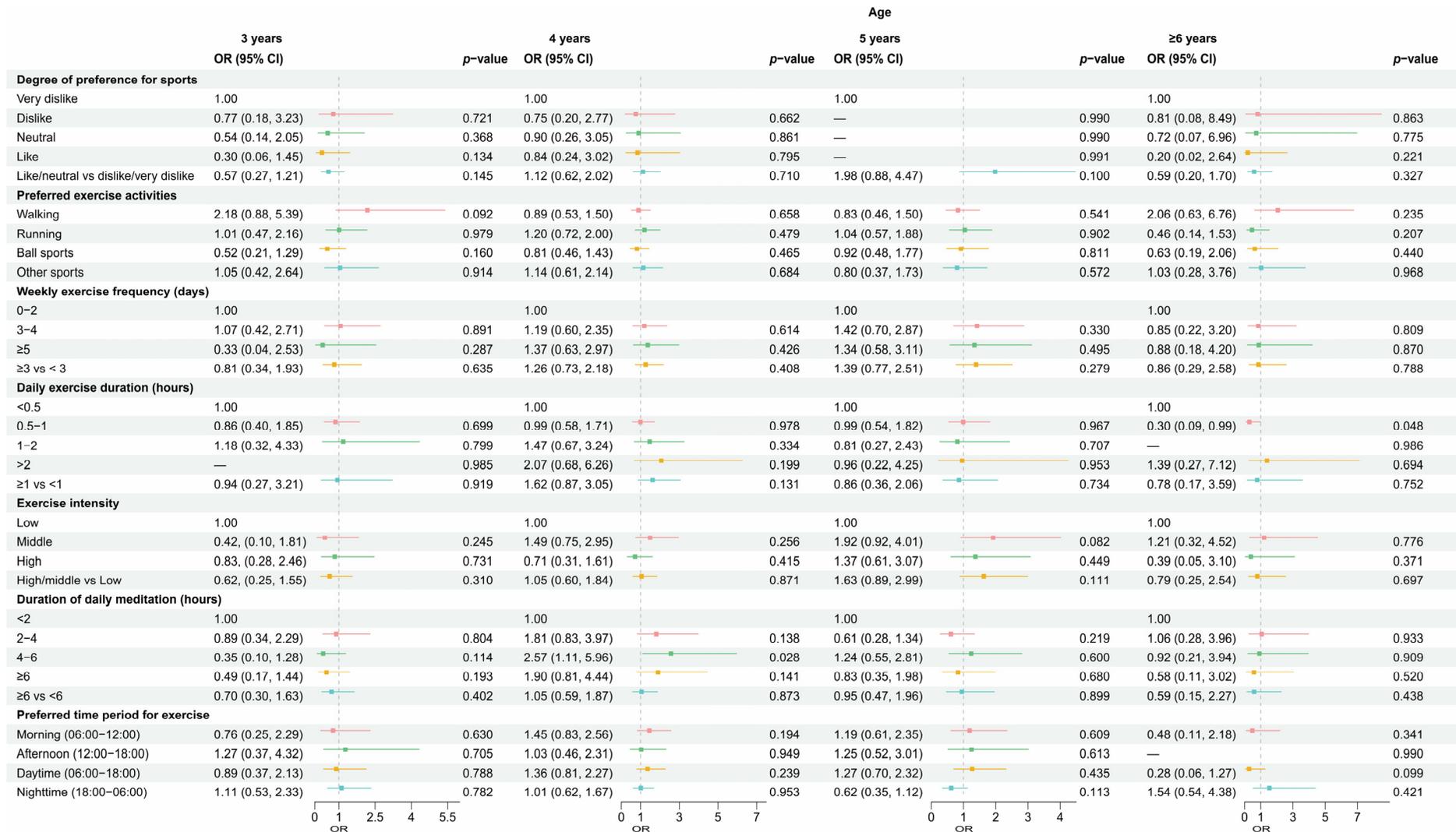


Figure S3b. Odds ratio (95% CI) of children’s physician-diagnosed asthma for paternal exercise during normal days and before pregnancy, stratified age. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

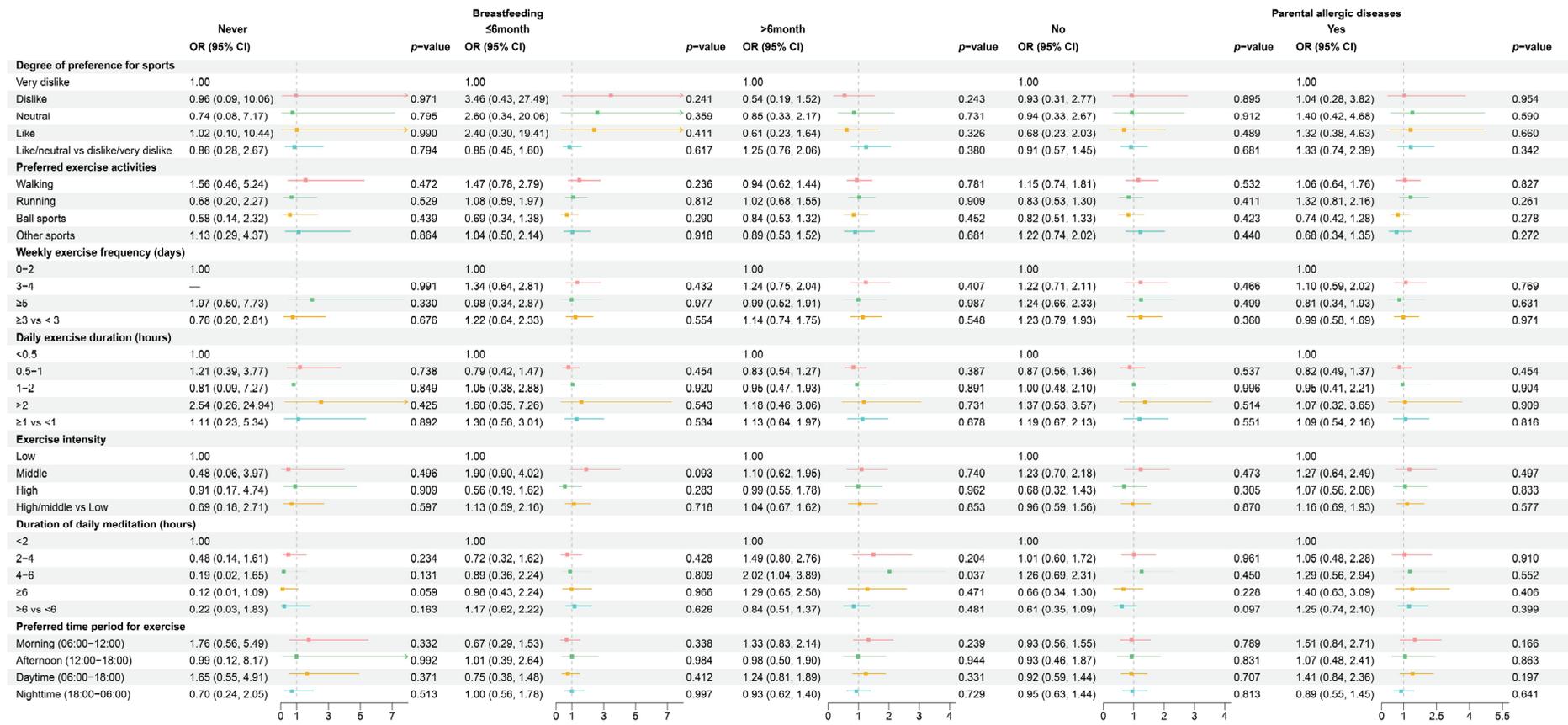


Figure S3c. Odds ratio (95% CI) of children’s physician-diagnosed asthma for paternal exercise during normal days and before pregnancy, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

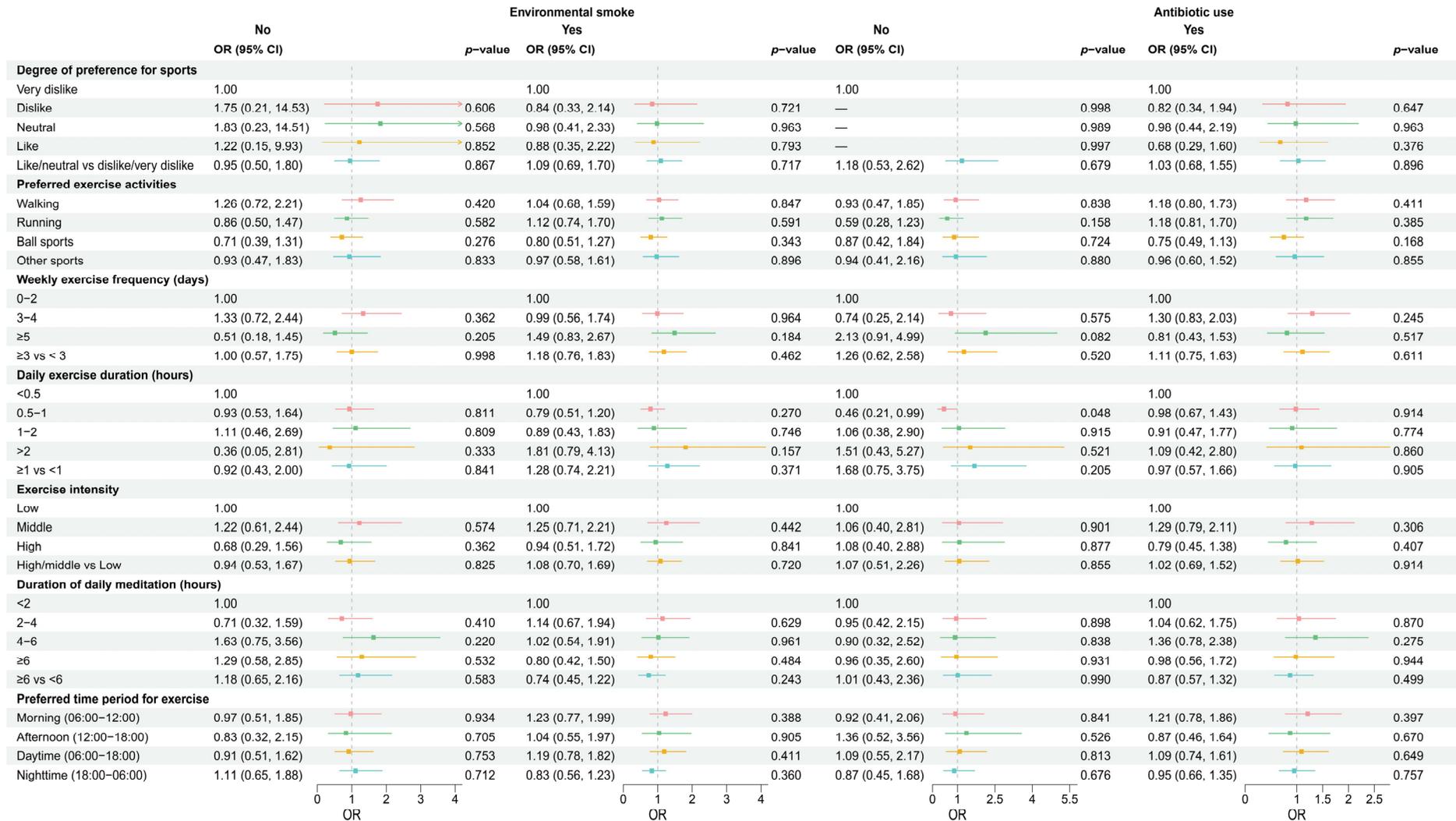


Figure S3d. Odds ratio (95% CI) of children’s physician-diagnosed asthma for paternal exercise during normal days and before pregnancy, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates, exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

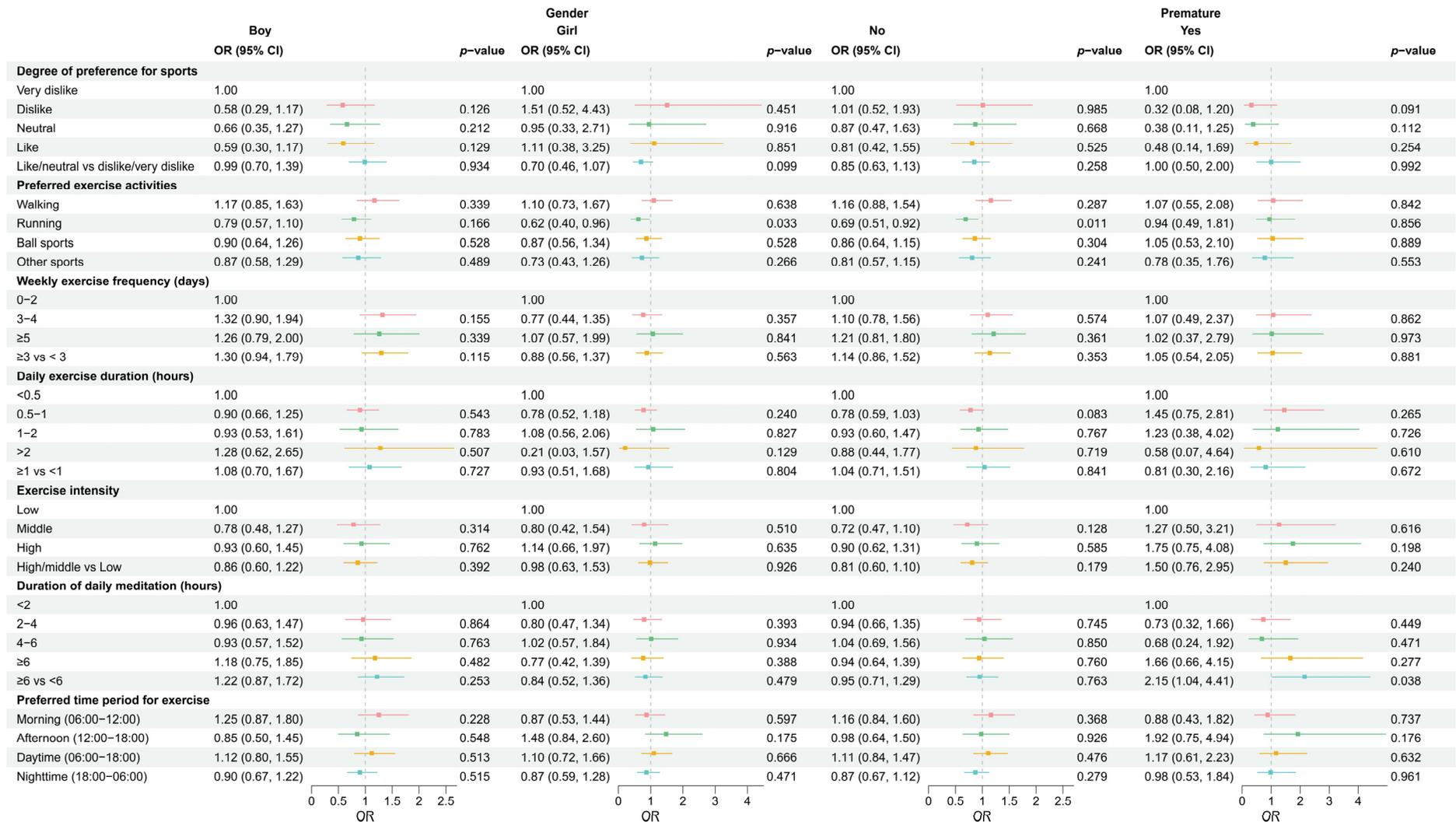


Figure S4a. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for paternal exercise during normal days and before pregnancy, stratified by gender and premature. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

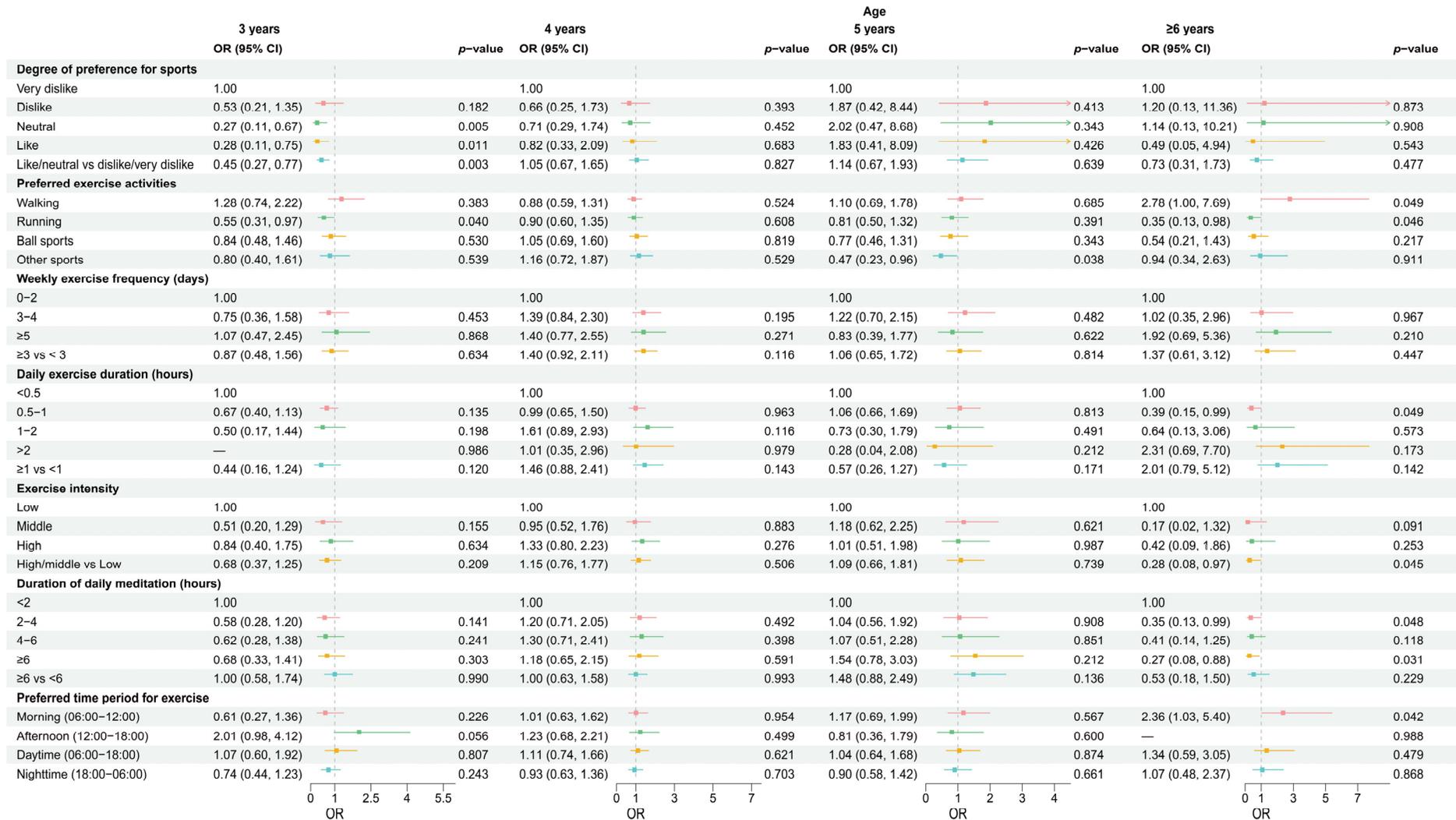


Figure S4b. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for paternal exercise during normal days and before pregnancy, stratified by age. ORs were calculated after adjusting for the covariates in Table 1, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

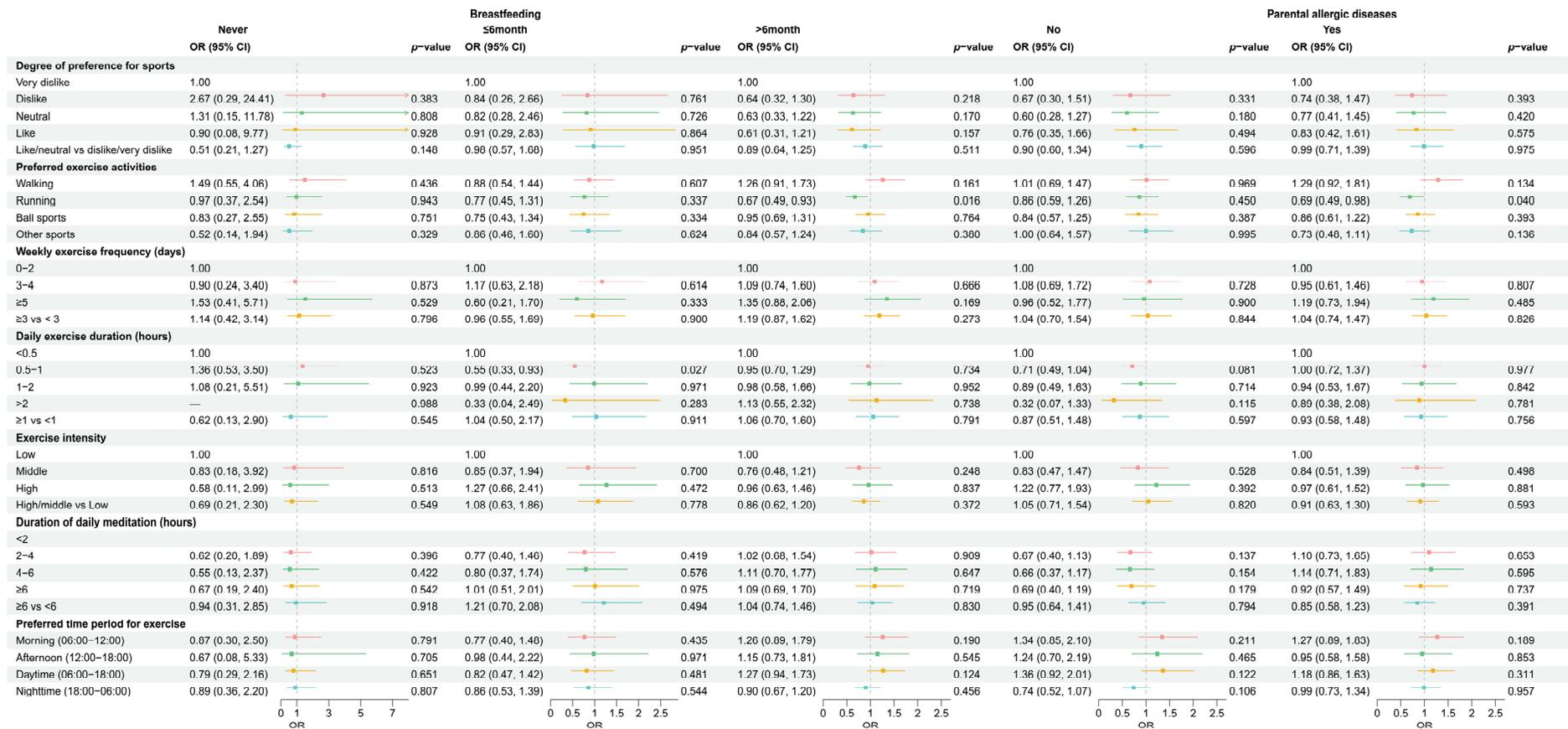


Figure S4c. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for paternal exercise during normal days and before pregnancy, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

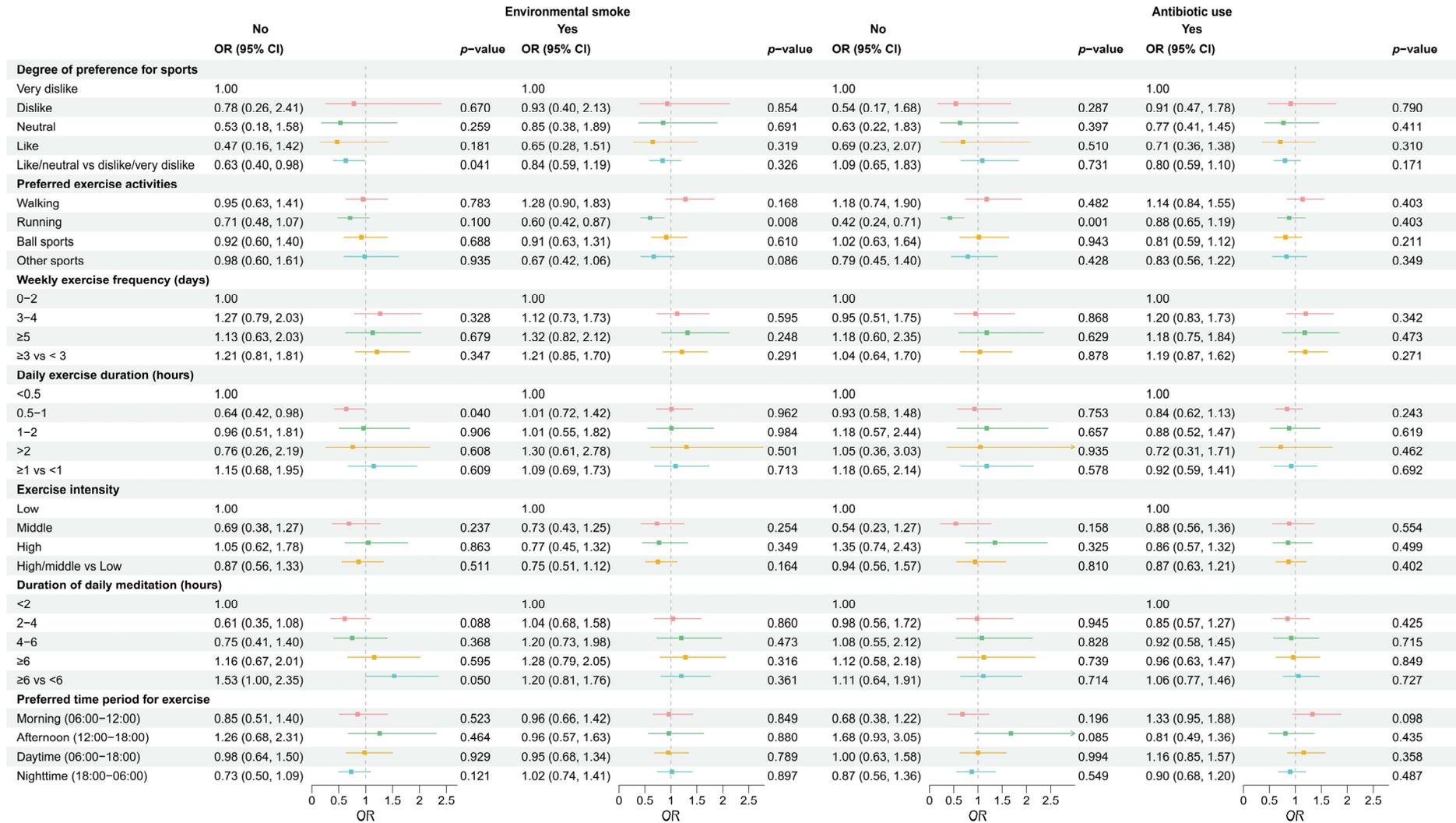


Figure S4d. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for paternal exercise during normal days and before pregnancy, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates, exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S5a. Associations between maternal exercise during normal days, the year prior to pregnancy and pregnancy and physician-diagnosed asthma in children. The single model shows odds ratios (ORs) with 95% confidence intervals (CIs) adjusted for the studied covariates. Adjusted Model I further accounts for individual exposure to ambient temperature during the preconception period. Adjusted Model II additionally adjusts for individual exposure to ambient nitrogen dioxide (NO₂) within the preconception period. Adjusted Model III includes adjustments for individual exposures to both ambient NO₂ and temperature during the postnatal period. *p*-value less than 0.05 is considered statistically significant.



Figure S5b. Associations between maternal exercise during normal days, the year prior to pregnancy and pregnancy and physician-diagnosed wheeze in children. The single model shows odds ratios (ORs) with 95% confidence intervals (CIs) adjusted for the studied covariates. Adjusted Model I further accounts for individual exposure to ambient temperature during the preconception period. Adjusted Model II additionally adjusts for individual exposure to ambient nitrogen dioxide (NO₂) within the preconception period. Adjusted Model III includes adjustments for individual exposures to both ambient NO₂ and temperature during the postnatal period. *p*-value less than 0.05 is considered statistically significant.

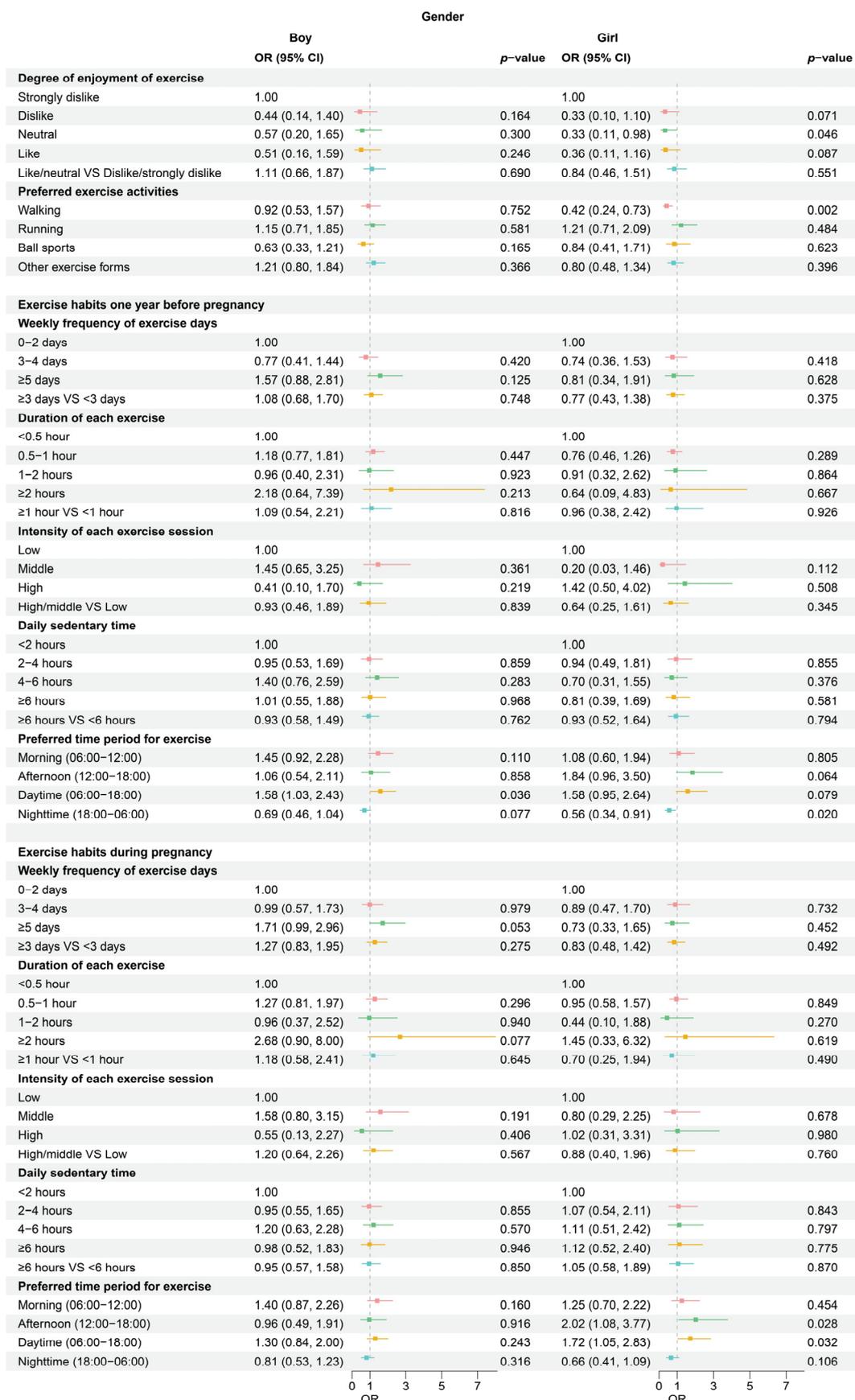


Figure S6a. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by gender. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

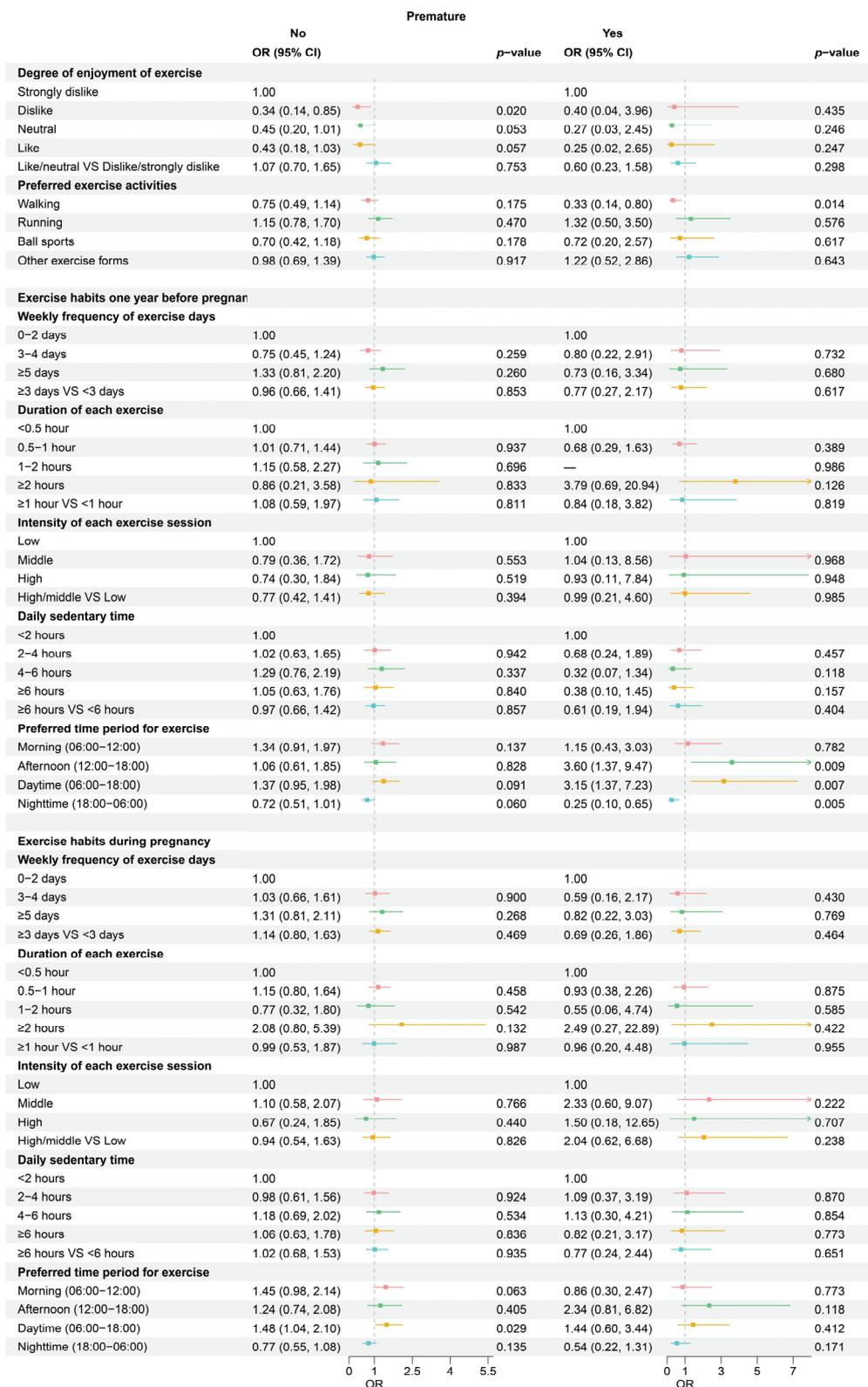


Figure S6b. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by premature. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

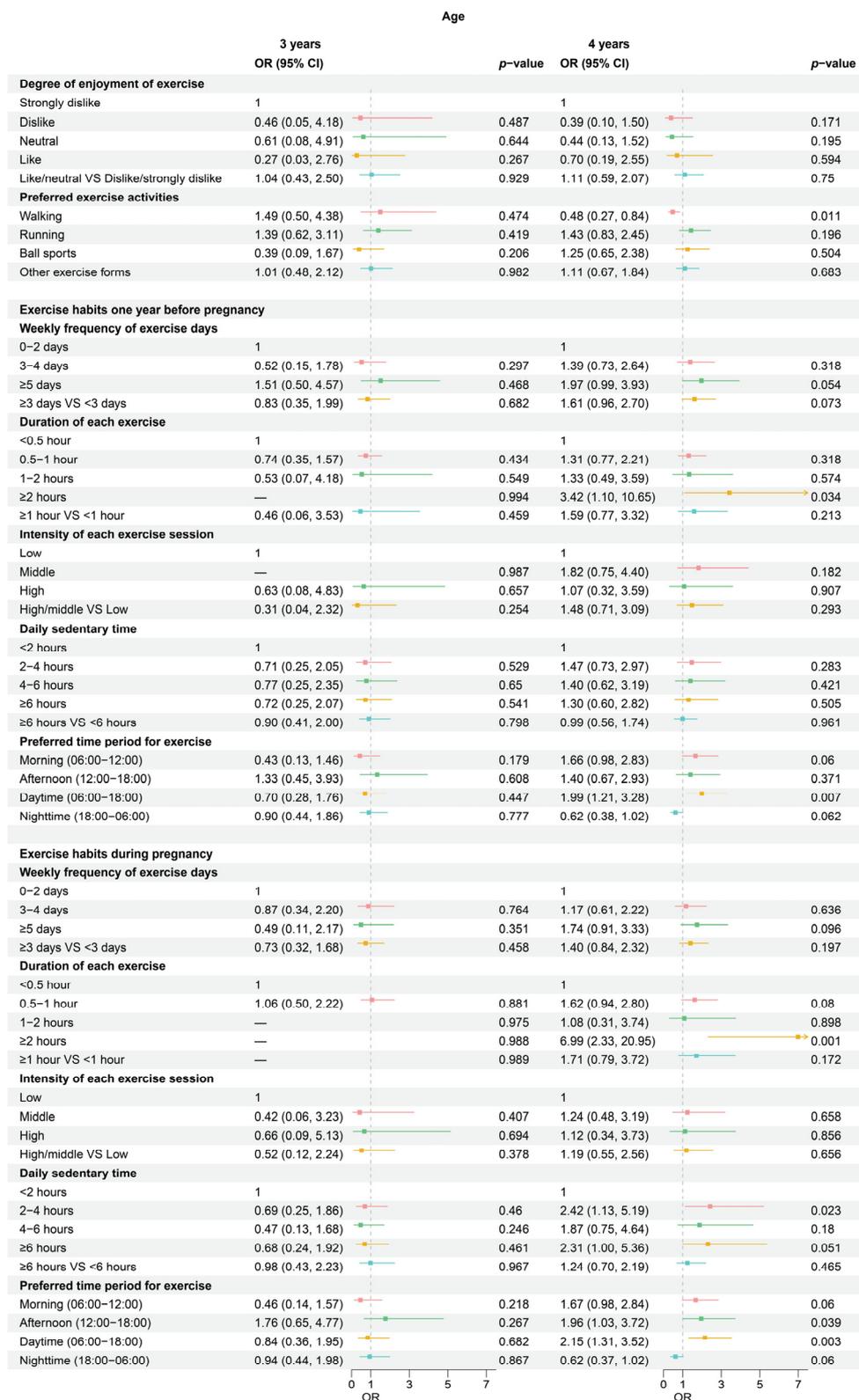


Figure S6c. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by age 3 and 4. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

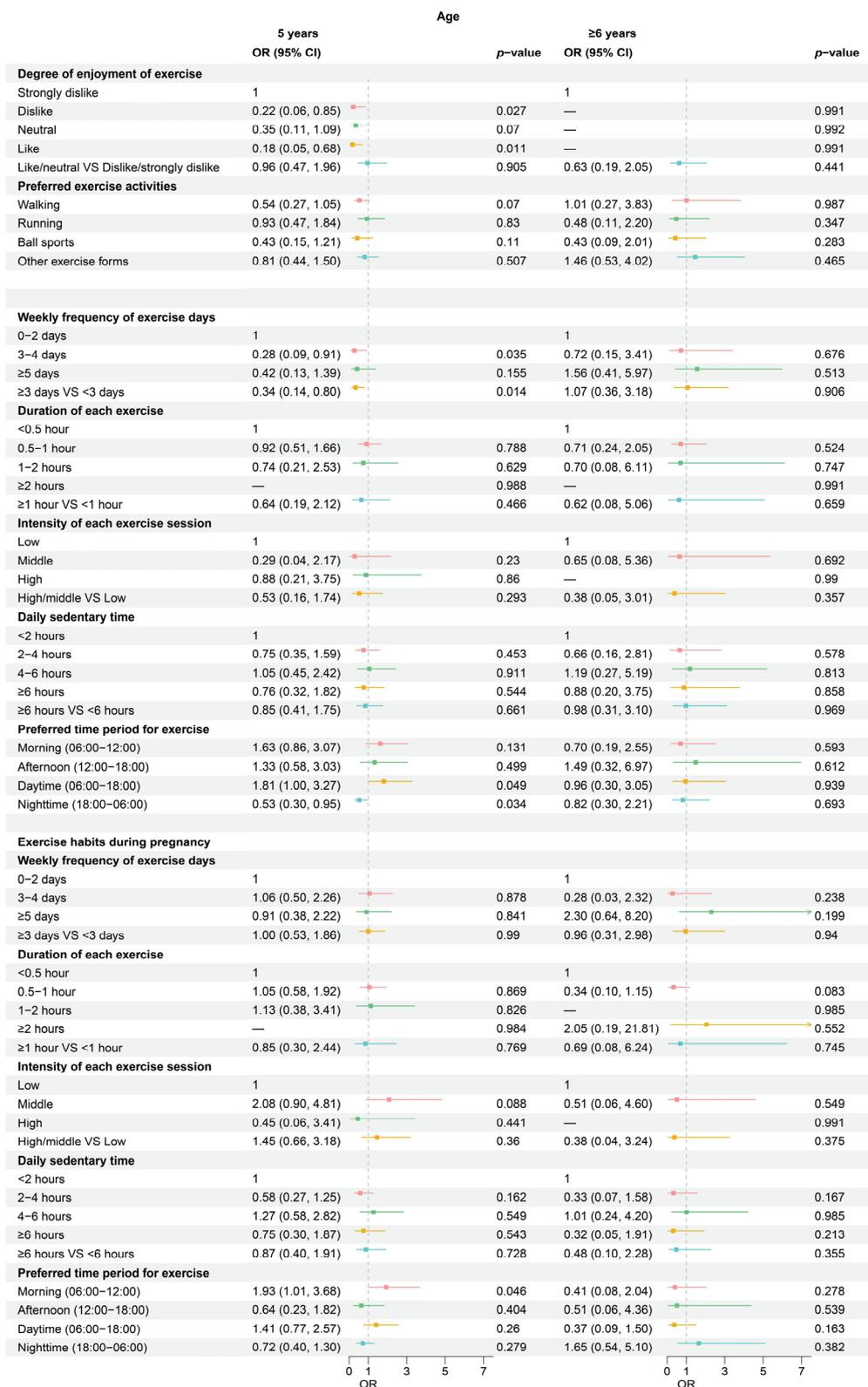


Figure S6d. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by age 5 and ≥6. ORs were calculated

after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

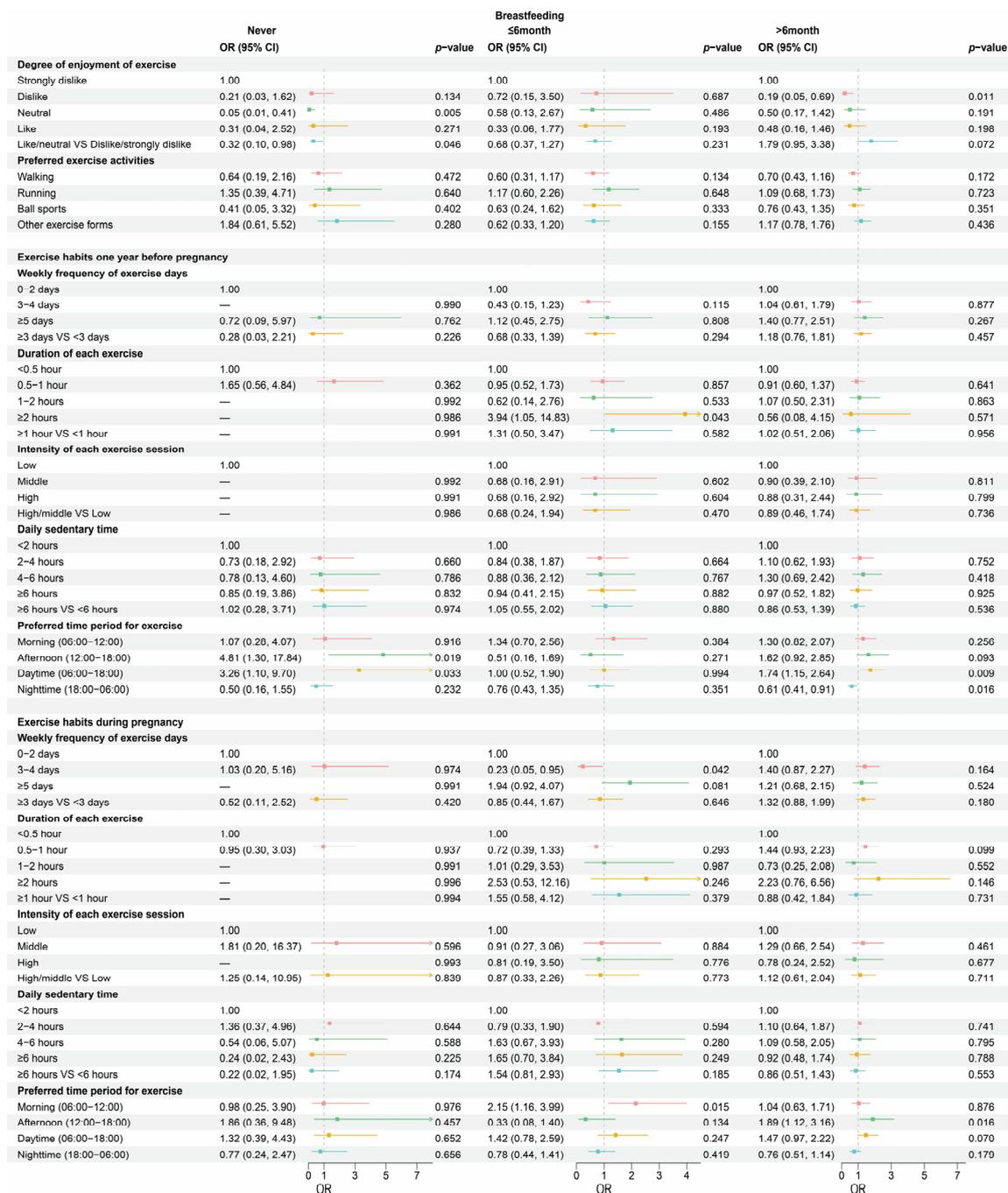


Figure S6e. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by breastfeeding. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

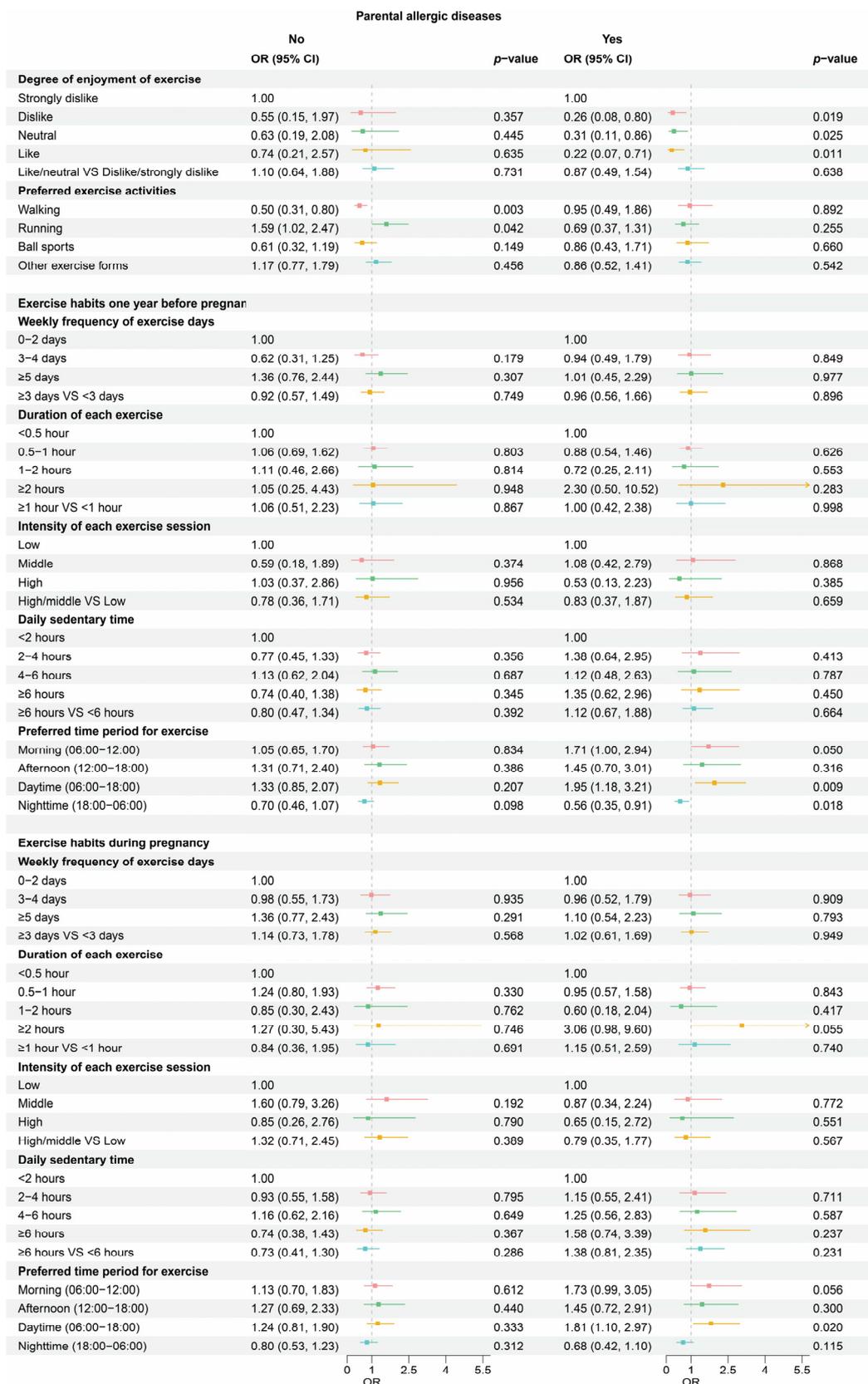


Figure S6f. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

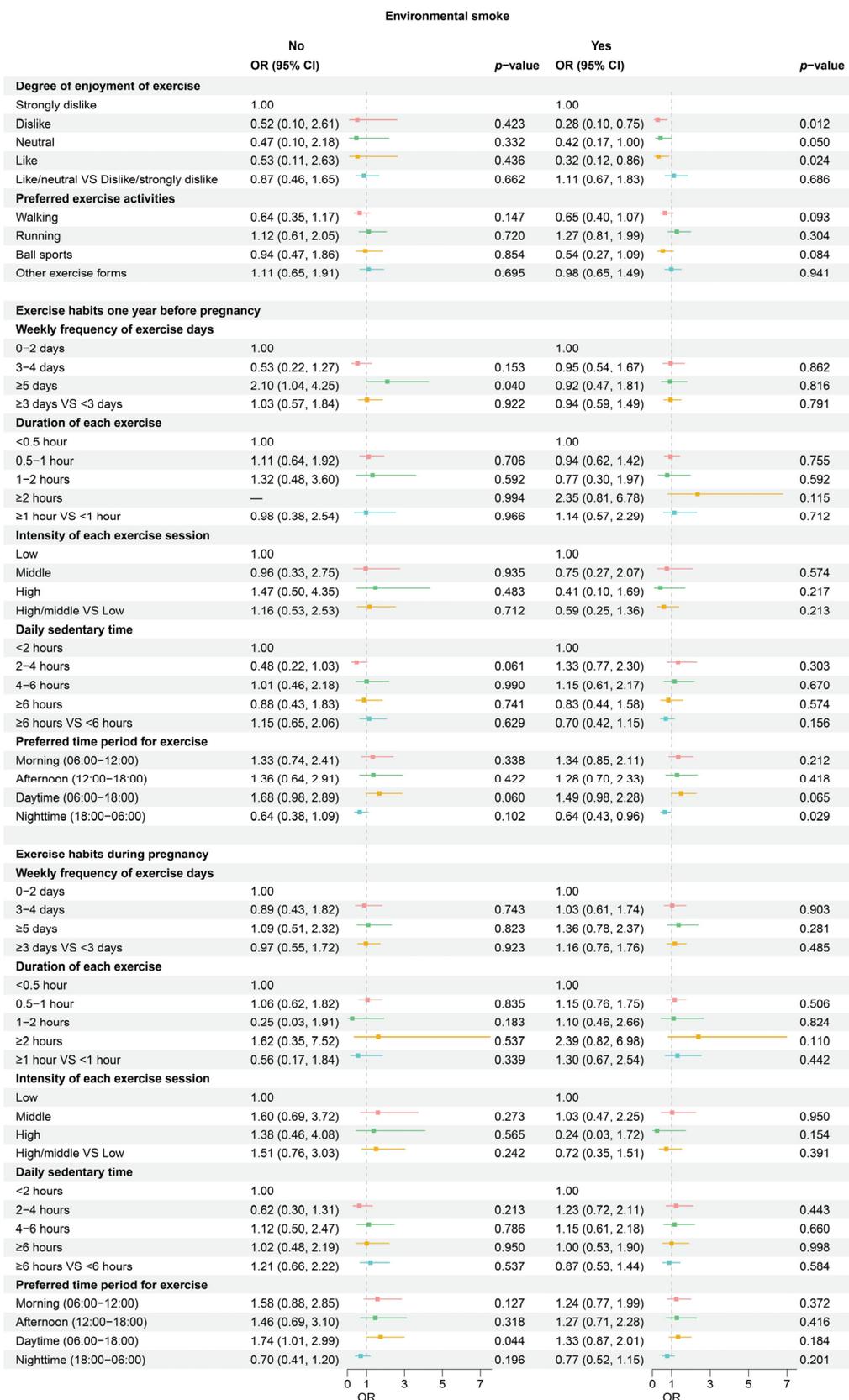


Figure S6g. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by secondhand smoke. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

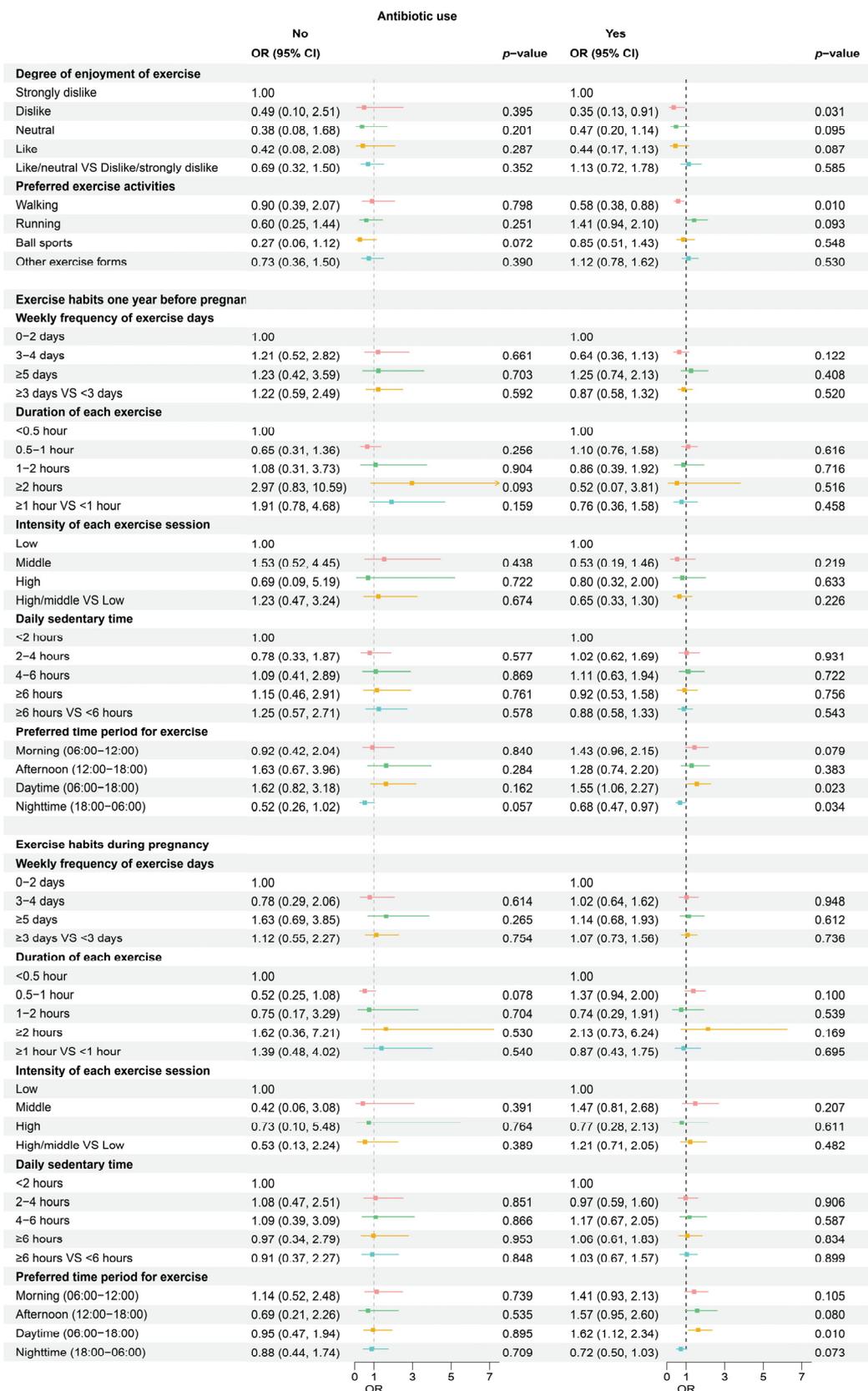


Figure S6h. Odds ratio (95% CI) of children’s physician-diagnosed asthma for maternal exercise during normal days, the year prior to pregnancy and pregnancy, stratified by antibiotic use. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

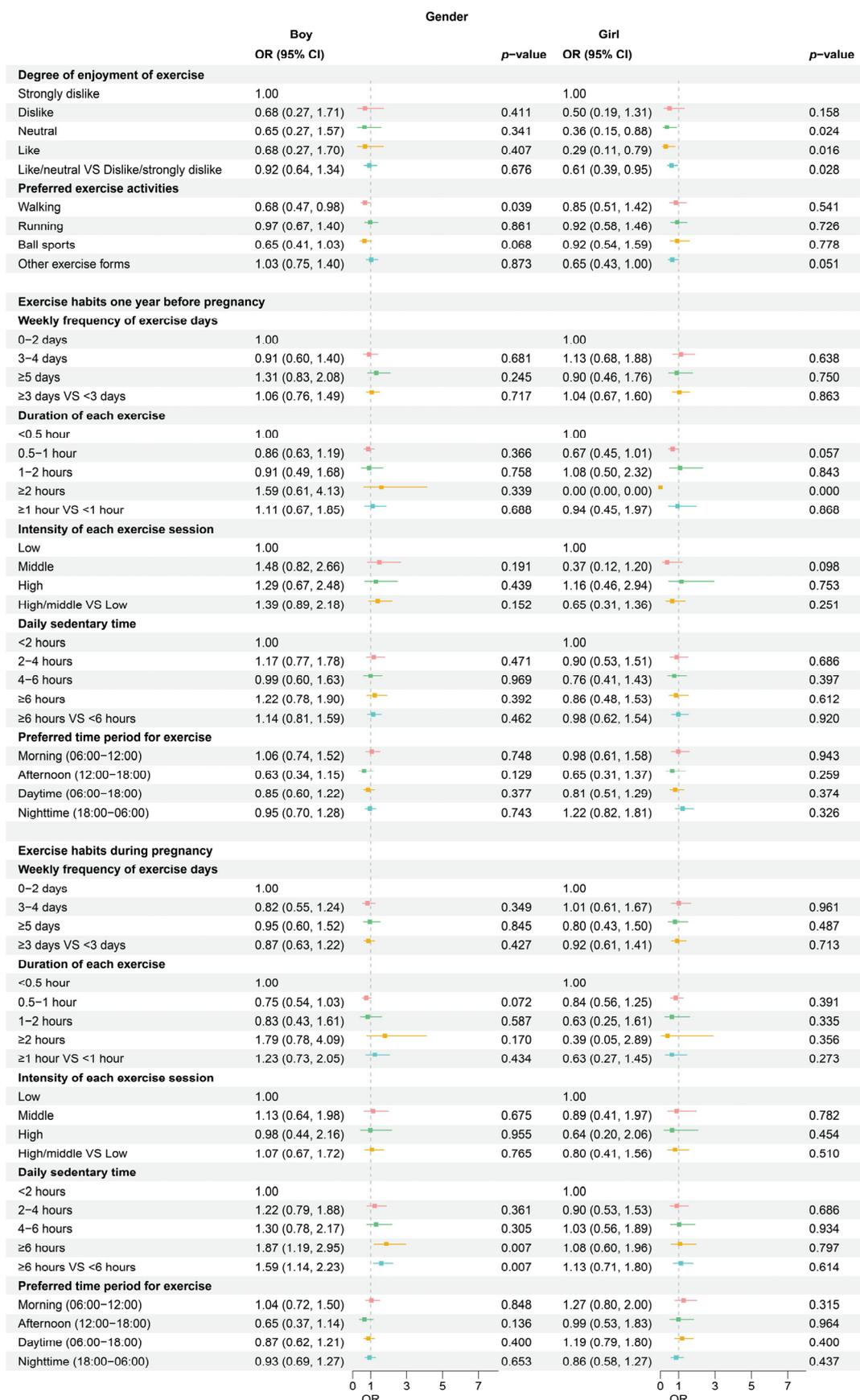


Figure S7a. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by gender. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

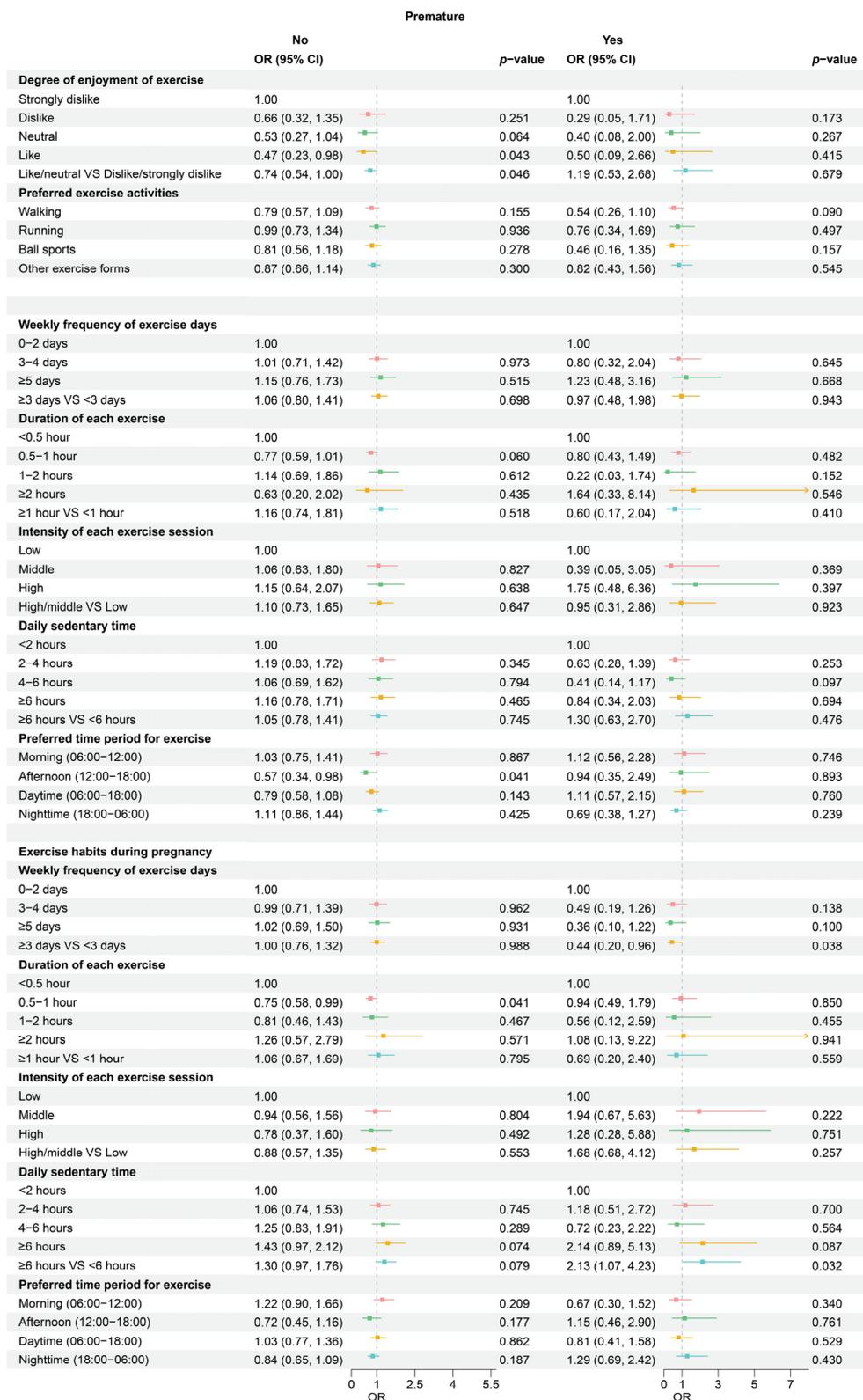


Figure S7b. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by premature. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

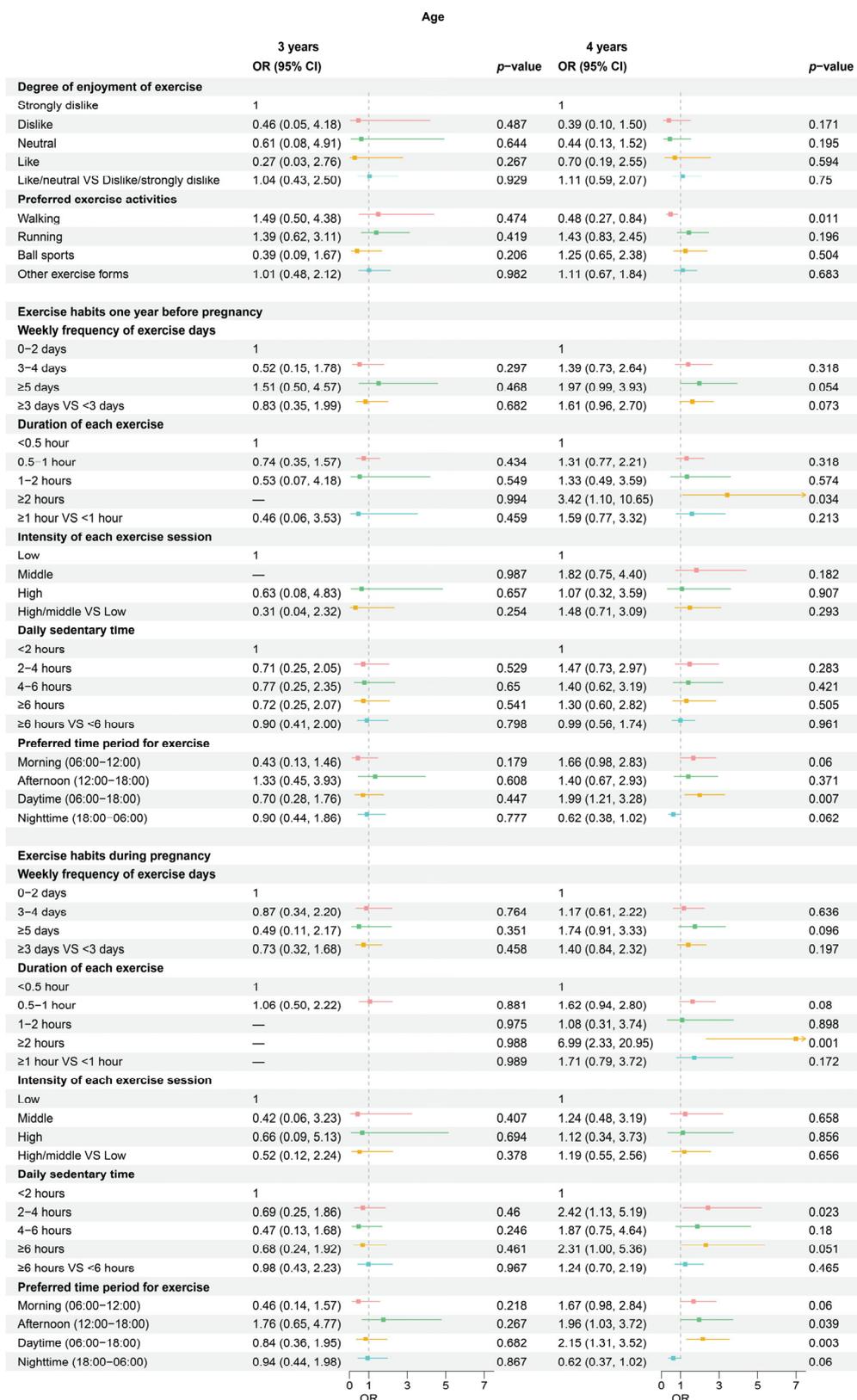


Figure S7c. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by age 3 and 4. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

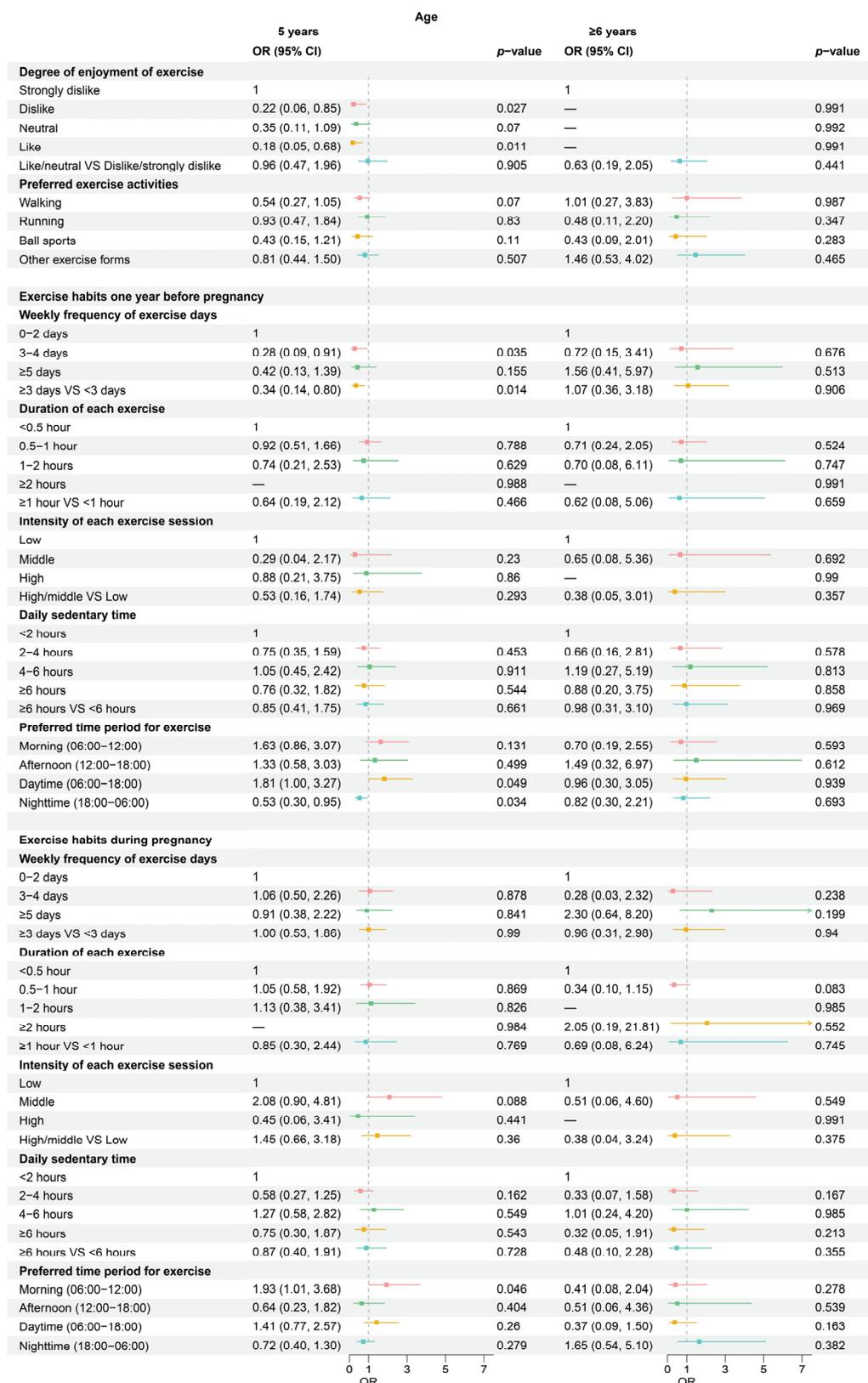


Figure S7d. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by age 5 and ≥6. ORs were calculated after

adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S7e. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by breastfeeding. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

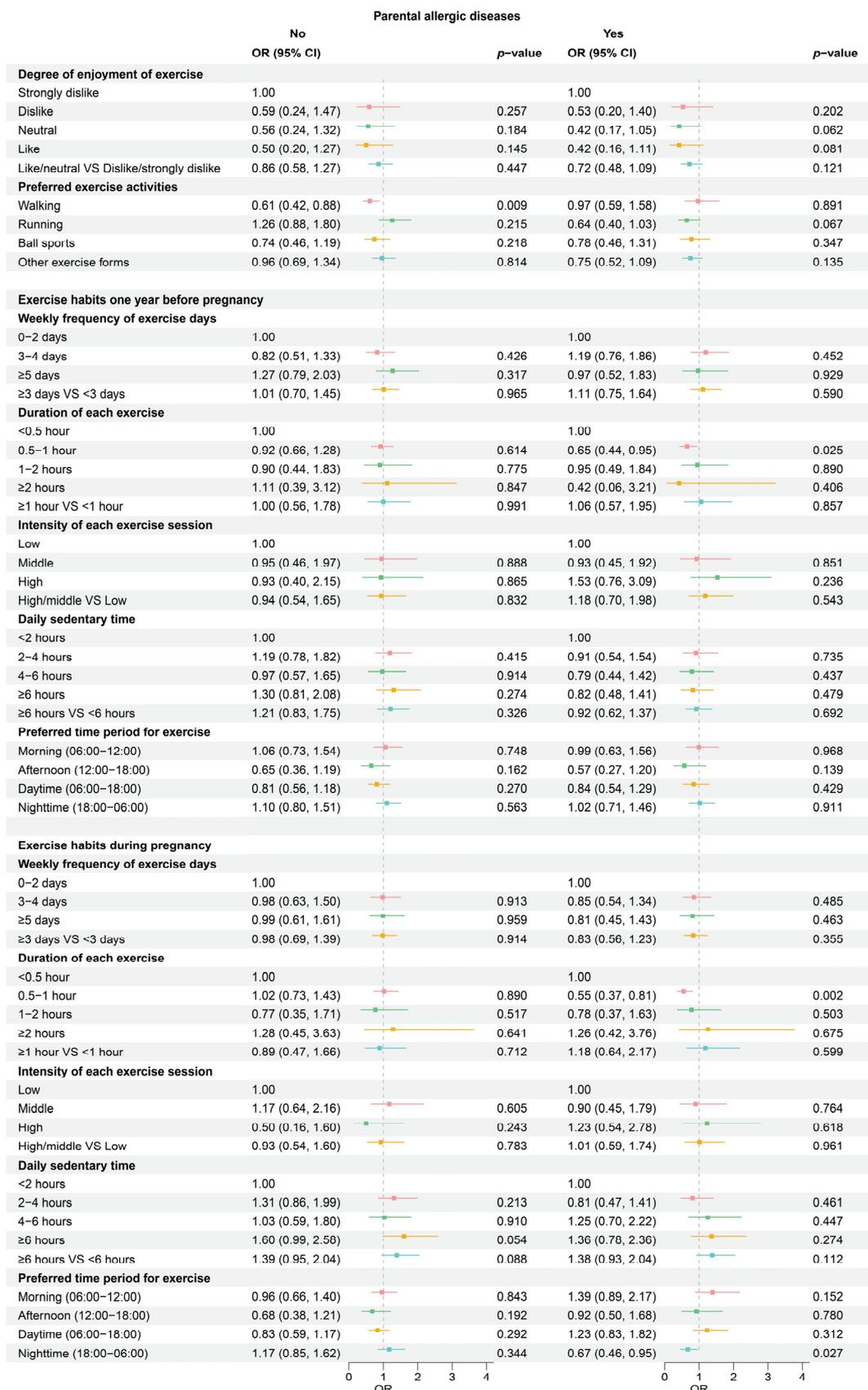


Figure S7f. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

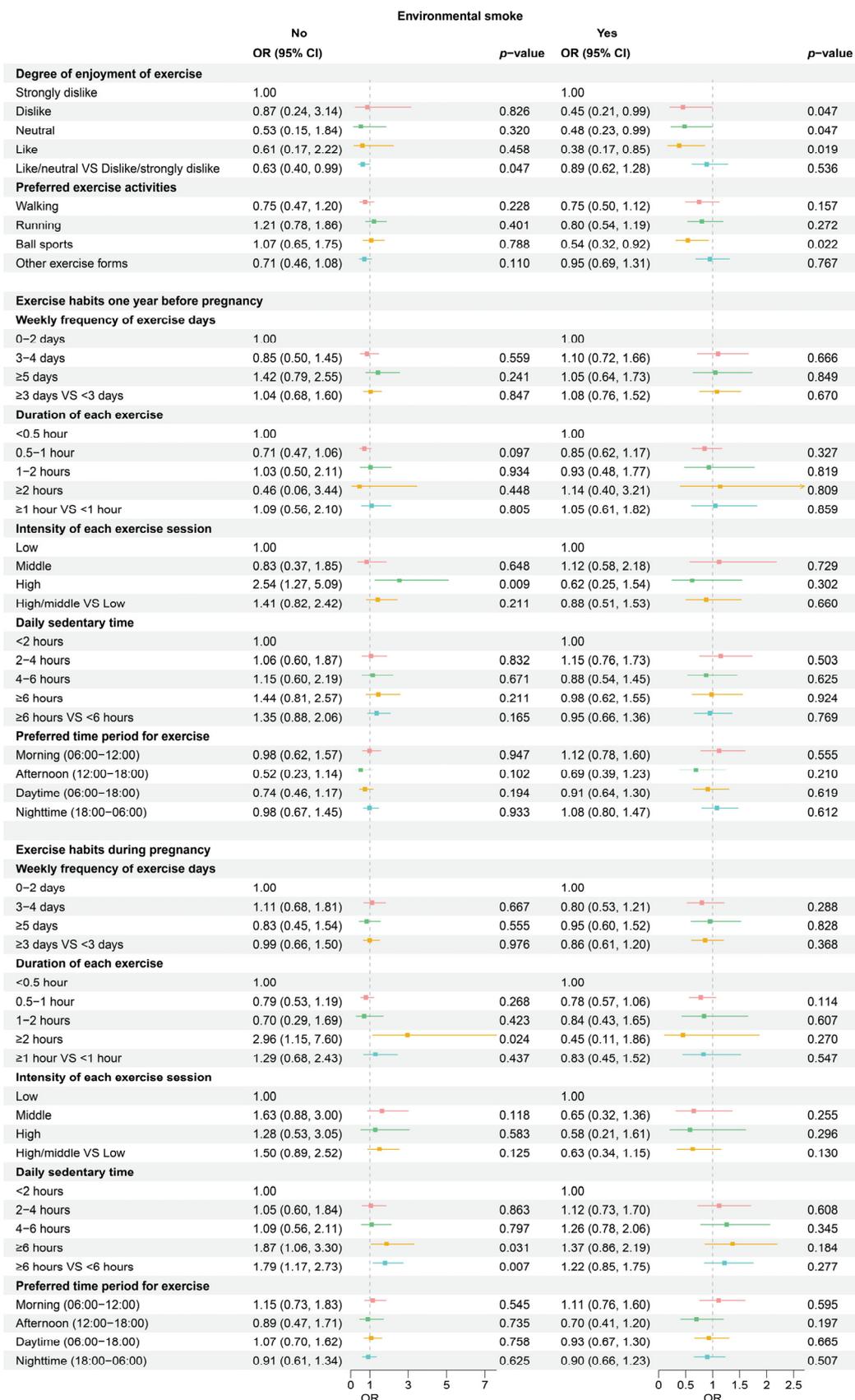


Figure S7g. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by secondhand smoke. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

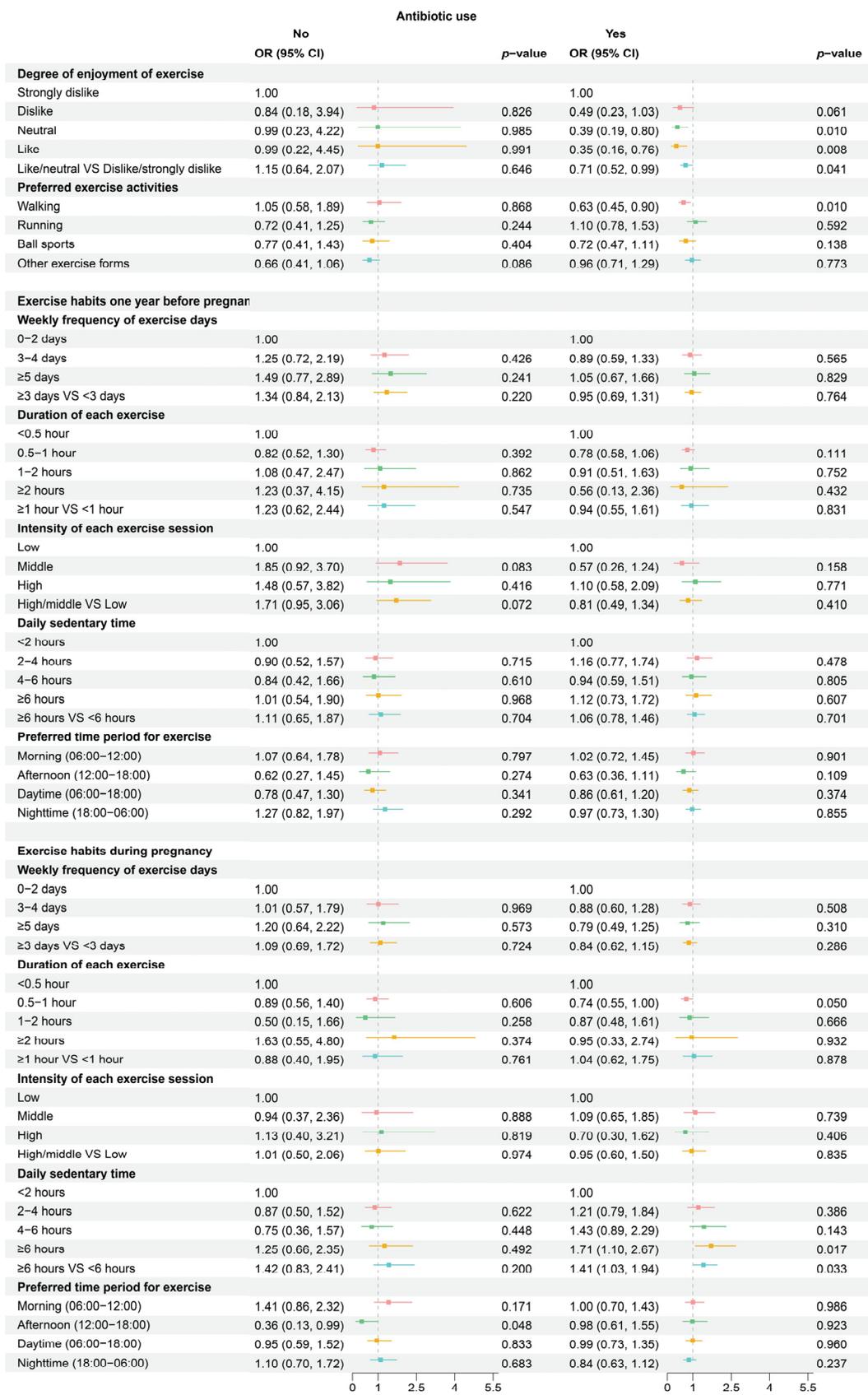


Figure S7h. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for maternal exercise during normal days, the year prior to pregnancy and in utero, stratified by antibiotic use. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. p-value < 0.05 was indicated as statistical significance.

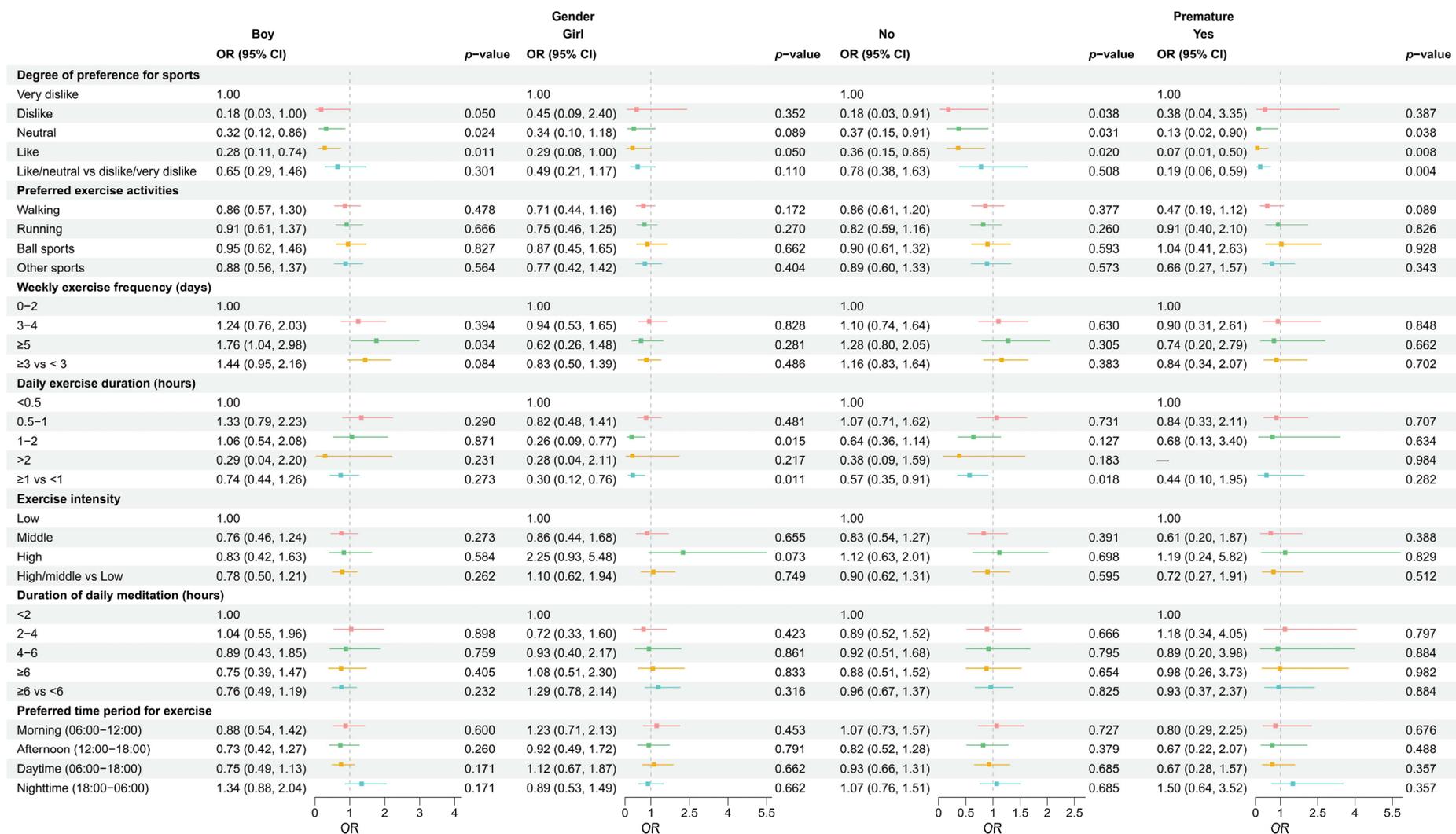


Figure S8a. Odds ratio (95% CI) of children's physician-diagnosed asthma for childhood exercise after birth, stratified by gender and premature. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

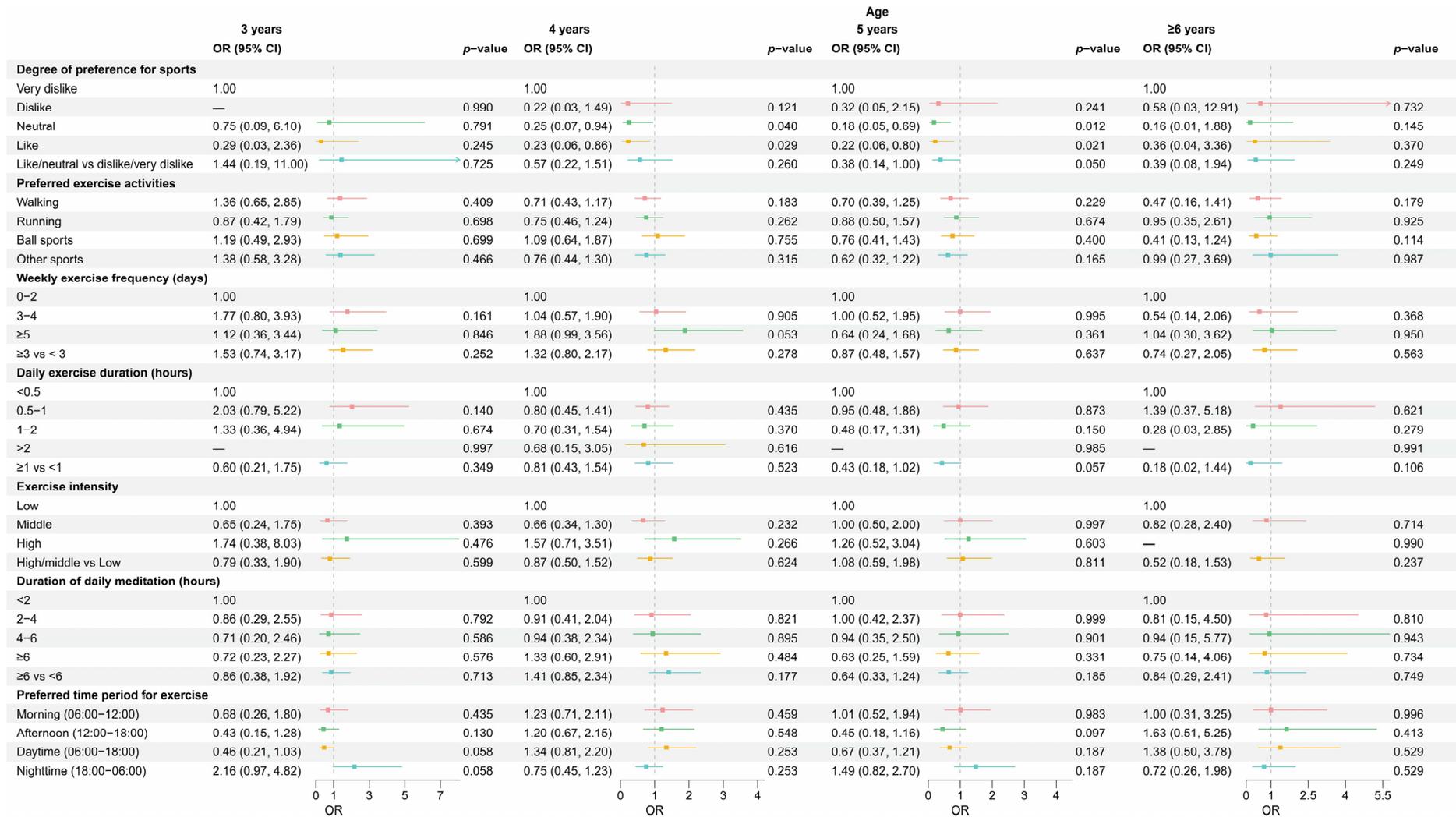


Figure S8b. Odds ratio (95% CI) of children’s physician-diagnosed asthma for childhood exercise after birth, stratified by age. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

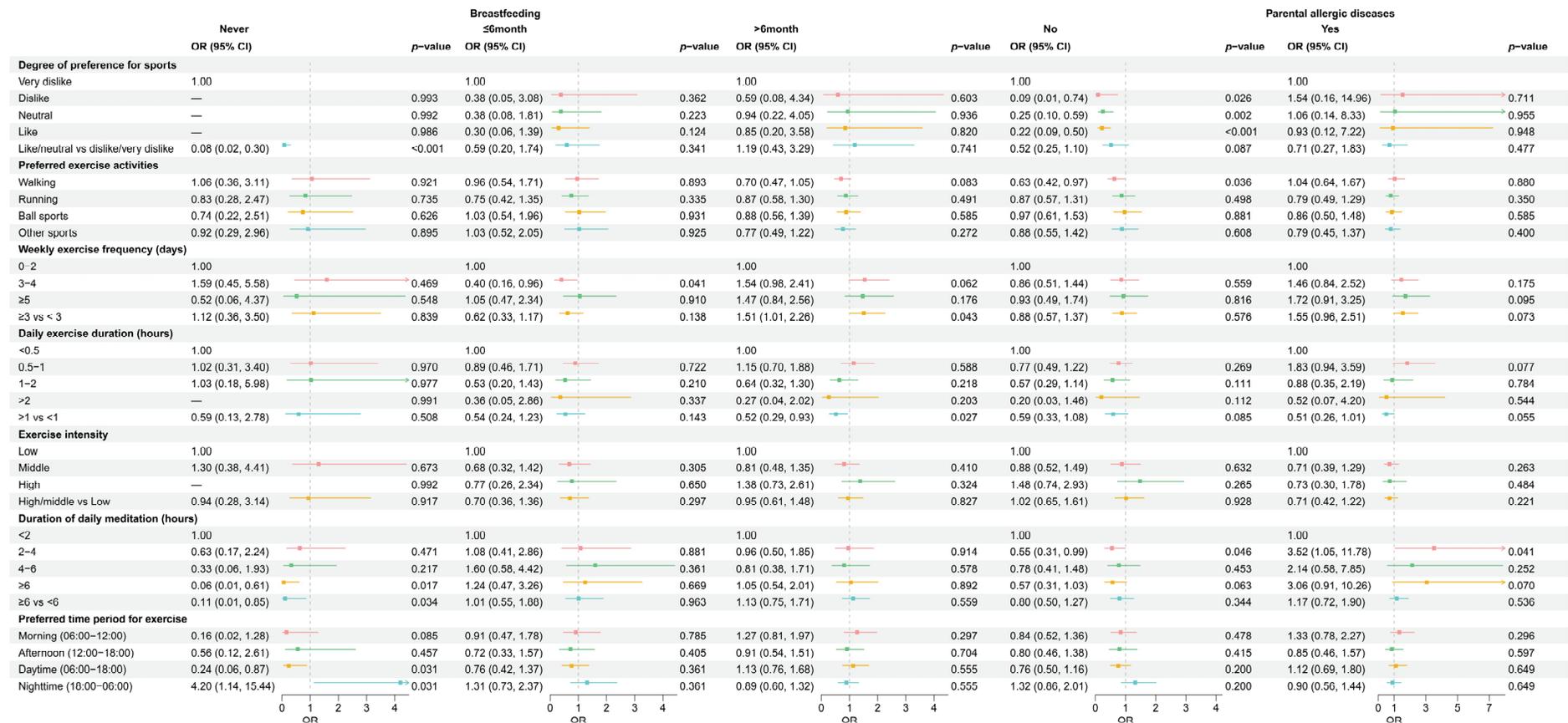


Figure S8c. Odds ratio (95% CI) of children’s physician-diagnosed asthma for childhood exercise after birth, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

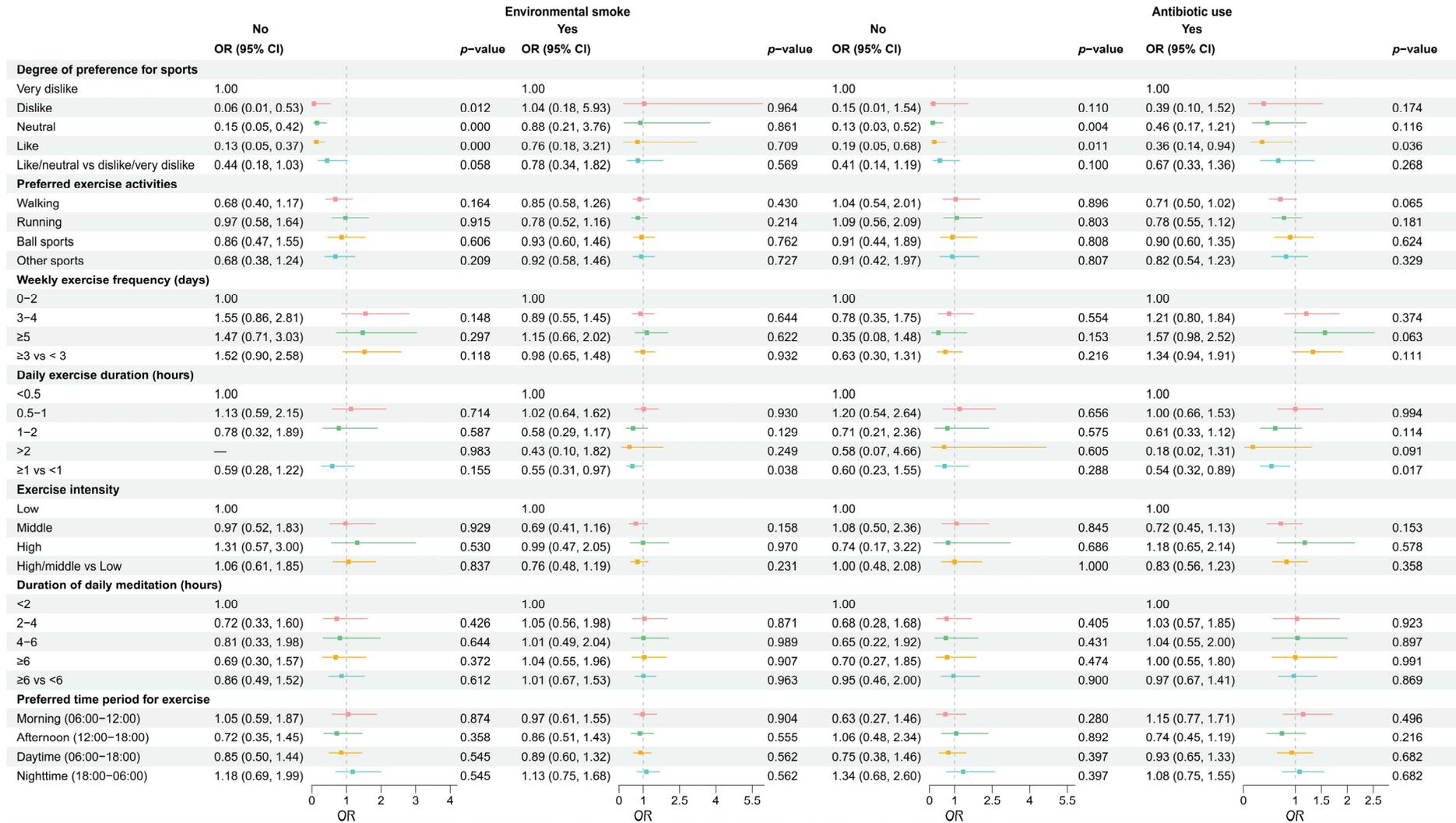


Figure S8d. Odds ratio (95% CI) of children’s physician-diagnosed asthma for childhood exercise after birth, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates in Table 1, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

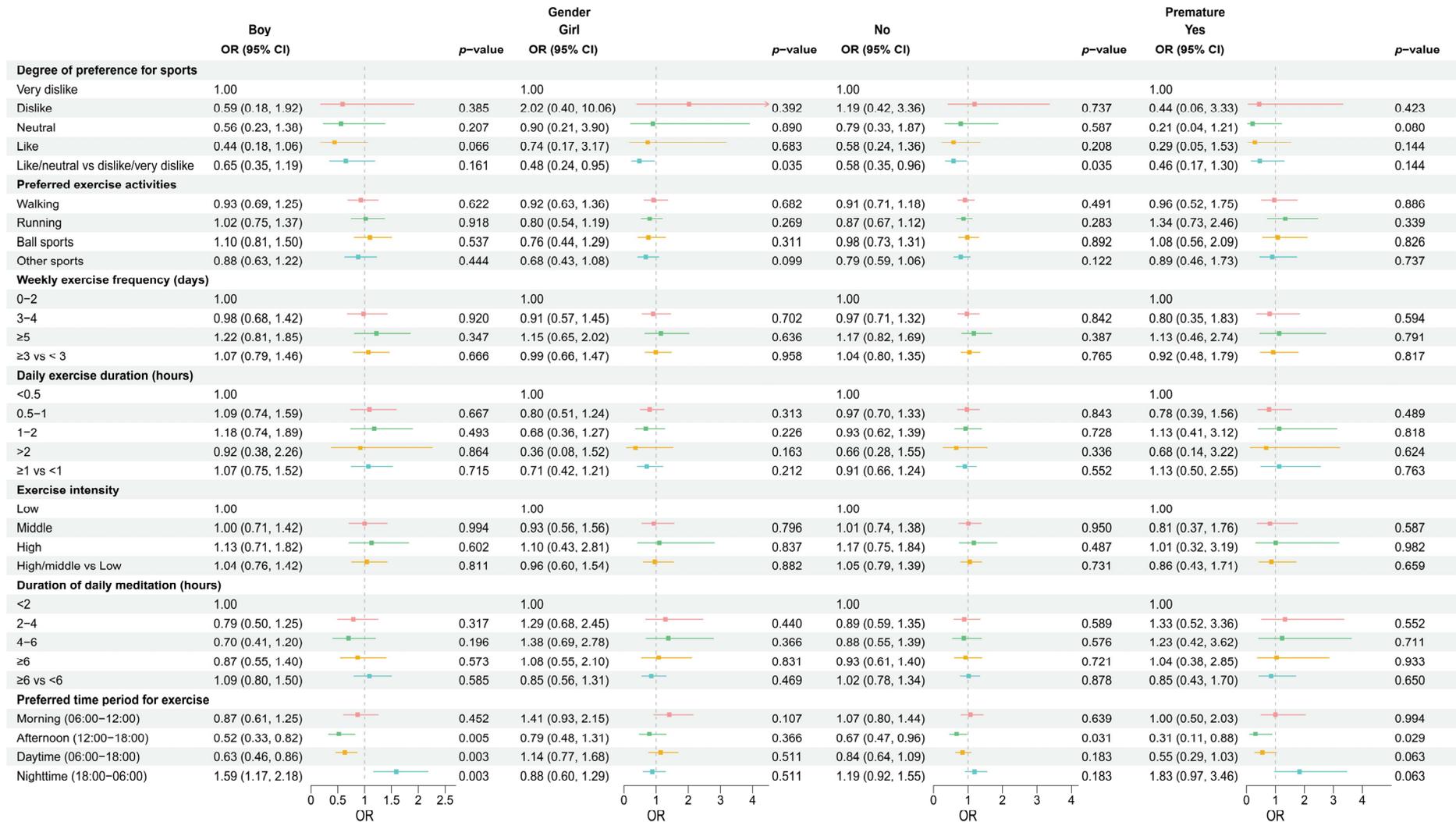


Figure S9a. Odds ratio (95% CI) of children's physician-diagnosed wheeze for childhood exercise after birth, stratified by gender and premature. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

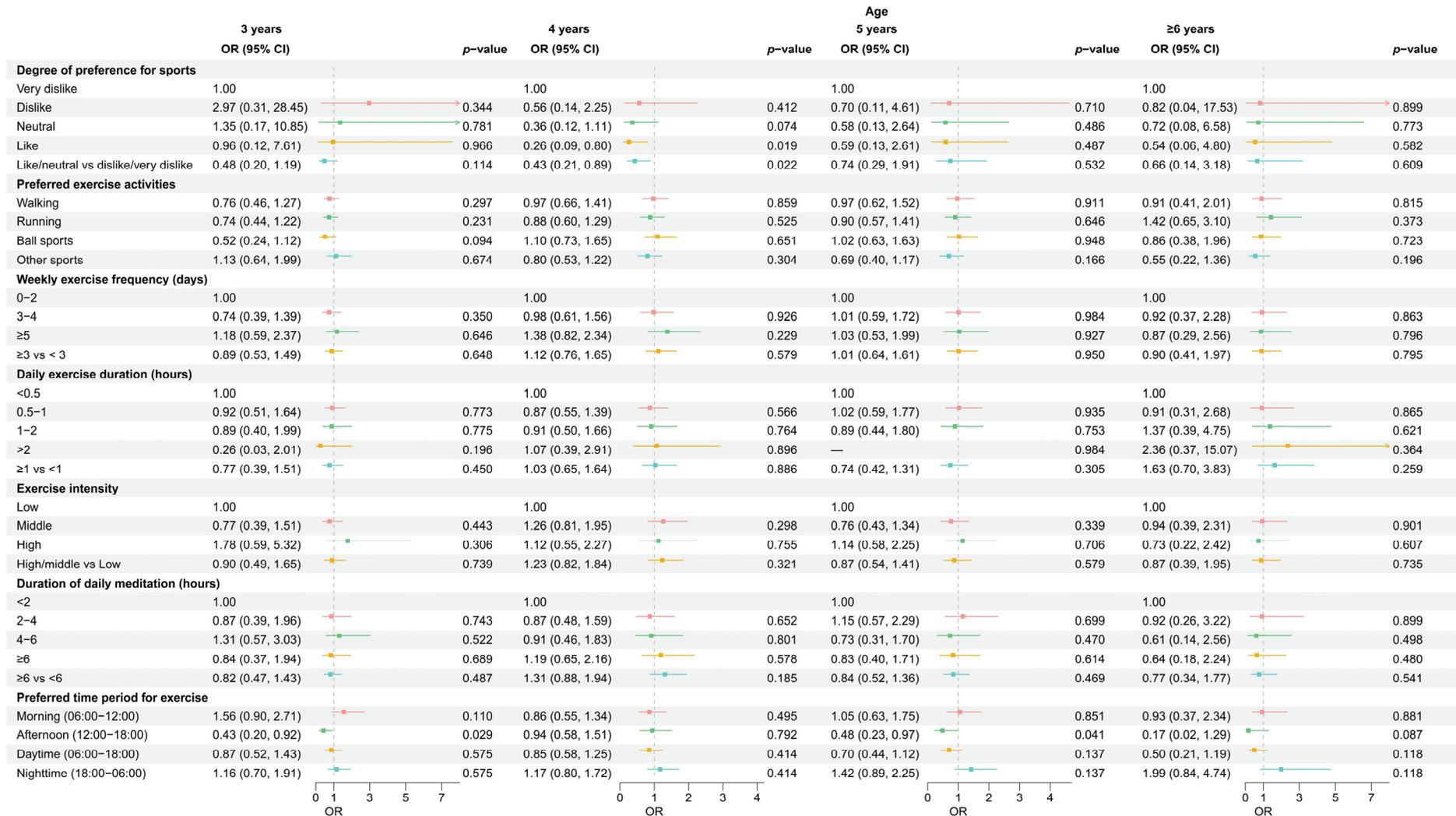


Figure S9b. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for childhood exercise after birth, stratified by age. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

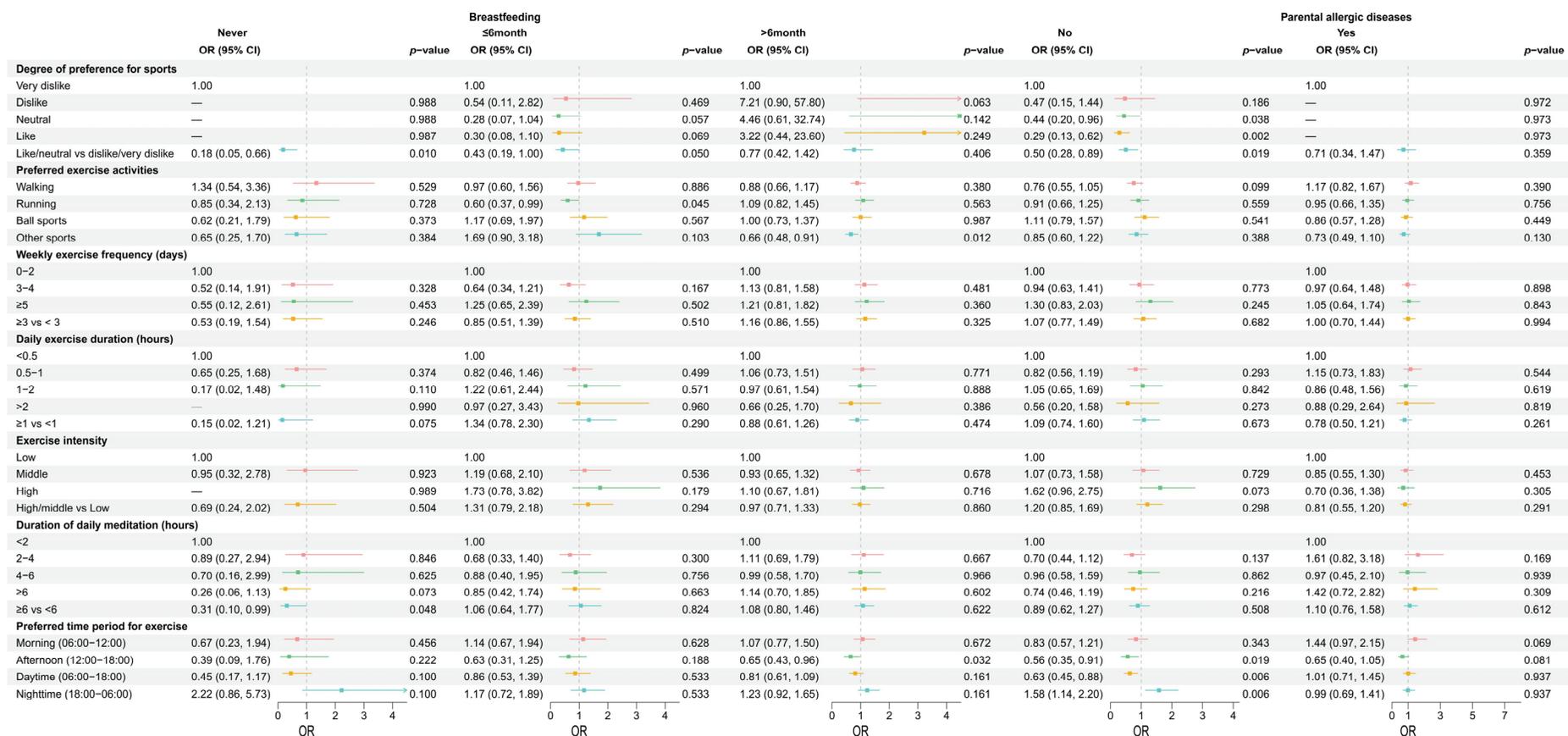


Figure S9c. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for childhood exercise after birth, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

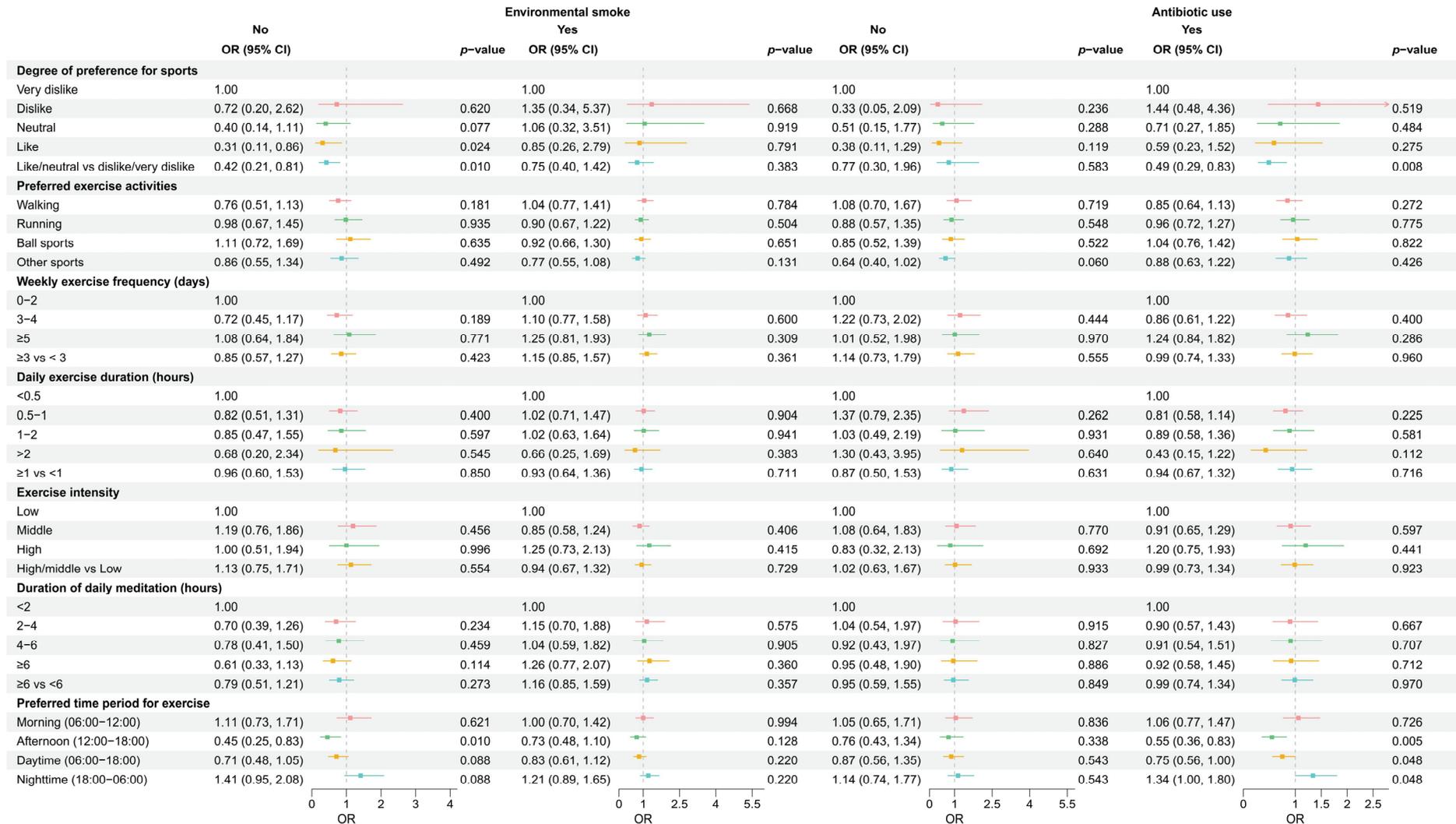


Figure S9d. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for childhood exercise after birth, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S10a. Odds ratio (95% CI) of children’s physician-diagnosed asthma for outdoor air pollution exposure during different time windows, stratified by gender and premature. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

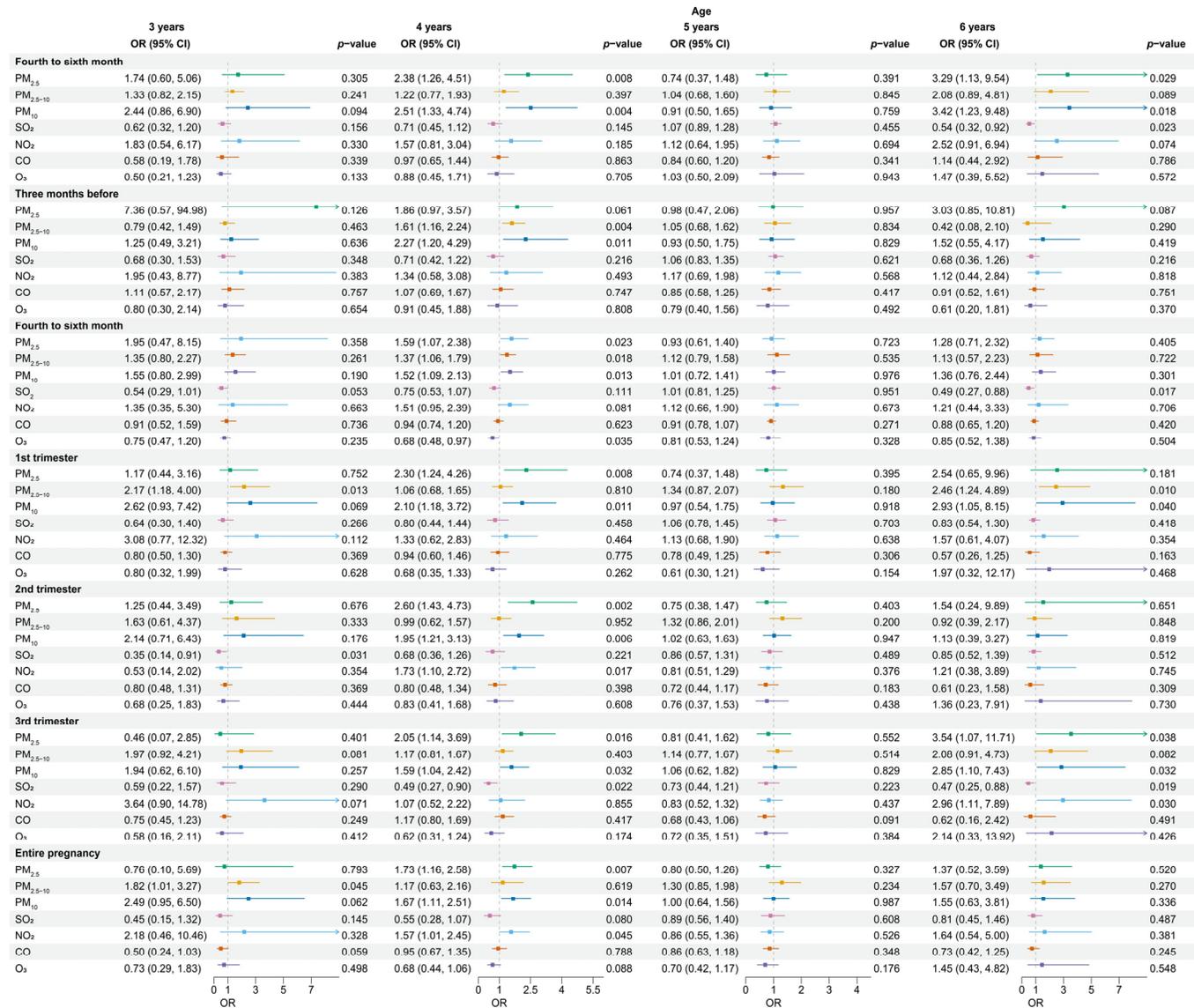


Figure S10b. Odds ratio (95% CI) of children’s physician-diagnosed asthma for outdoor air pollution exposure during different time windows, stratified by age. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S10c. Odds ratio (95% CI) of children’s physician-diagnosed asthma for outdoor air pollution exposure during different time windows, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. p -value < 0.05 was indicated as statistical significance.

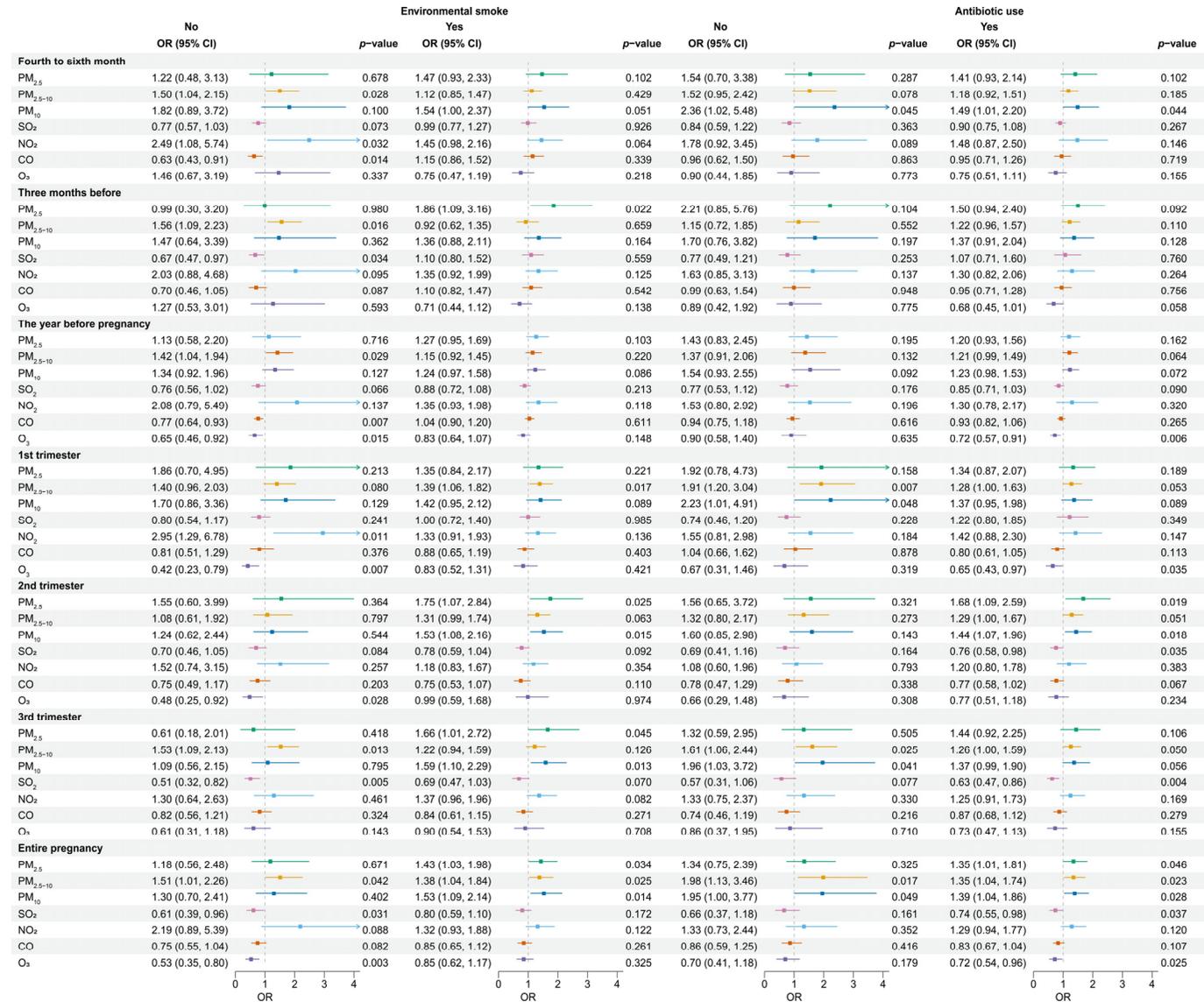


Figure S10d. Odds ratio (95% CI) of children’s physician-diagnosed asthma for outdoor air pollution exposure during different time windows, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

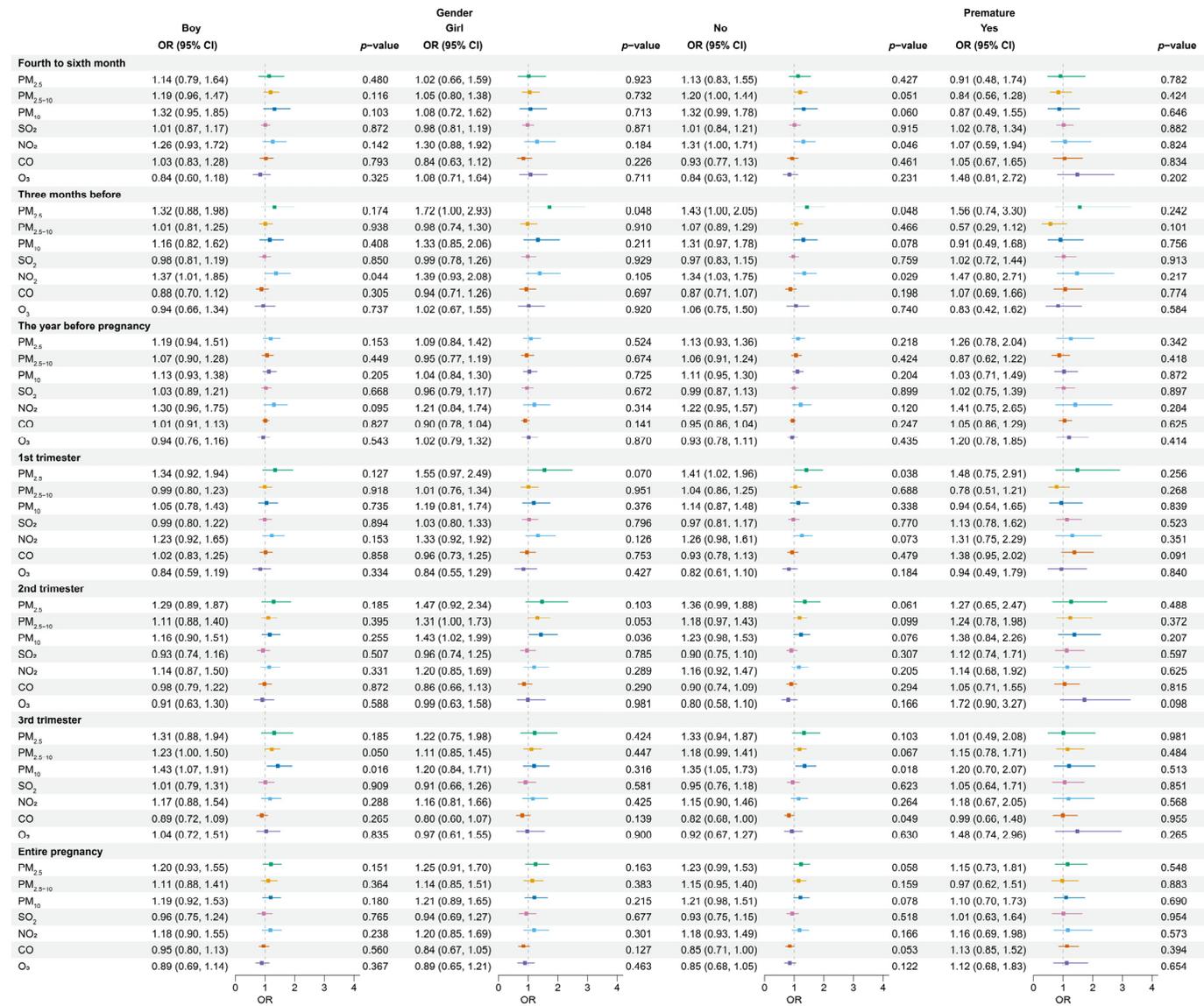


Figure S11a. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for outdoor air pollution exposure during different time windows, stratified by gender and premature. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S11b. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for outdoor air pollution exposure during different time windows, stratified by age. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S11c. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for outdoor air pollution exposure during different time windows, stratified by breastfeeding and parental allergic diseases. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.

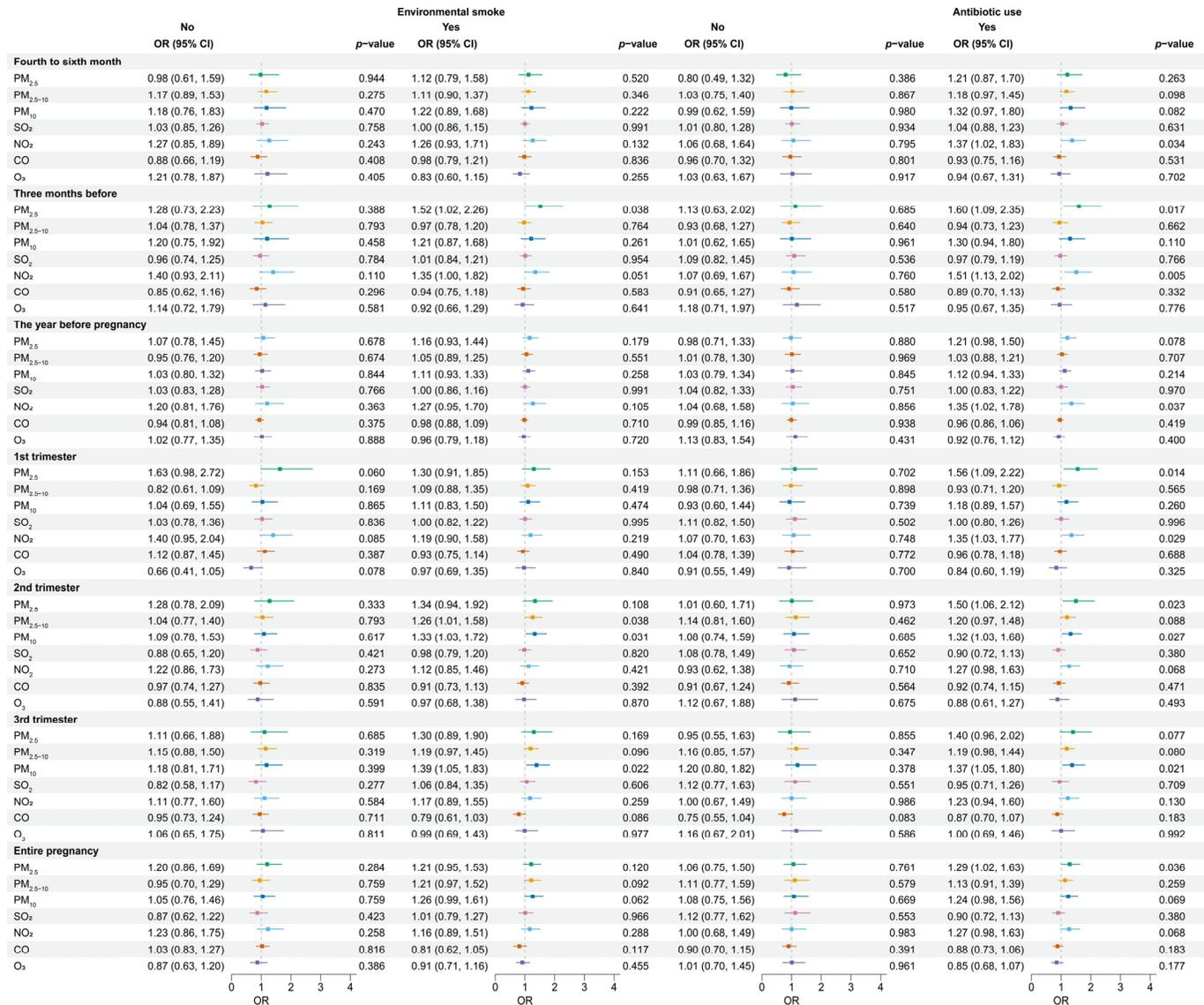


Figure S11d. Odds ratio (95% CI) of children’s physician-diagnosed wheeze for outdoor air pollution exposure during different time windows, stratified by secondhand smoke and antibiotic use. ORs were calculated after adjusting for the covariates and individual exposure to outdoor temperature during each time window. *p*-value < 0.05 was indicated as statistical significance.



Figure S12a. Associations between paternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5}) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each respective time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S12b. Associations between paternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5-10}) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each respective time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S12c. Associations between paternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM₁₀) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each respective time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

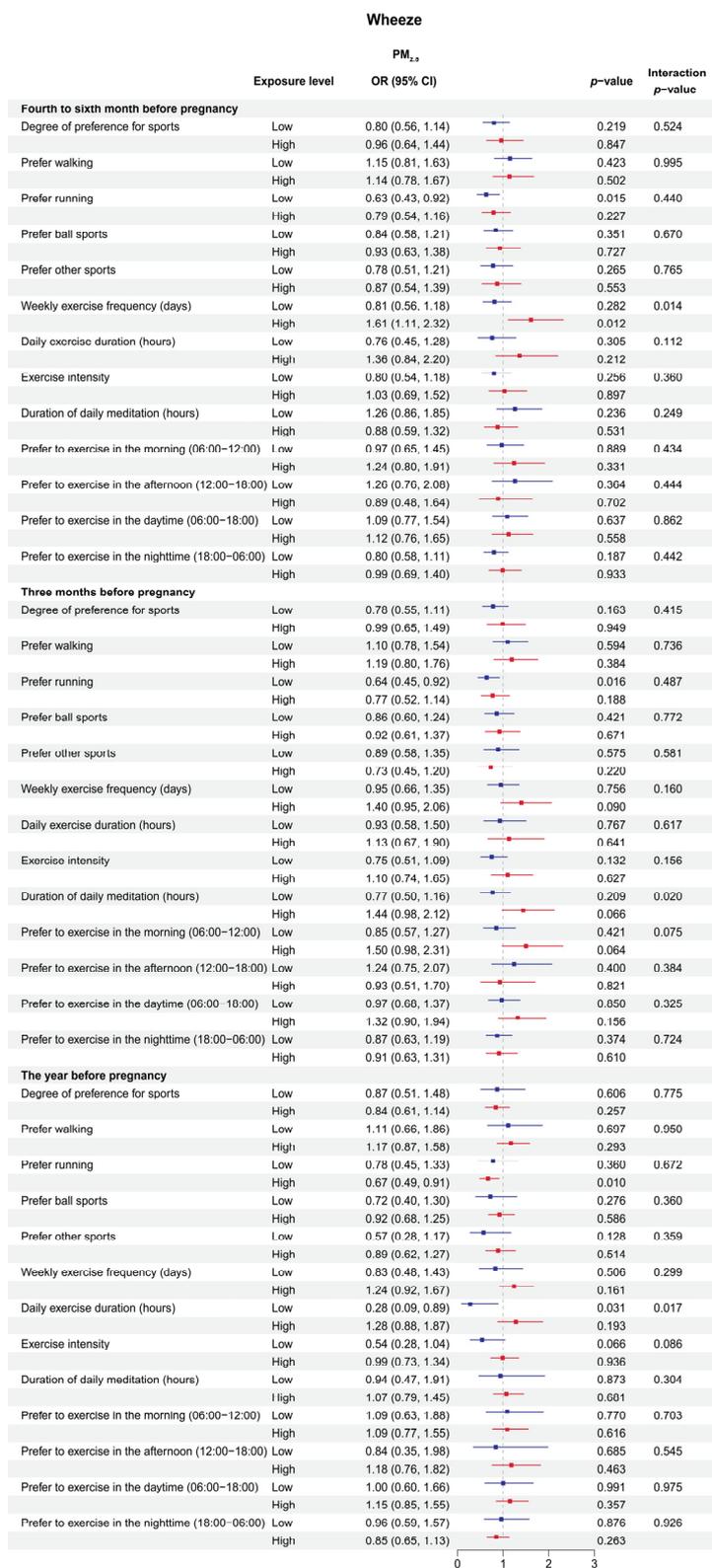


Figure S12d. Associations between paternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM_{2.5}) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within the relevant time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S12e. Associations between paternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM_{2.5-10}) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within the relevant time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S12f. Associations between paternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM₁₀) during the preconceptional period. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within the relevant time period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

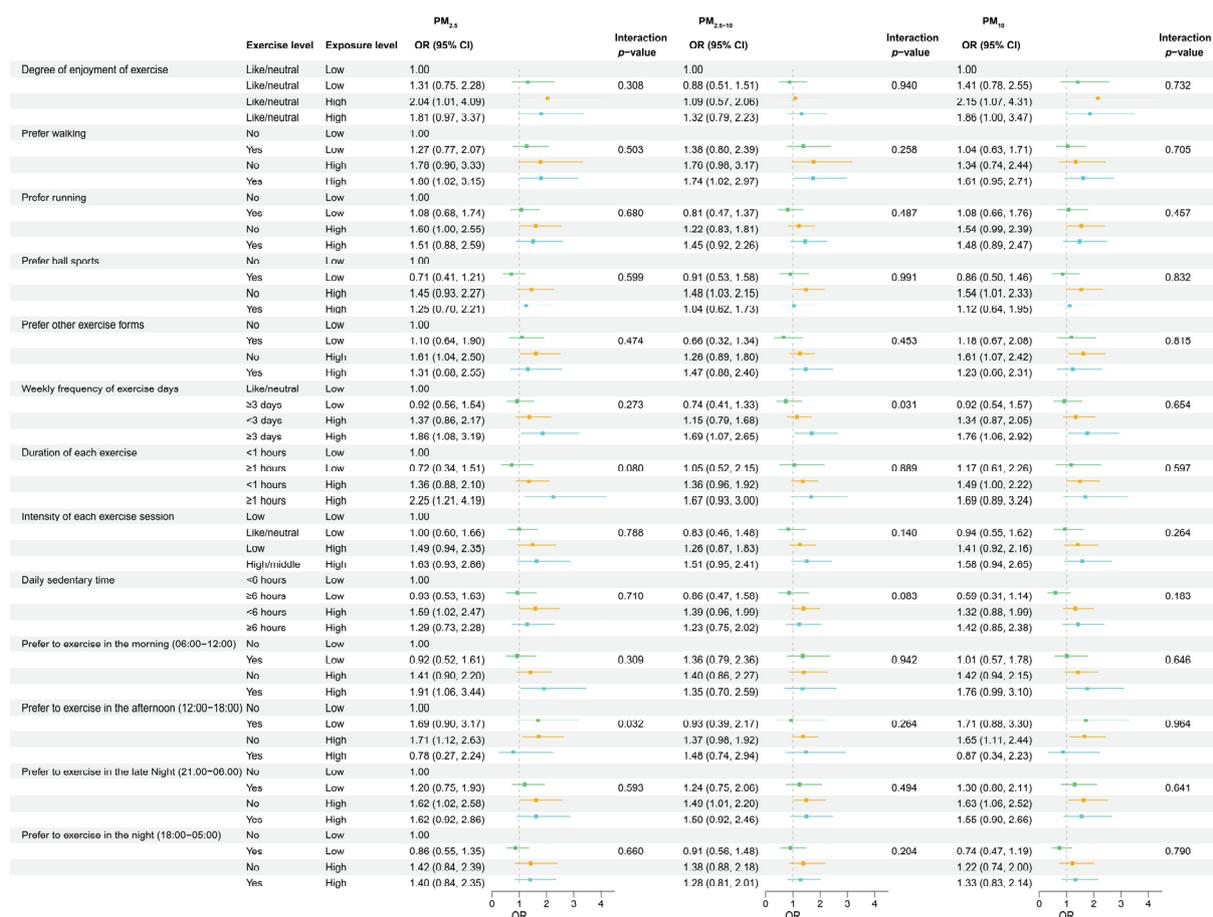


Figure S13a. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 4–6 months before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 4–6 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

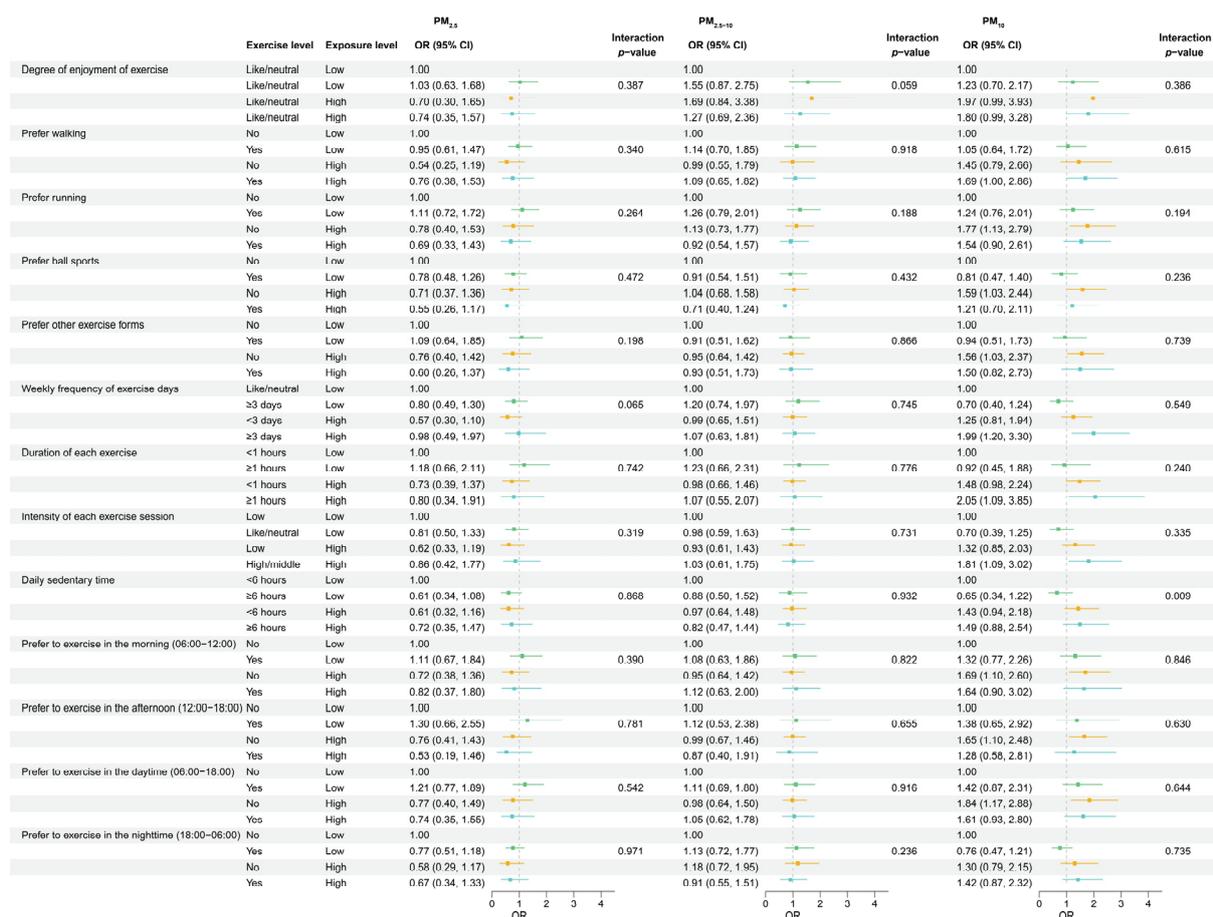


Figure S13b. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 3 months before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 3 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

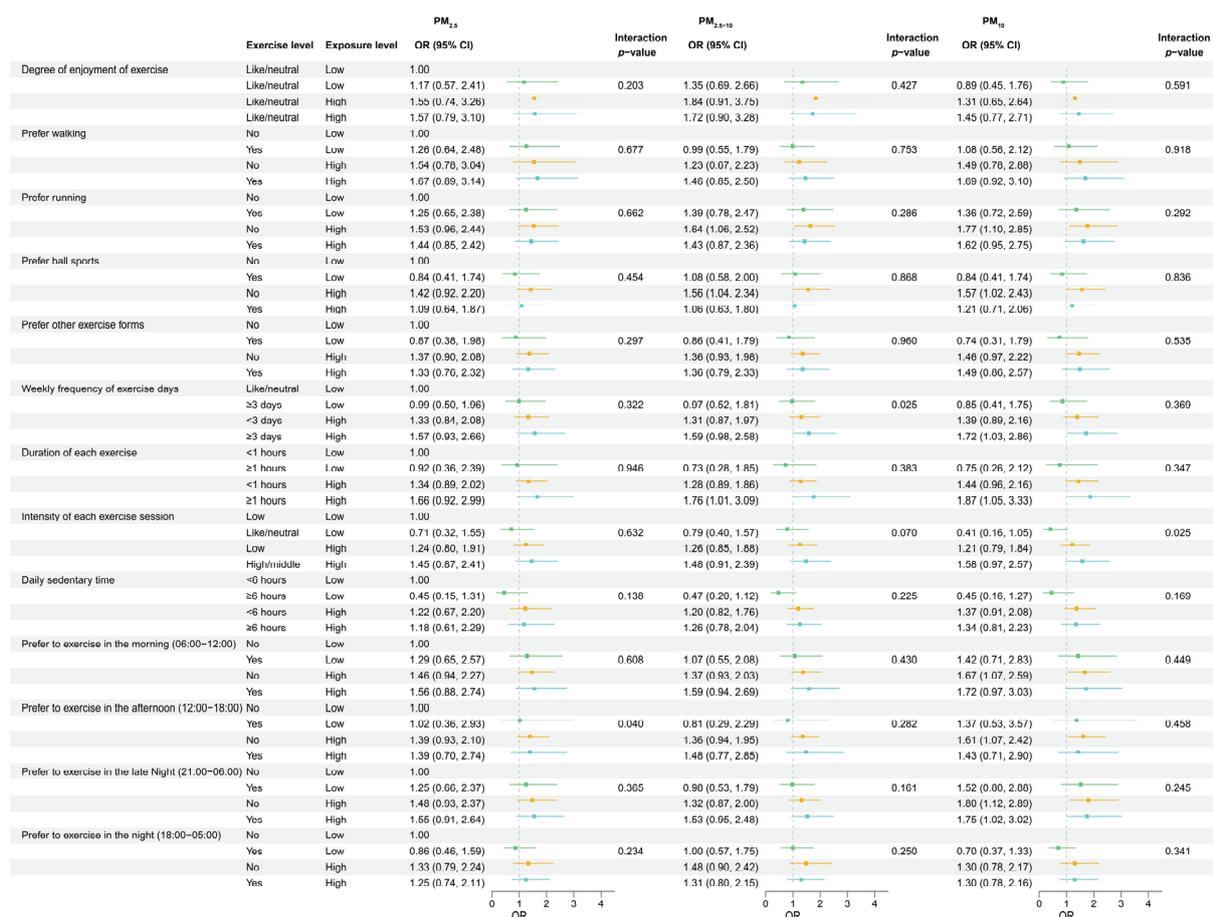


Figure S13c. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during one year before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during one year before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

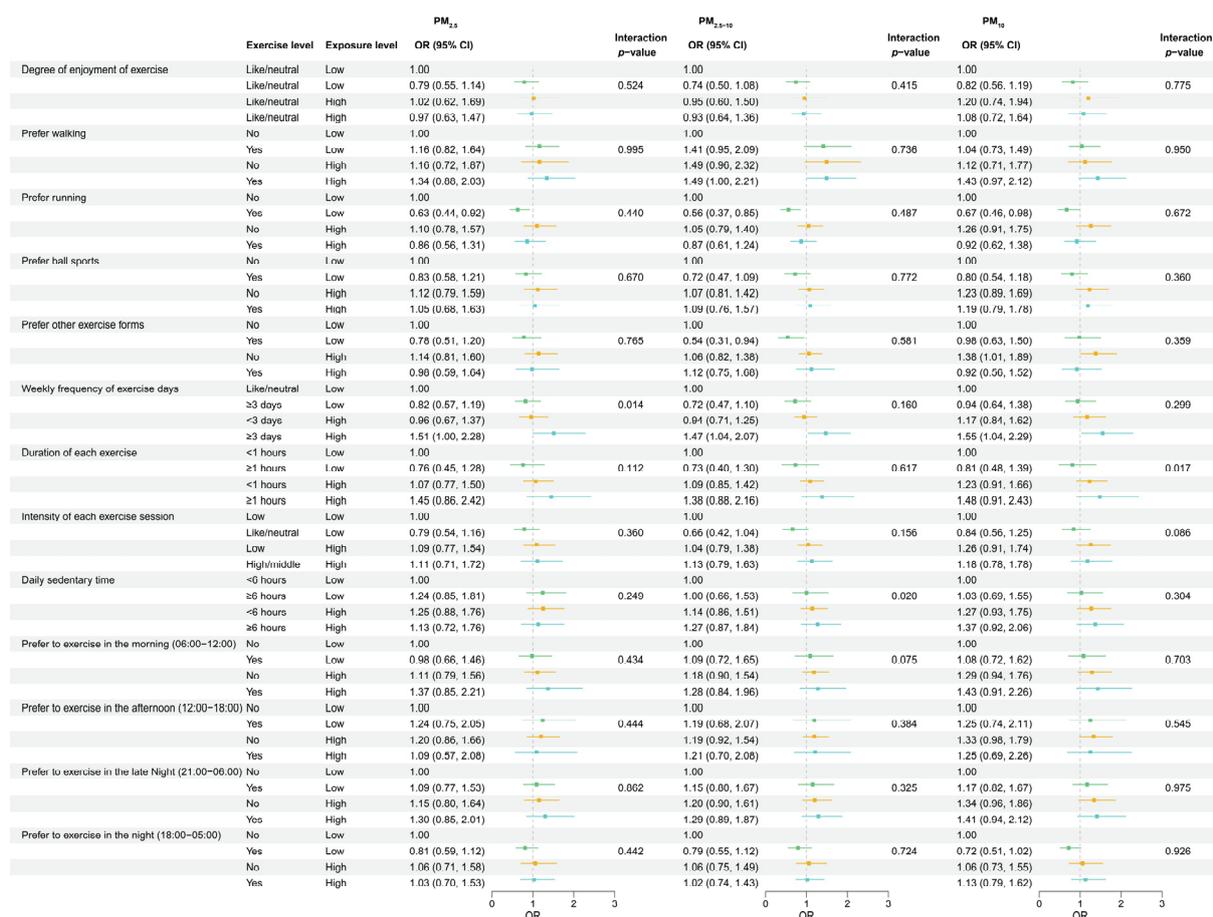


Figure S14a. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 4–6 months before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 4–6 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

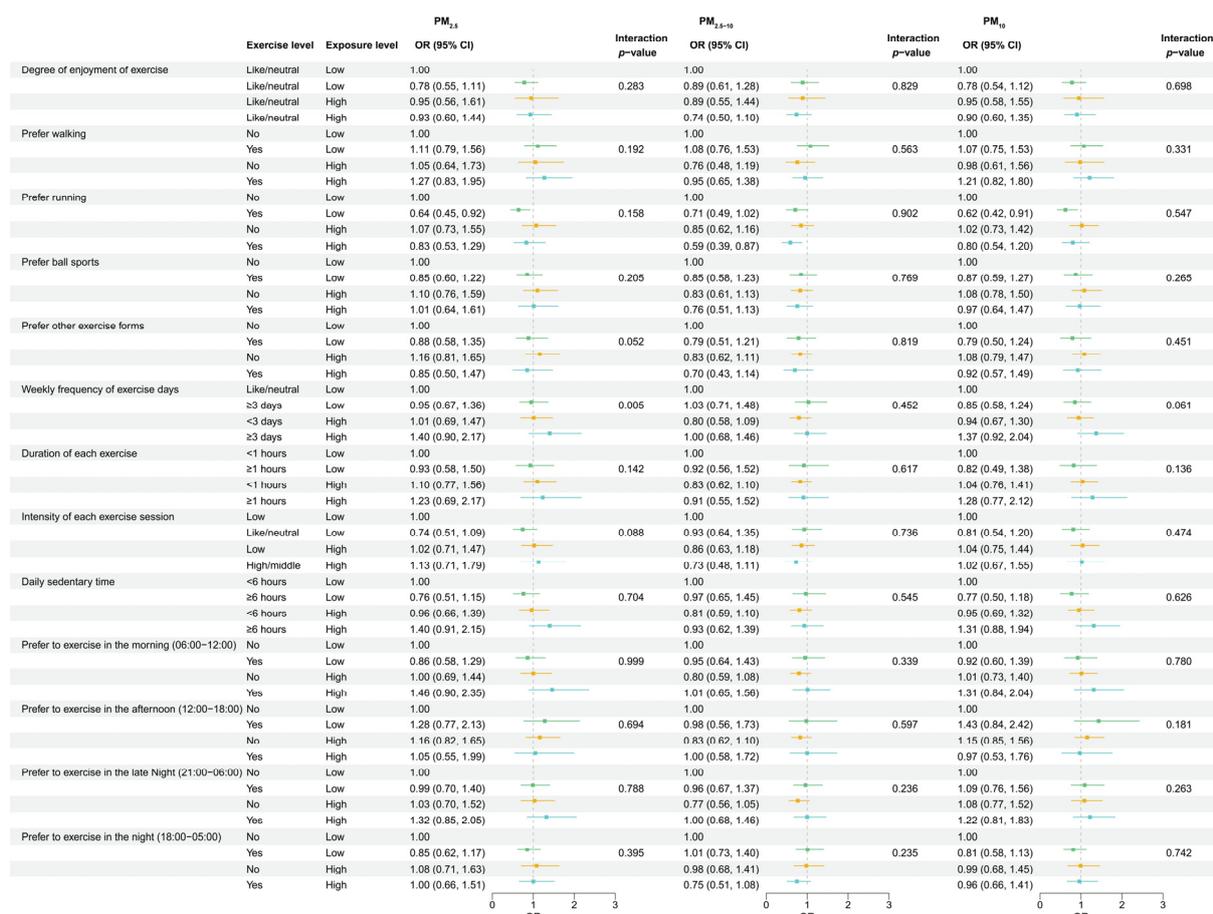


Figure S14b. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 3 months before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates in, individual exposure to outdoor NO₂ and temperature during 3 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

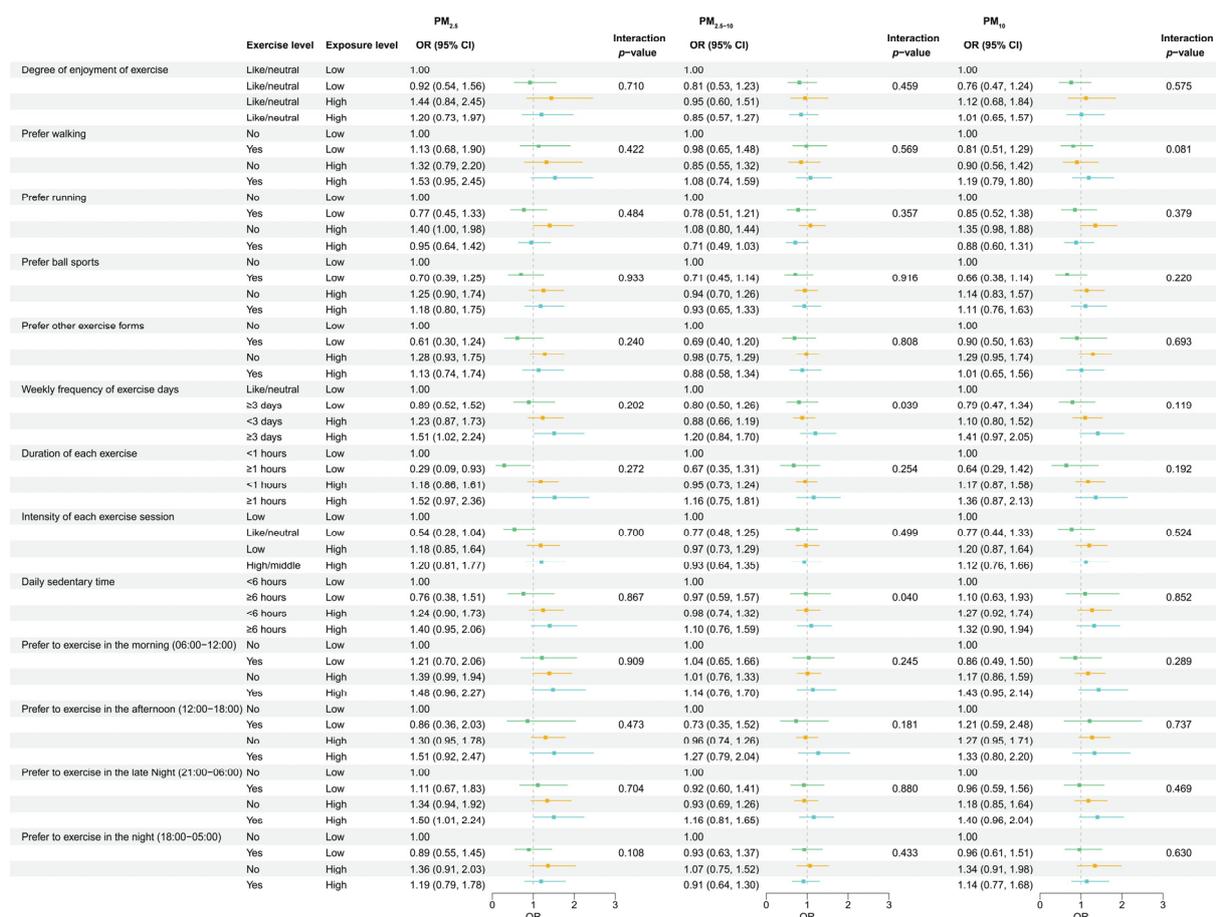


Figure S14c. Interaction (OR [95% CI]) of paternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during one year before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during one year before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

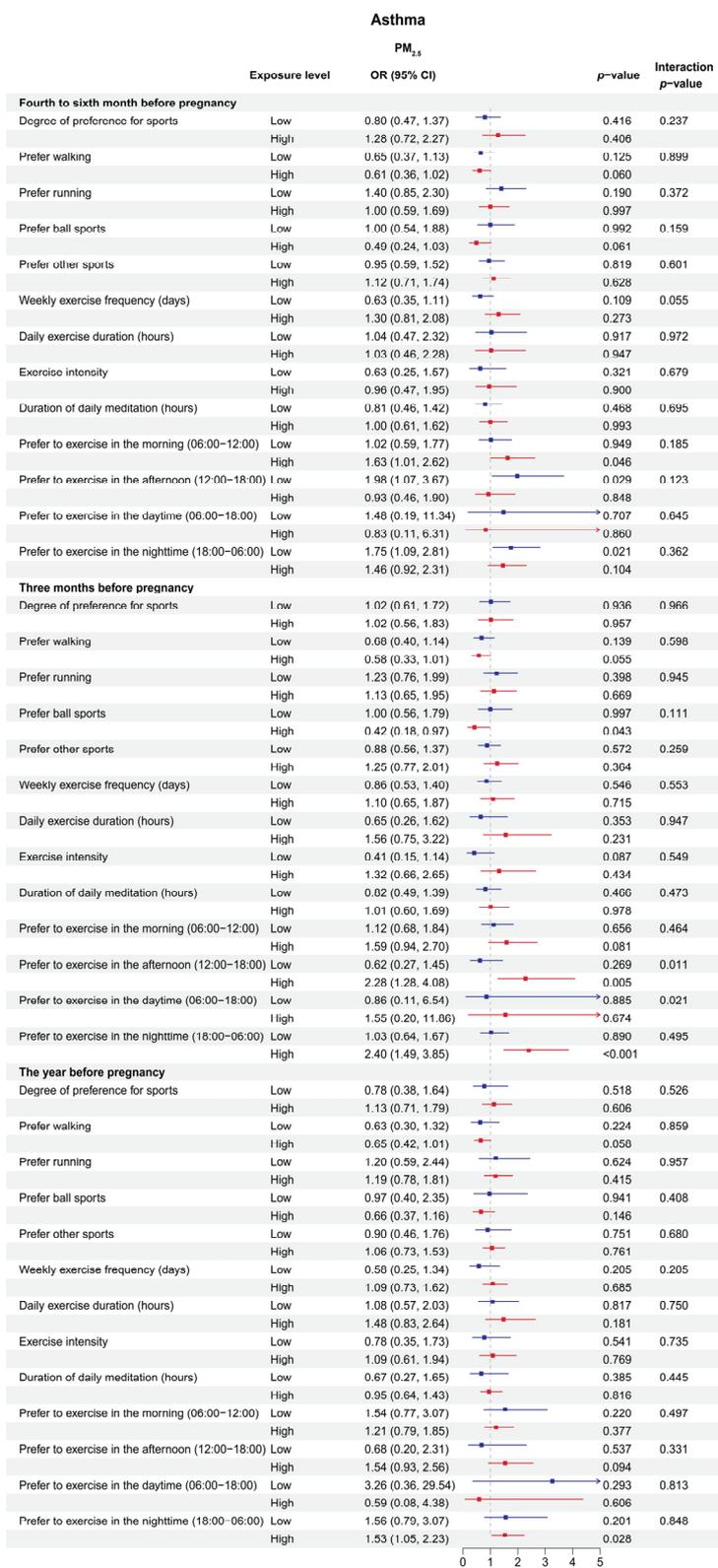


Figure S15a. Associations between maternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5}) during the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each relevant time window. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15b. Associations between maternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5-10}) during the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each relevant time window. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

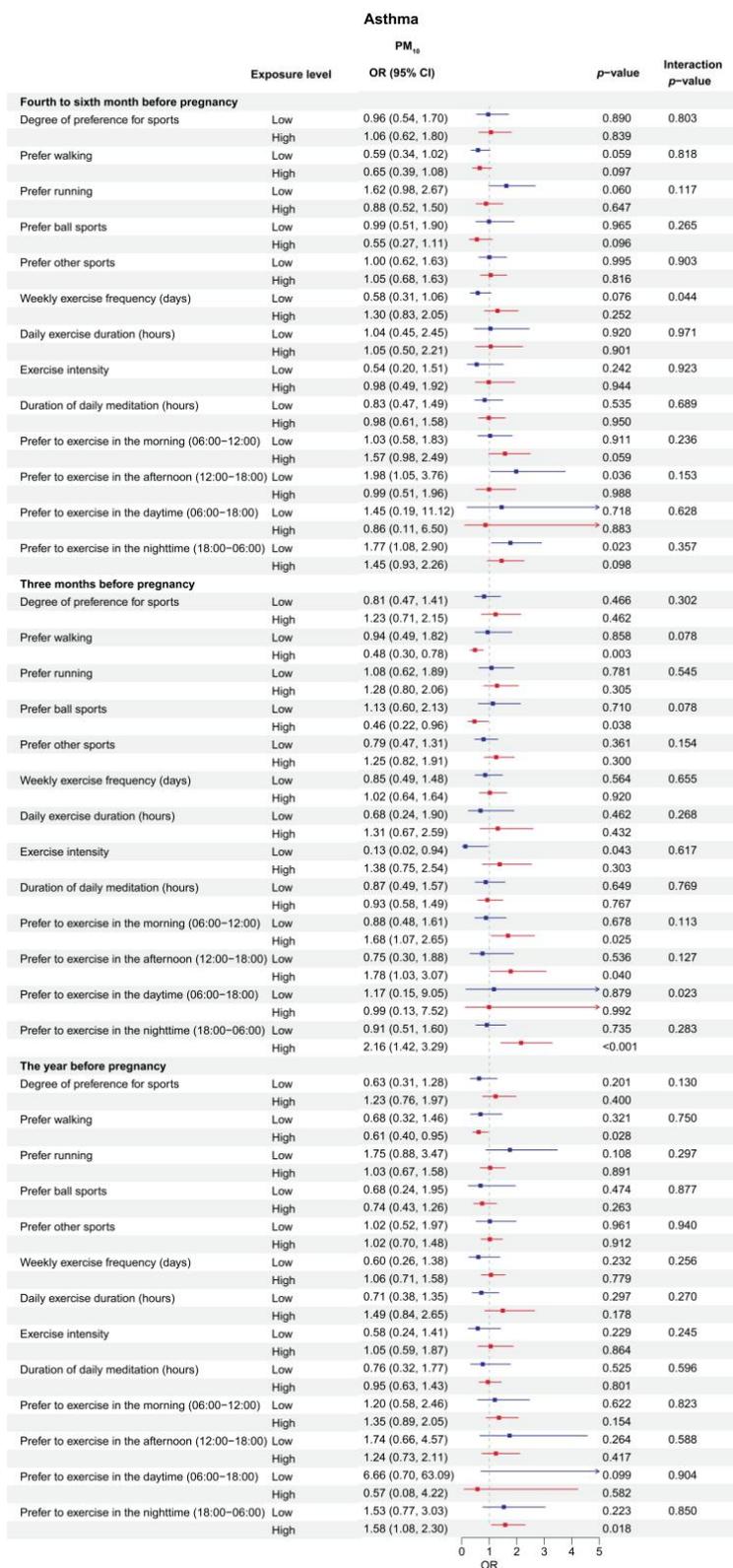


Figure S15c. Associations between maternal exercise prior to conception and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM₁₀) during the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature within each relevant time window. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

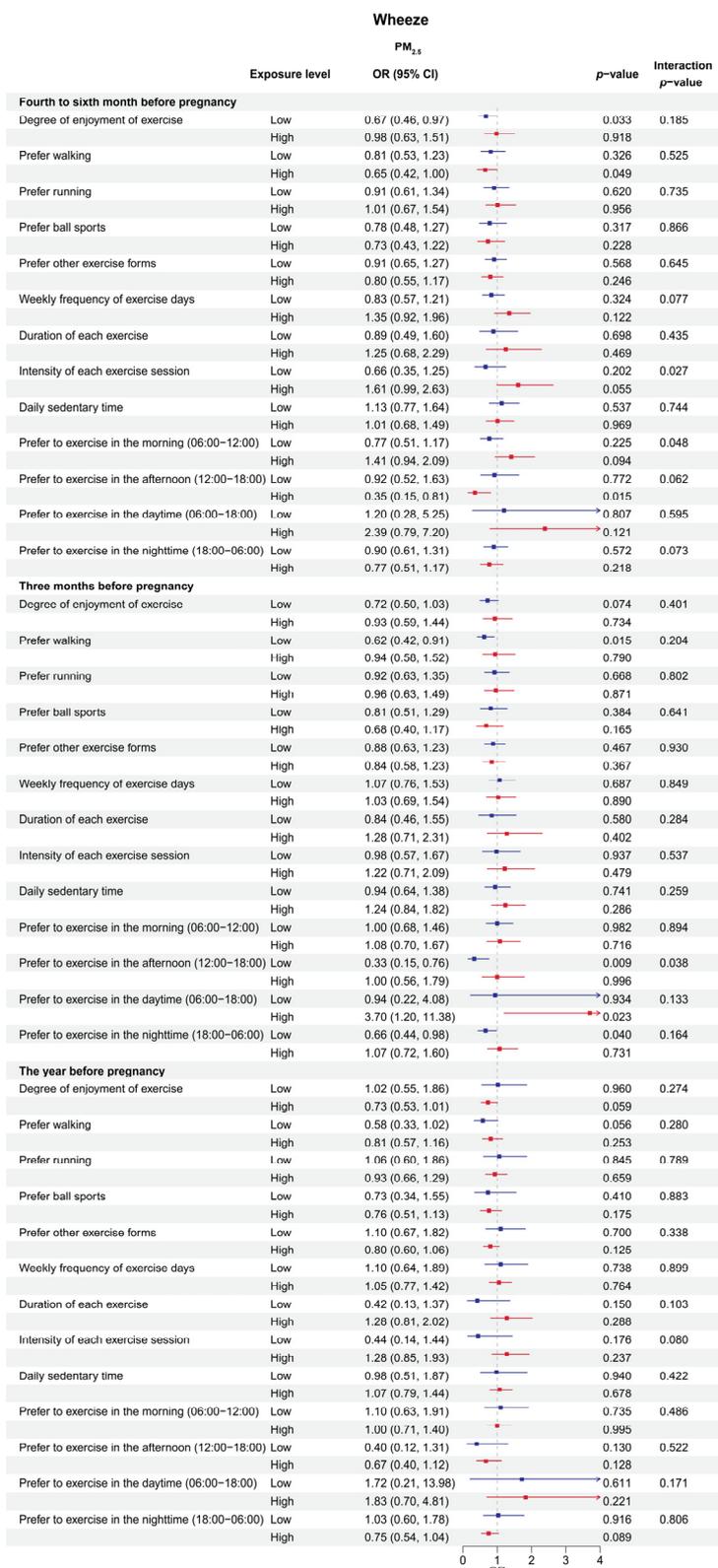


Figure S15d. Associations between maternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM_{2.5}) within the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, along with individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding time windows. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

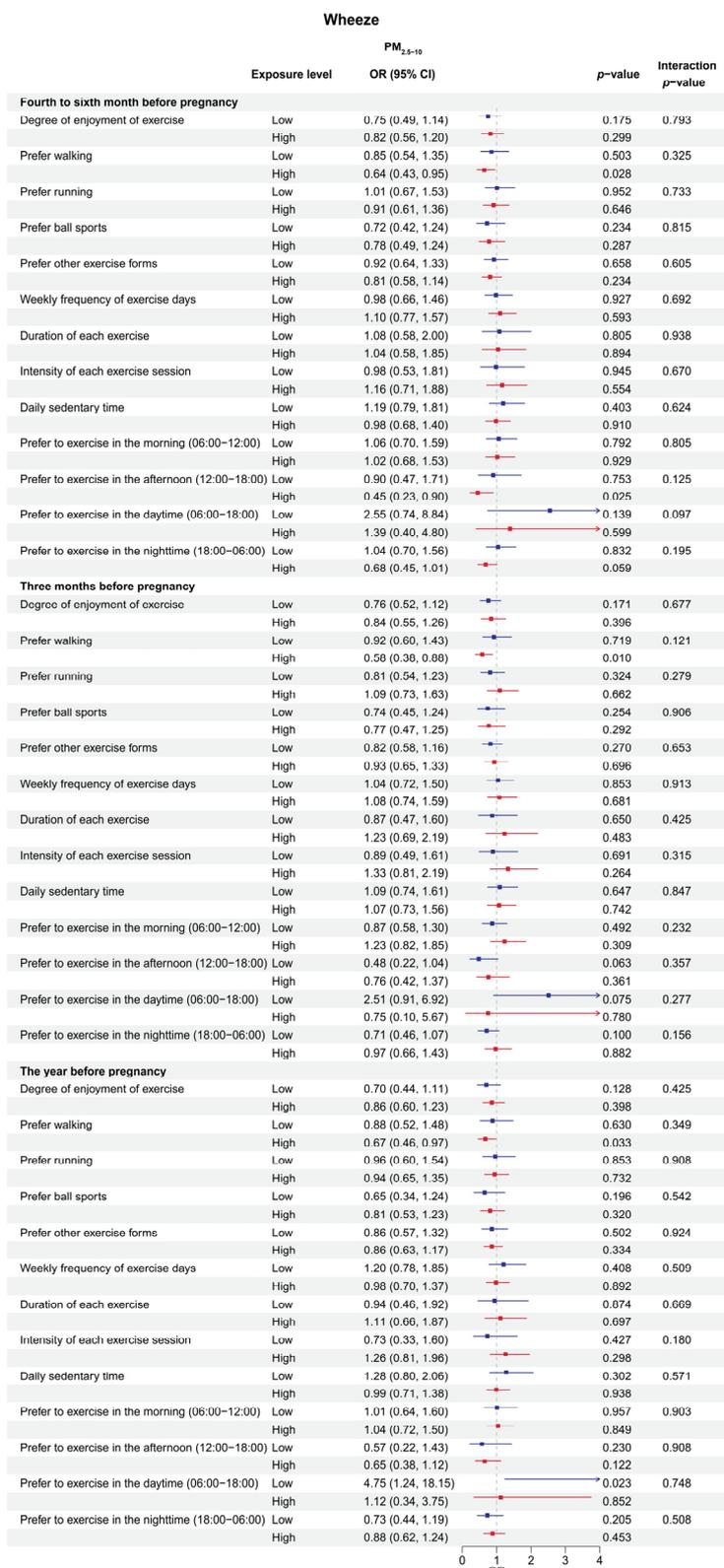


Figure S15e. Associations between maternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM_{2.5-10}) within the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, along with individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding time windows. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

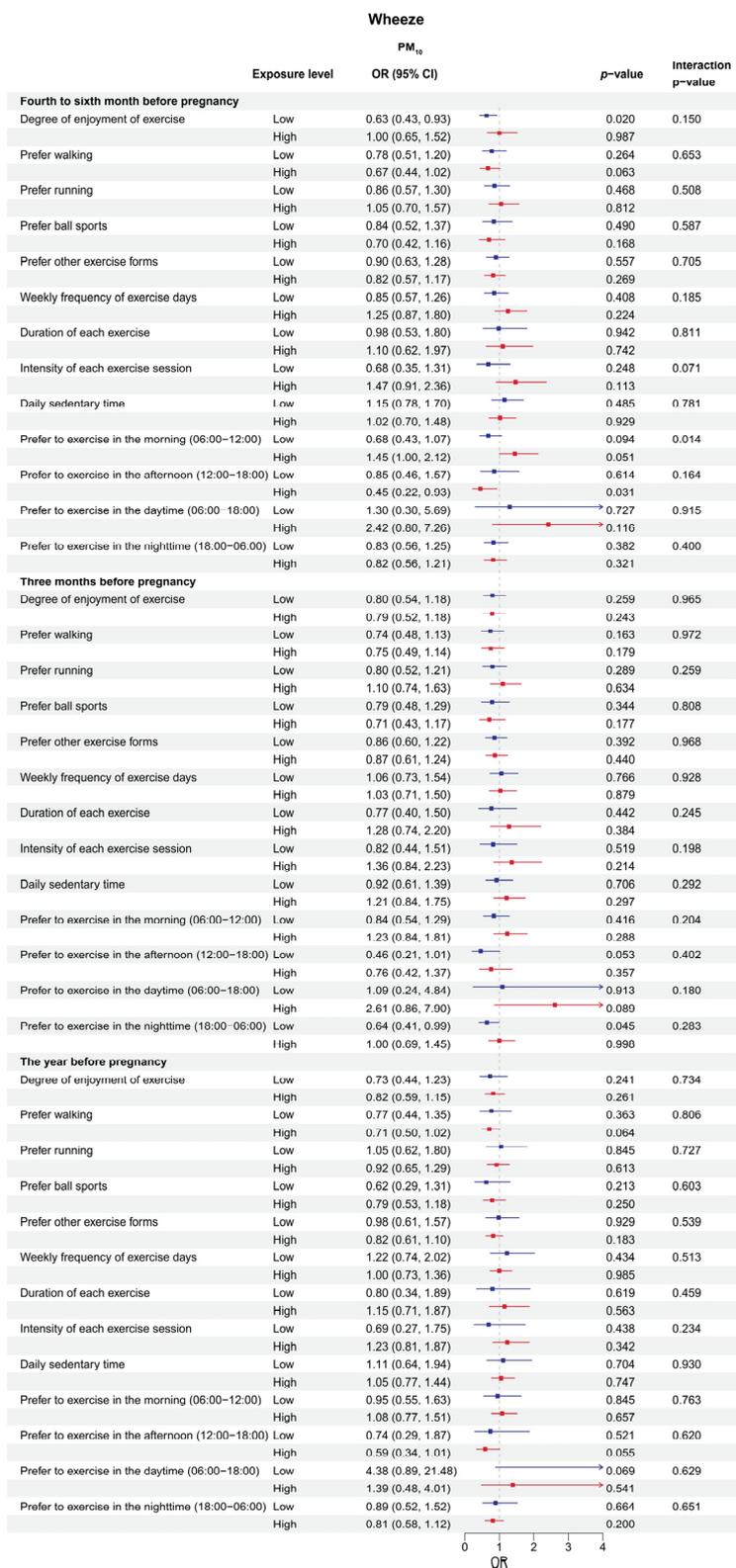


Figure S15f. Associations between maternal exercise prior to conception and physician-diagnosed wheeze in children, stratified by varying exposure levels of particulate matter (PM₁₀) within the preconceptional period. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, along with individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding time windows. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15g. Associations between maternal exercise during the prenatal period and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5}) within the same prenatal timeframe. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15h. Associations between maternal exercise during the prenatal period and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM_{2.5-10}) within the same prenatal timeframe. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15i. Associations between maternal exercise during the prenatal period and physician-diagnosed asthma in children, stratified by different exposure levels of particulate matter (PM₁₀) within the same prenatal timeframe. Odds ratios (ORs) and 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposure to ambient nitrogen dioxide (NO₂) and temperature during the corresponding period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15j. Associations between maternal exercise during the prenatal period and physician-diagnosed wheeze in children, stratified by different exposure levels of particulate matter (PM_{2.5}, PM_{2.5-10}, PM₁₀) during the same prenatal timeframe. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposures to ambient nitrogen dioxide (NO₂) and temperature within each relevant period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15k. Associations between maternal exercise during the prenatal period and physician-diagnosed wheeze in children, stratified by different exposure levels of particulate matter (PM_{2.5}, PM_{2.5-10}, PM₁₀) during the same prenatal timeframe. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposures to ambient nitrogen dioxide (NO₂) and temperature within each relevant period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S15I. Associations between maternal exercise during the prenatal period and physician-diagnosed wheeze in children, stratified by different exposure levels of particulate matter (PM_{2.5}, PM_{2.5-10}, PM₁₀) during the same prenatal timeframe. Odds ratios (ORs) with 95% confidence intervals (CIs) were adjusted for the studied covariates, as well as individual exposures to ambient nitrogen dioxide (NO₂) and temperature within each relevant period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

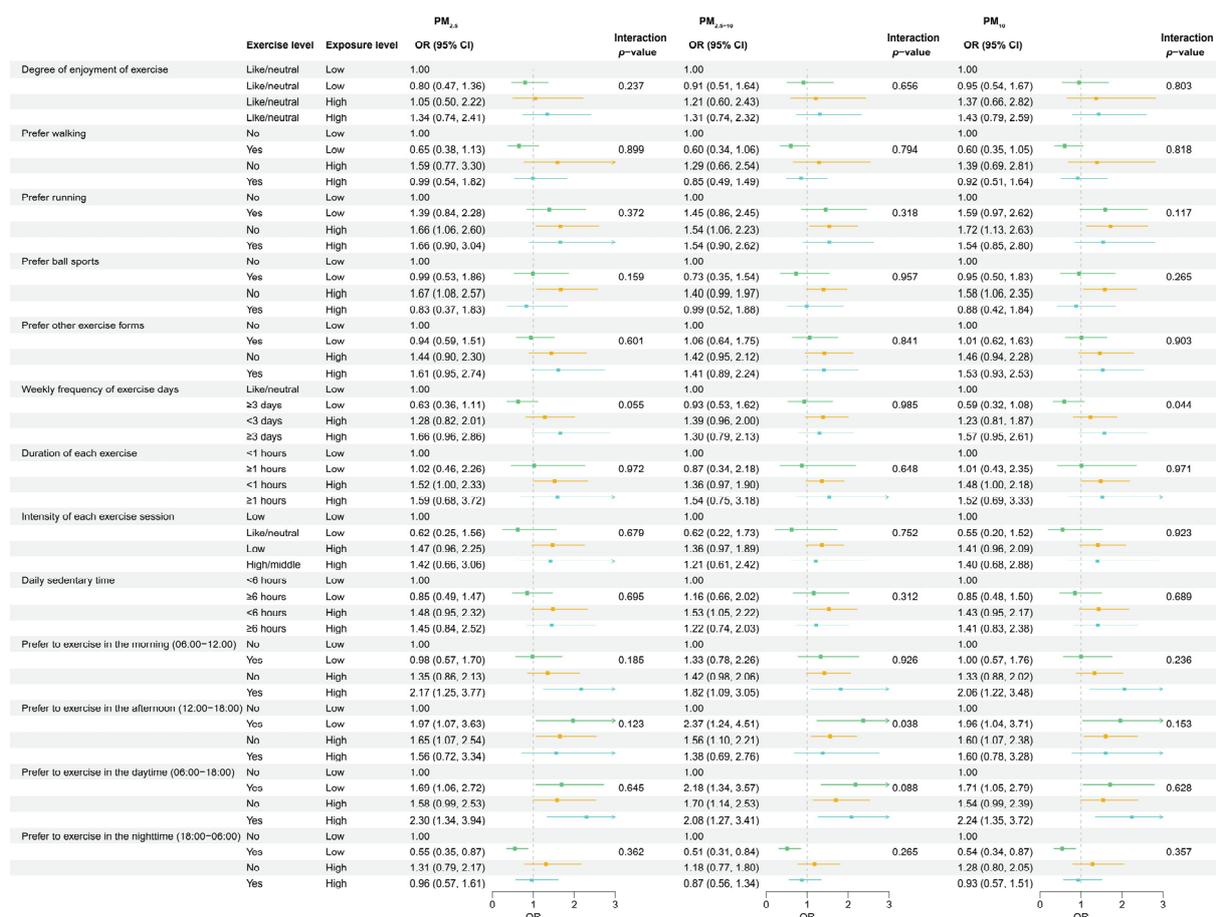


Figure S16a. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 4–6 months before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 4–6 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

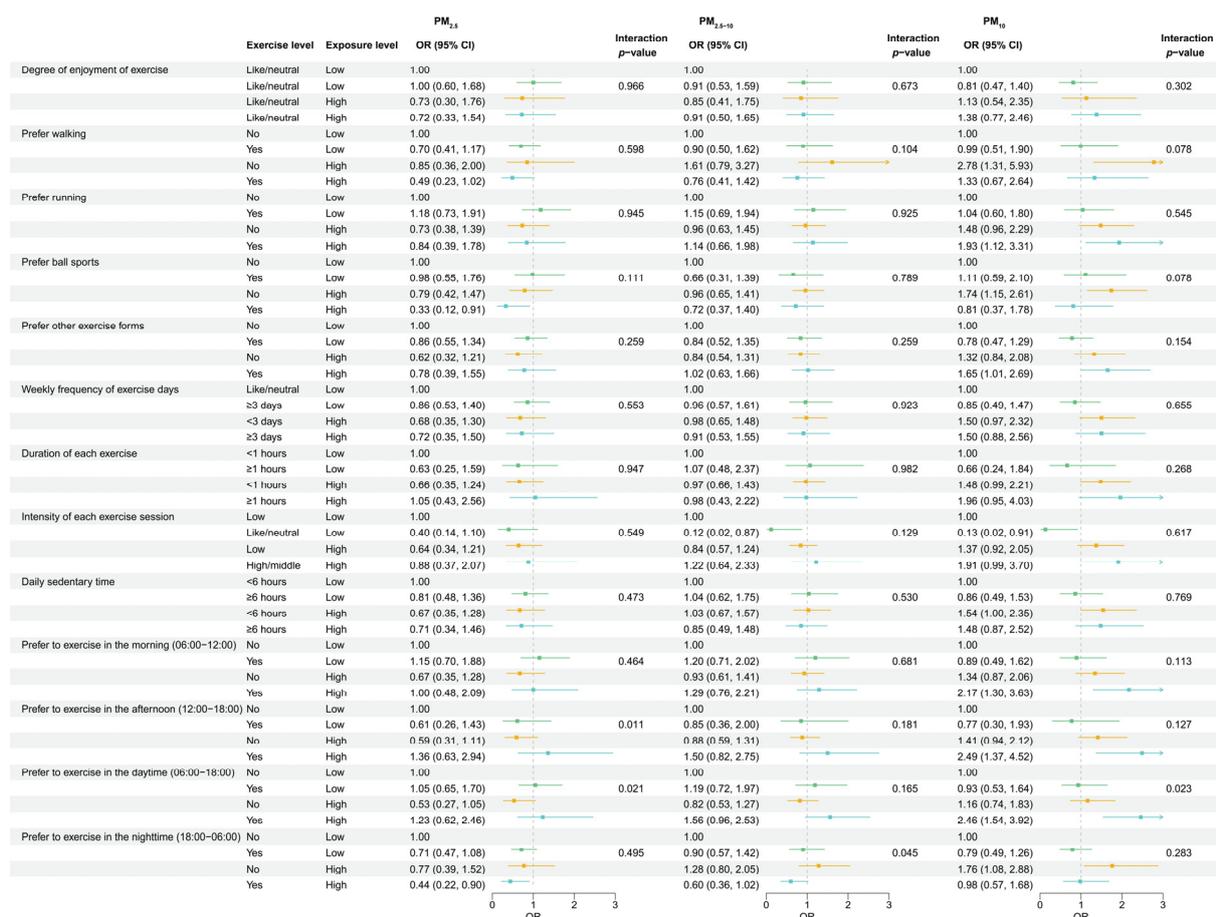


Figure S16b. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 3 months before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 3 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S16c. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during one year before pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during one year before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

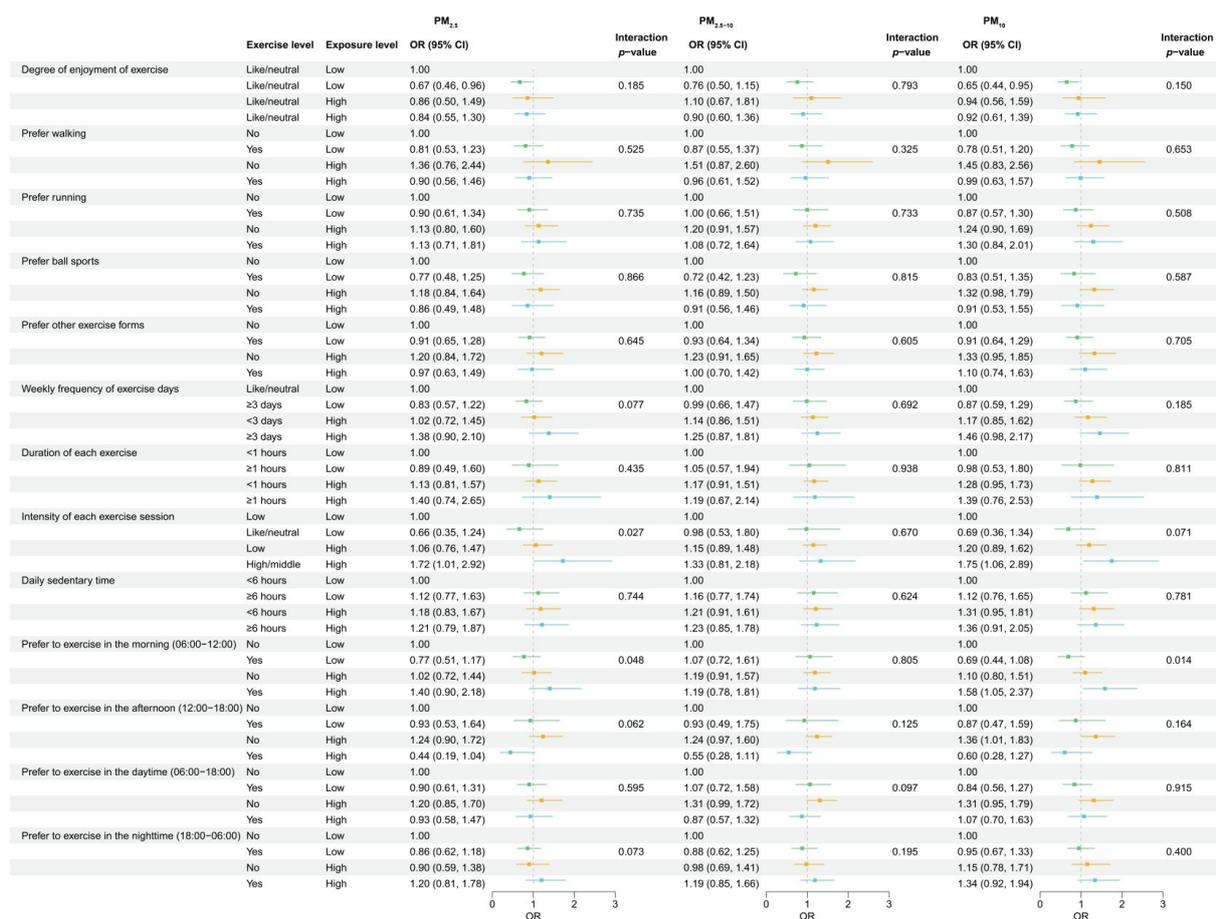


Figure S17a. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 4–6 months before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 4–6 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

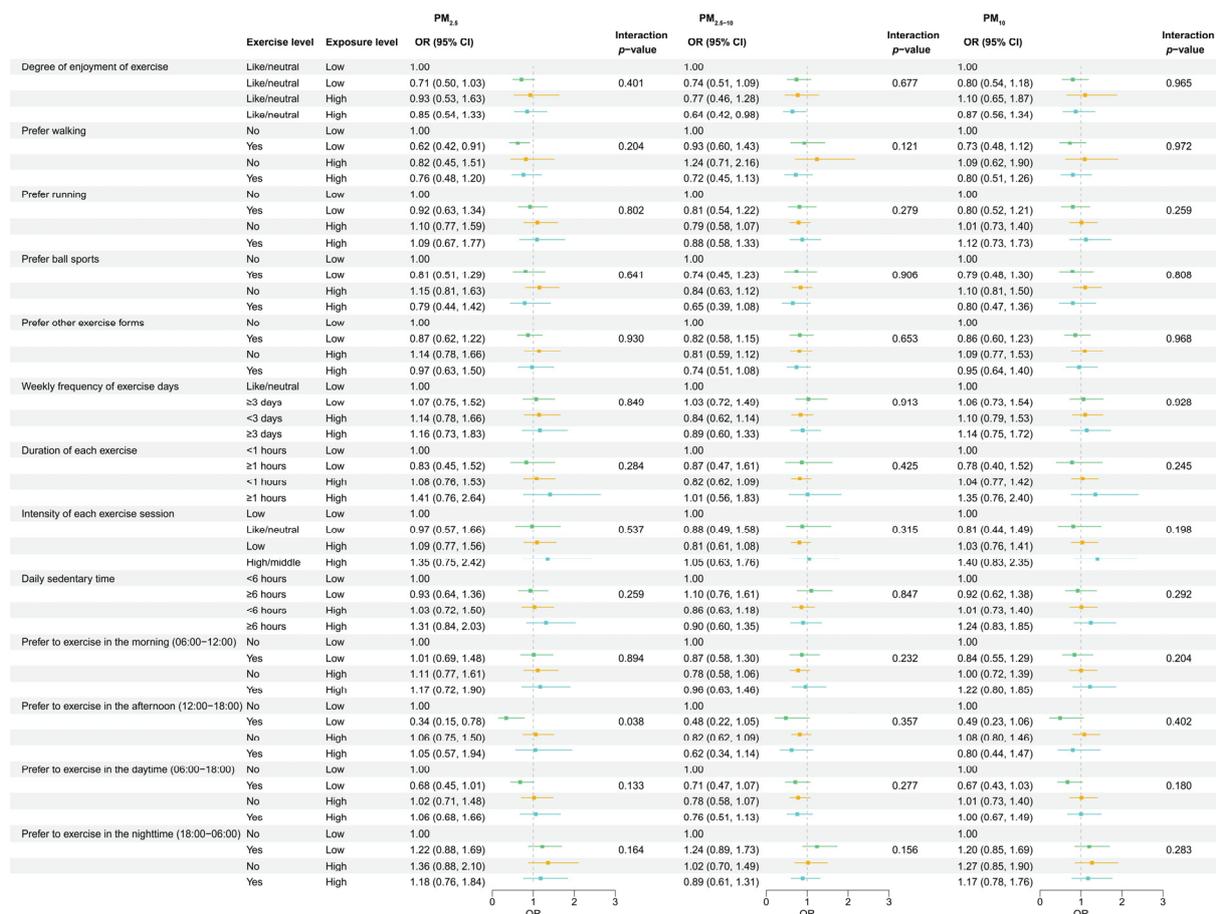


Figure S17b. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the 3 months before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during 3 months before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

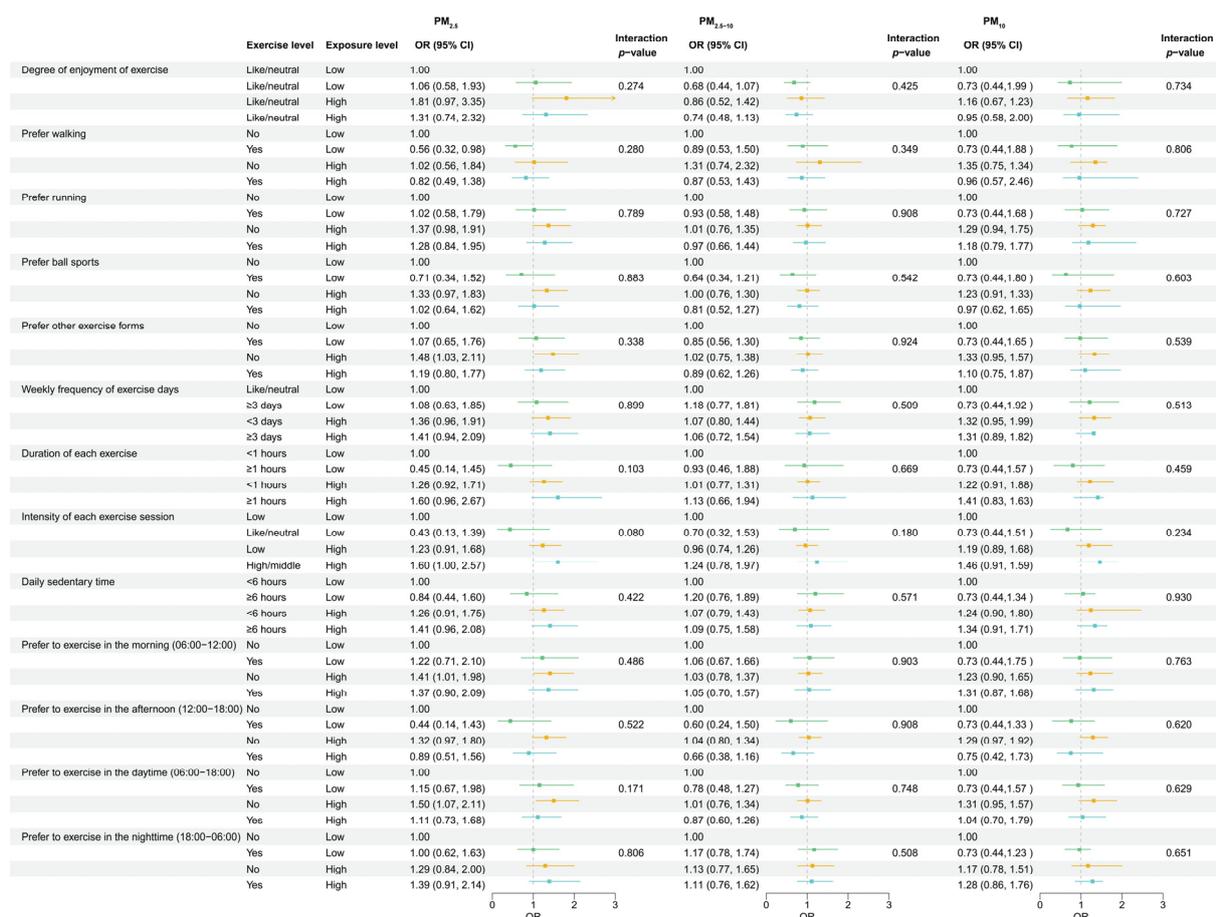


Figure S17c. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during one year before pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during one year before pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

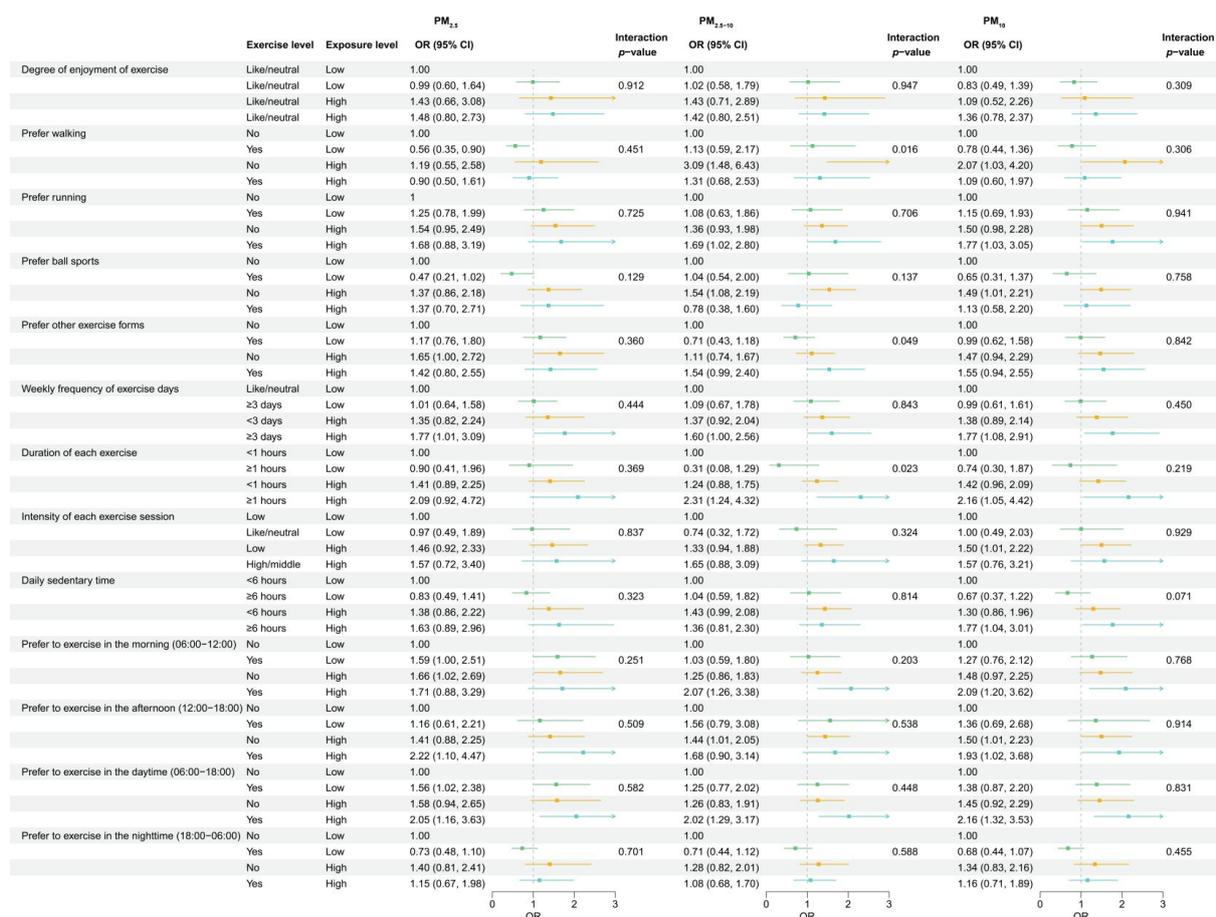


Figure S18a. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the first trimester of pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during the first trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

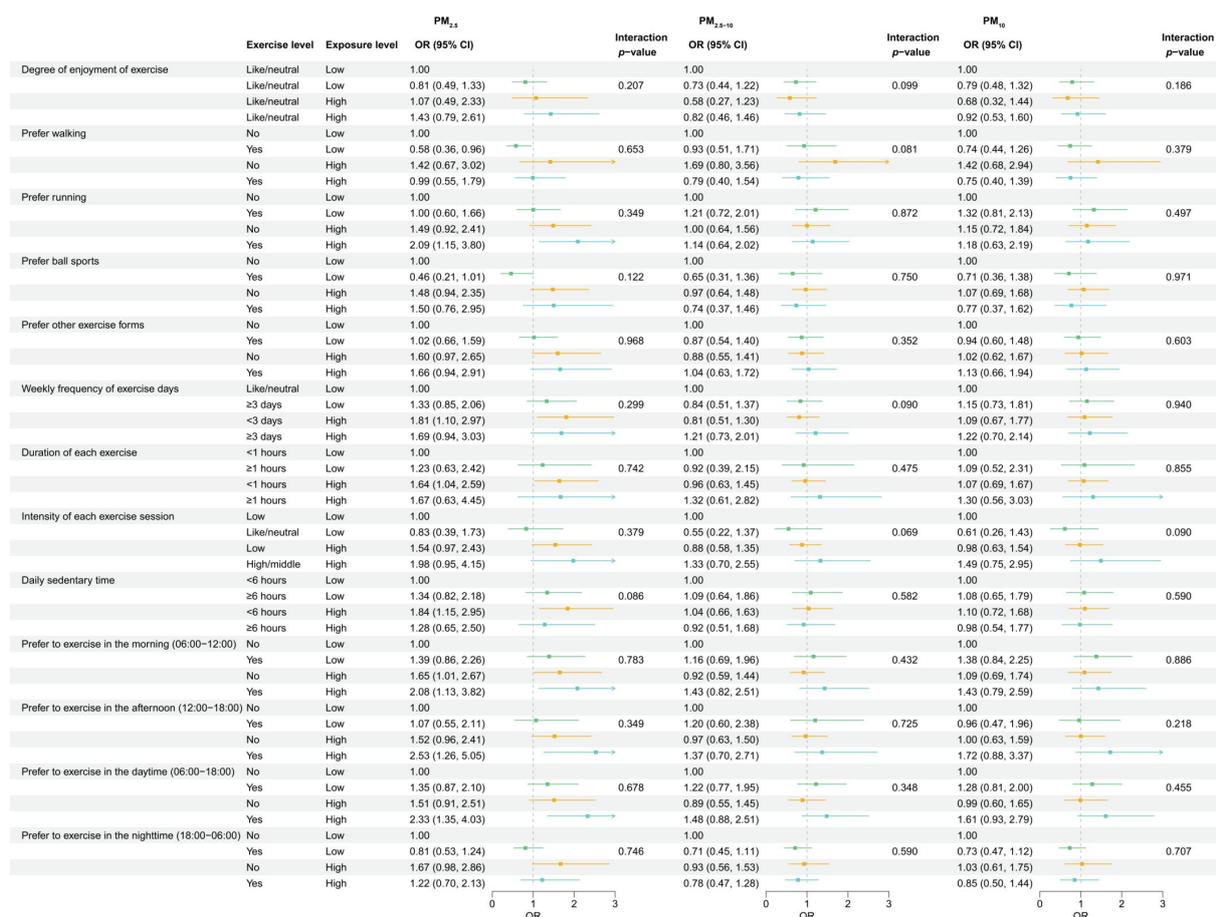


Figure S18b. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the second trimester of pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during the second trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

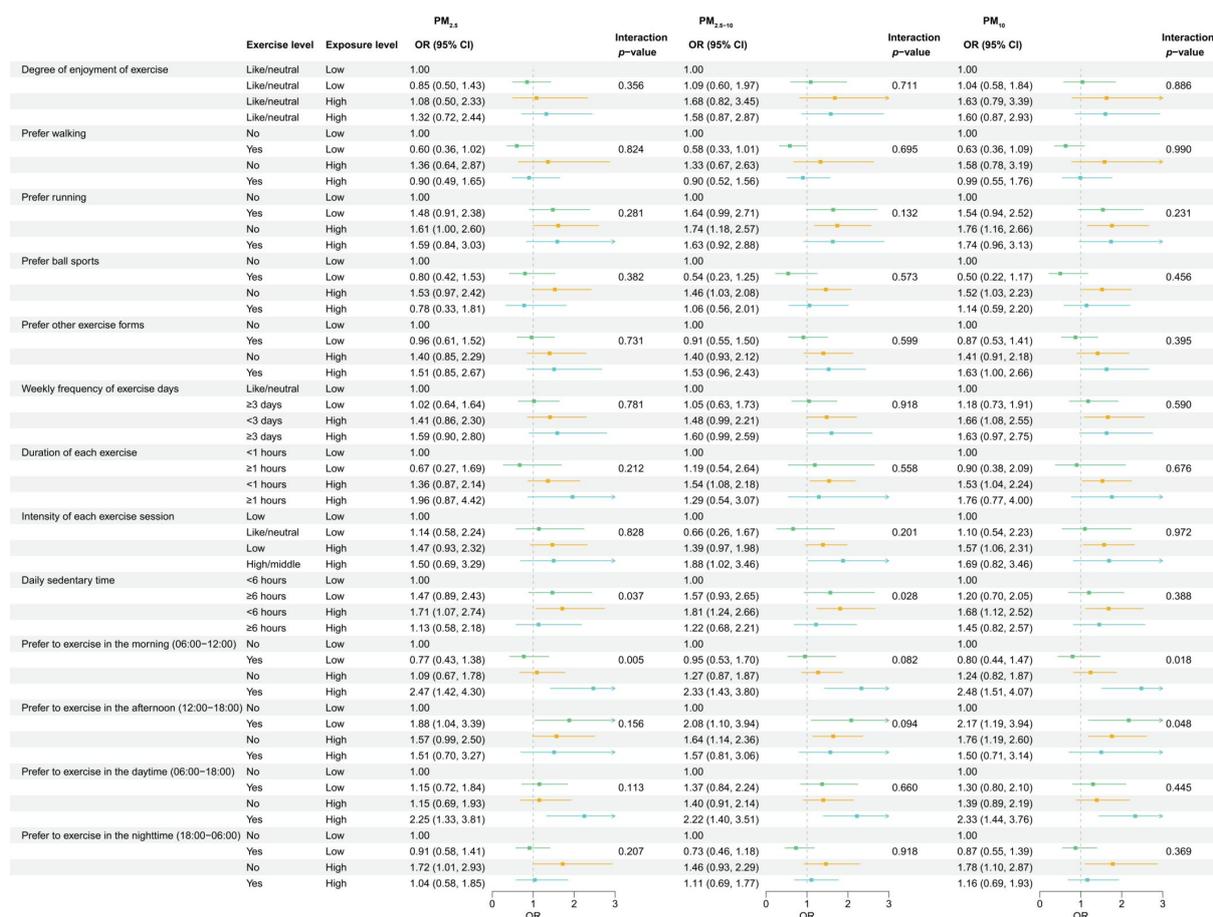


Figure S18c. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during the third trimester of pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during the third trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

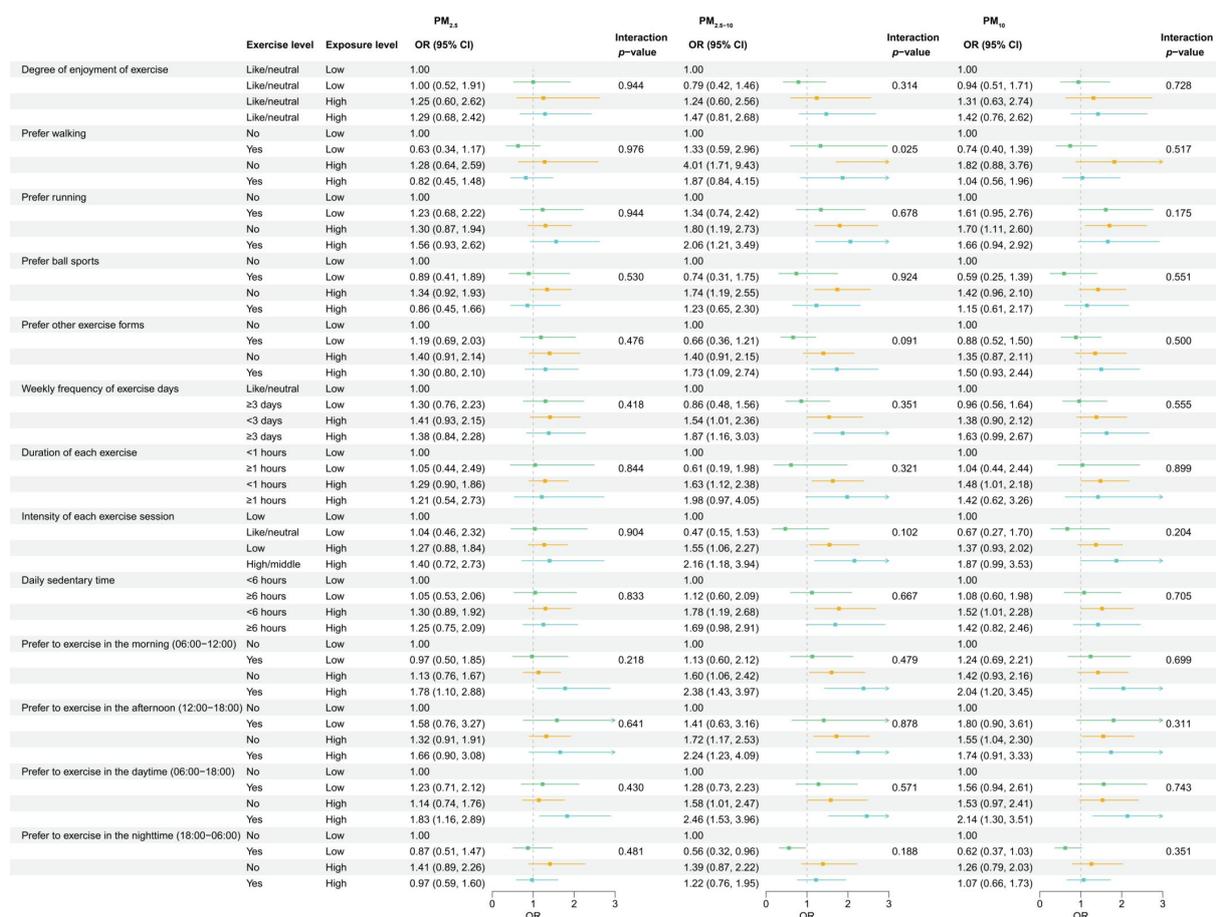


Figure S18d. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during entire pregnancy on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during entire pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

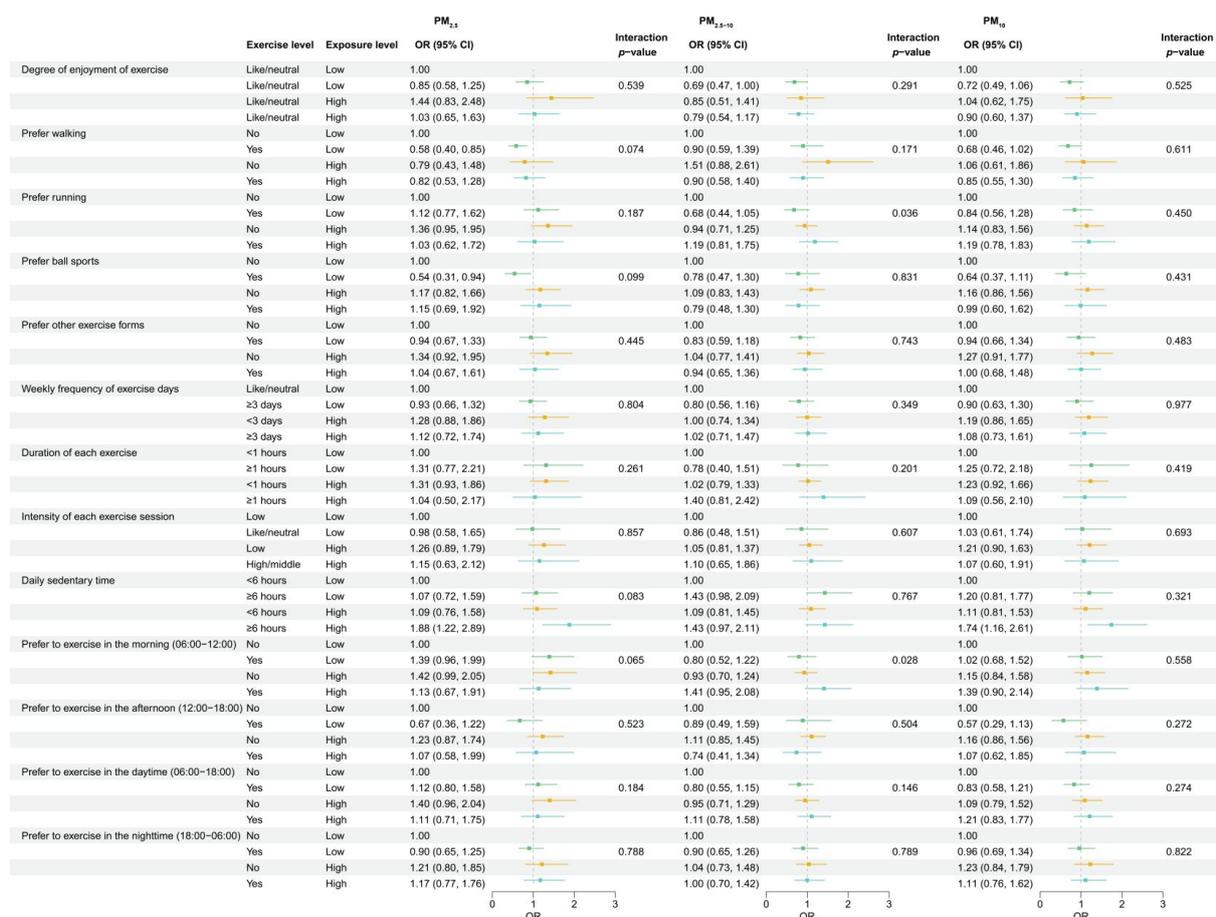


Figure S19a. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during first trimester of pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during first trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

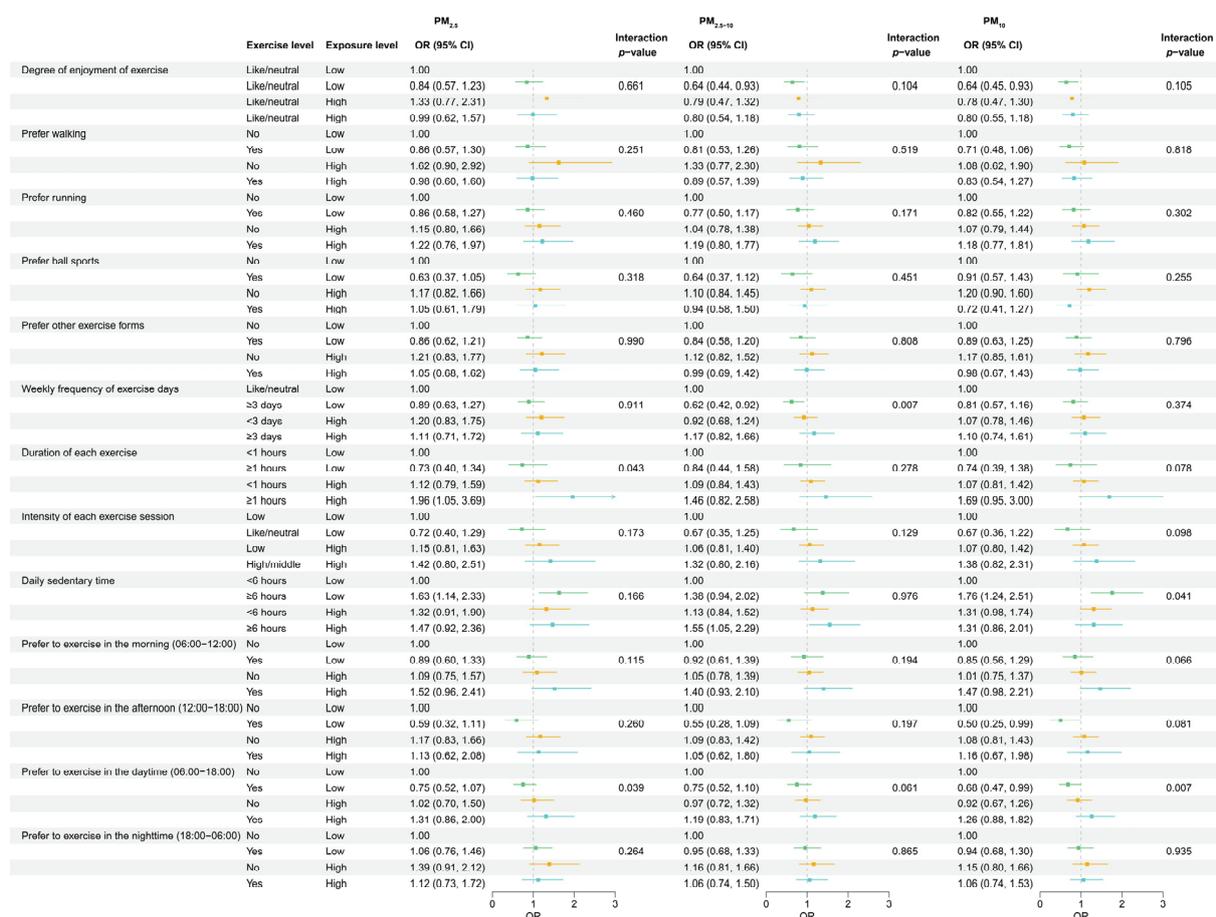


Figure S19b. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during second trimester of pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during first trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

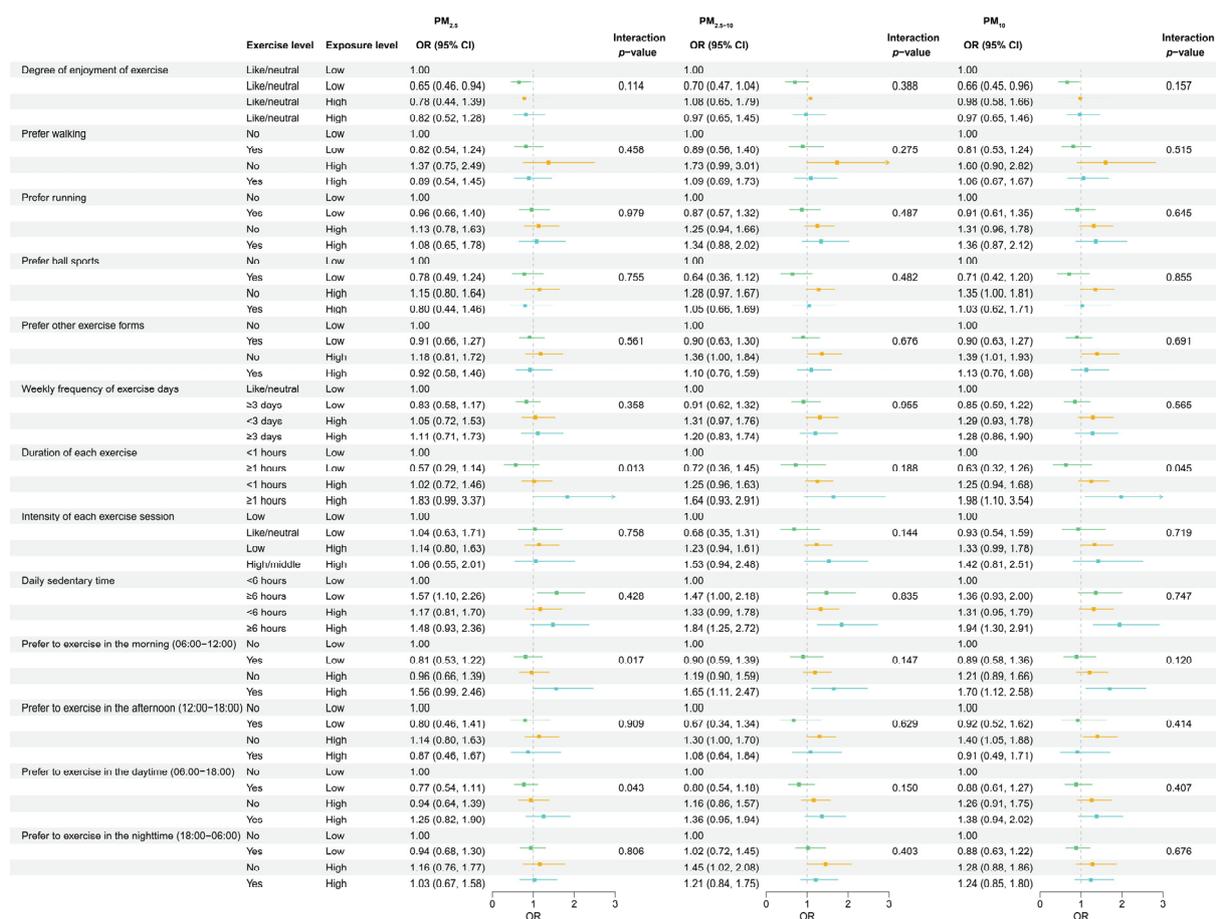


Figure S19c. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during third trimester of pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during first trimester of pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

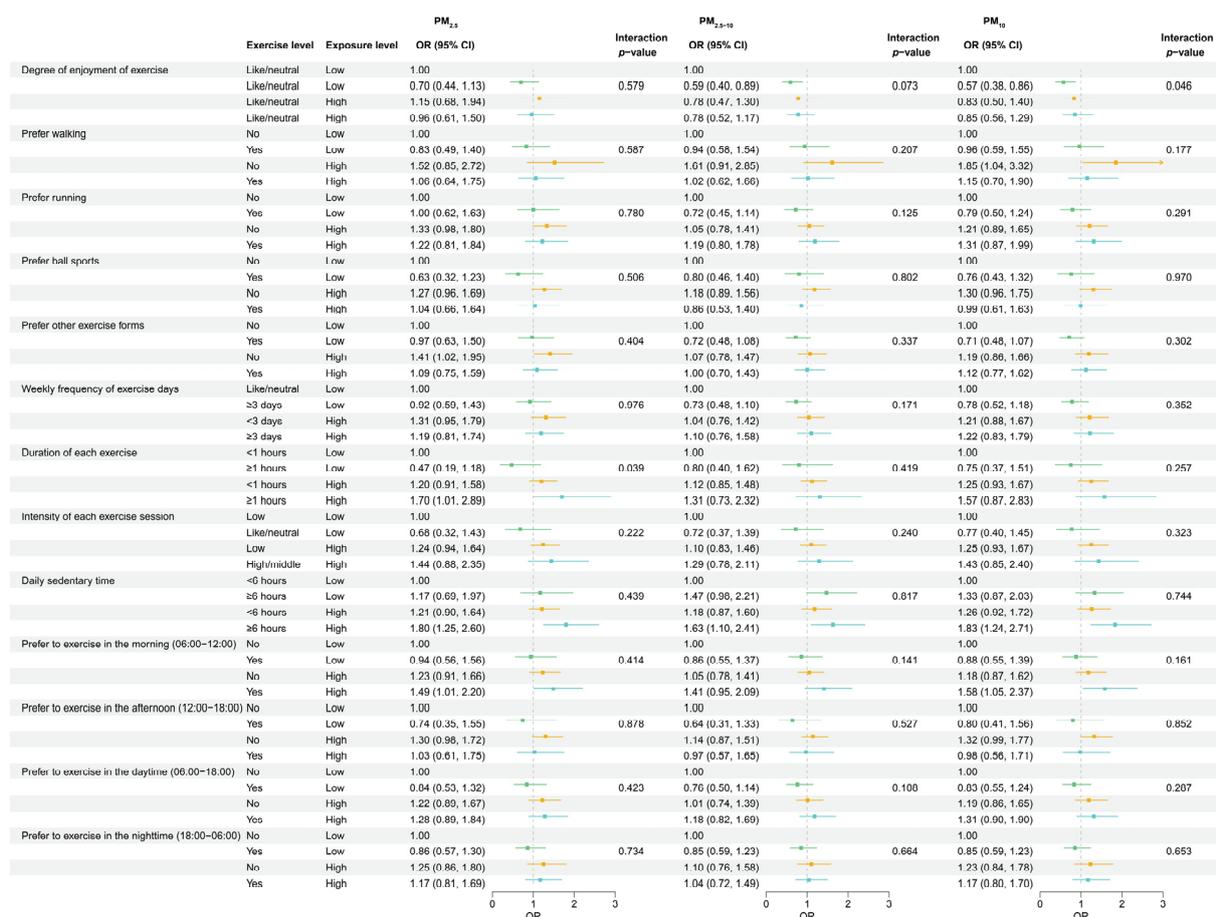


Figure S19d. Interaction (OR [95% CI]) of maternal exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during entire pregnancy on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during entire pregnancy. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.



Figure S20a. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during first year of life on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during first year of life. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

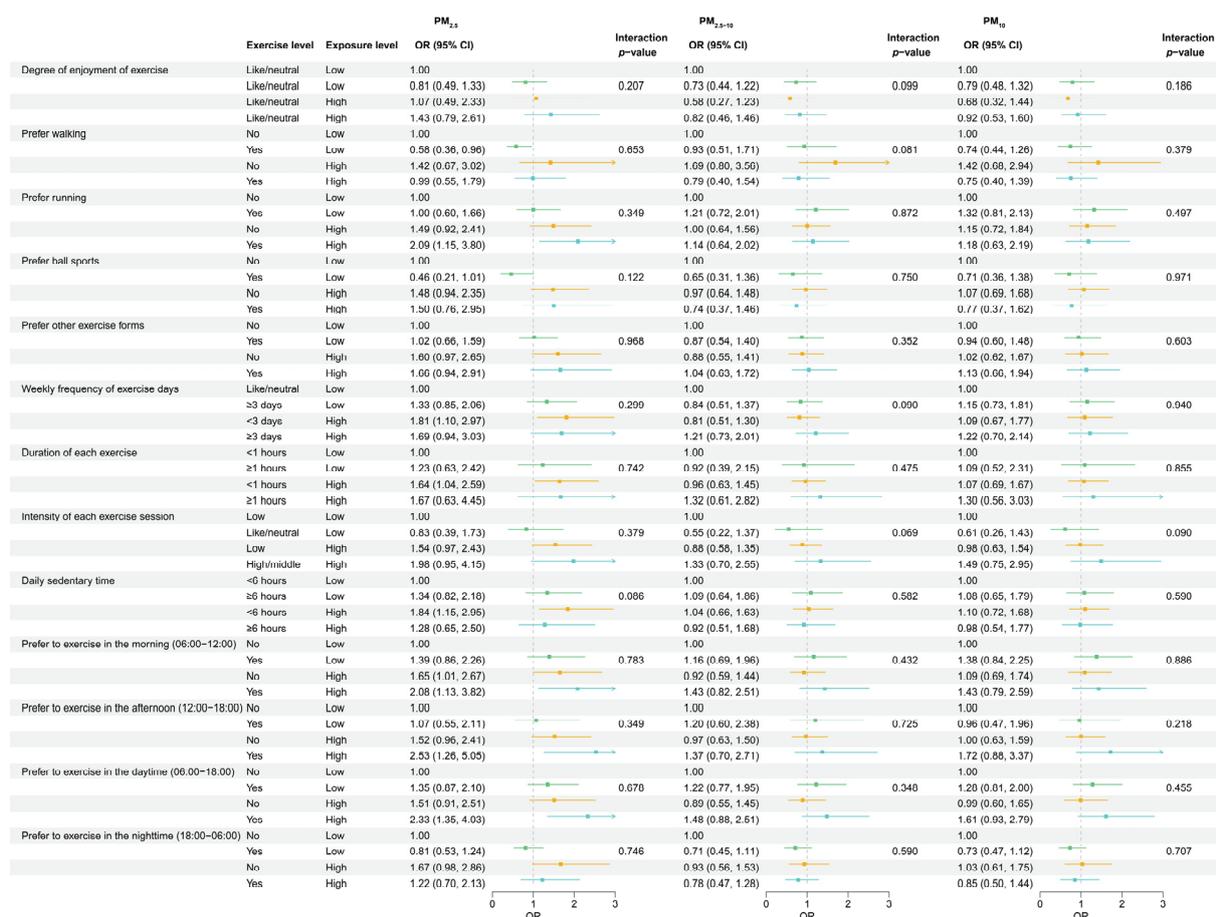


Figure S20b. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during past year on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during past year. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

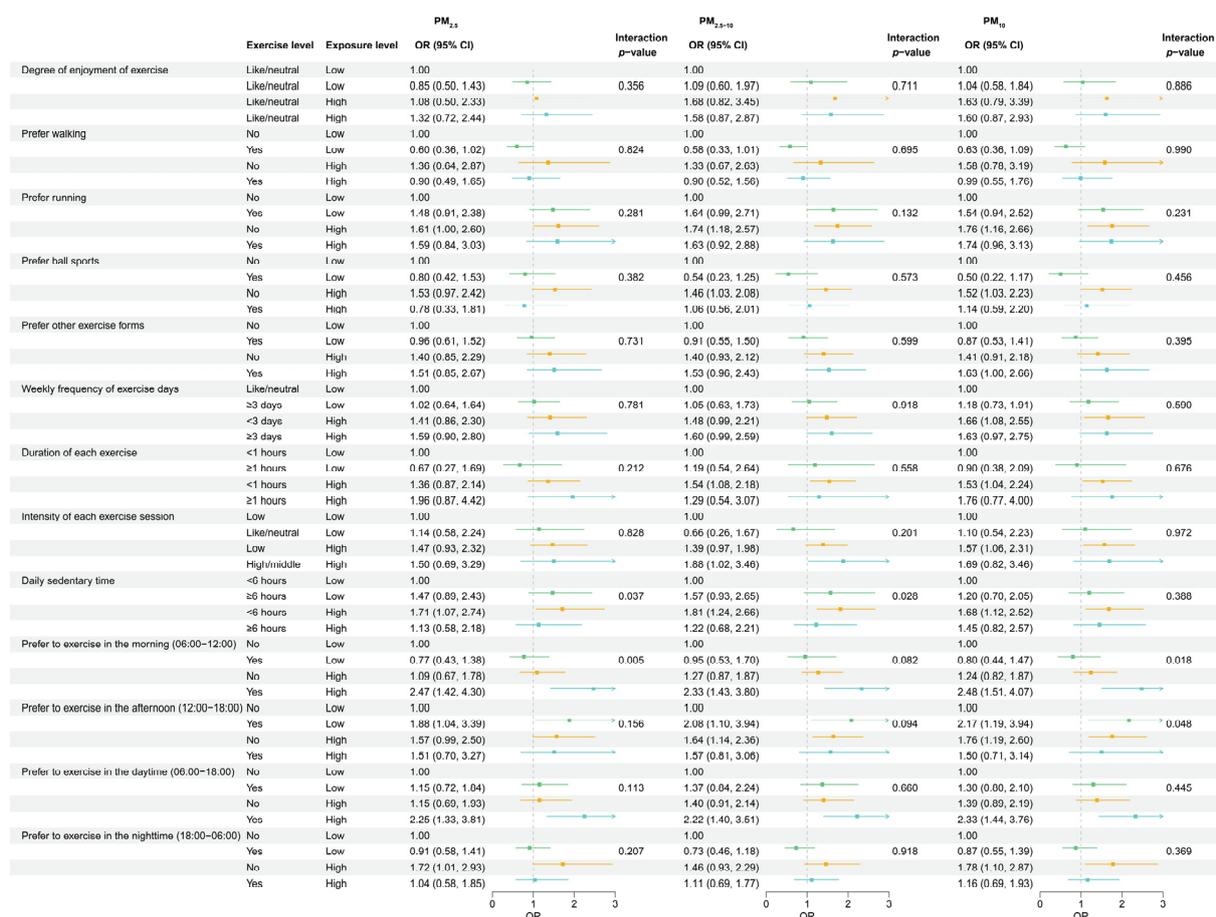


Figure S20c. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during entire postnatal period on childhood physician-diagnosed asthma. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during entire postnatal period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

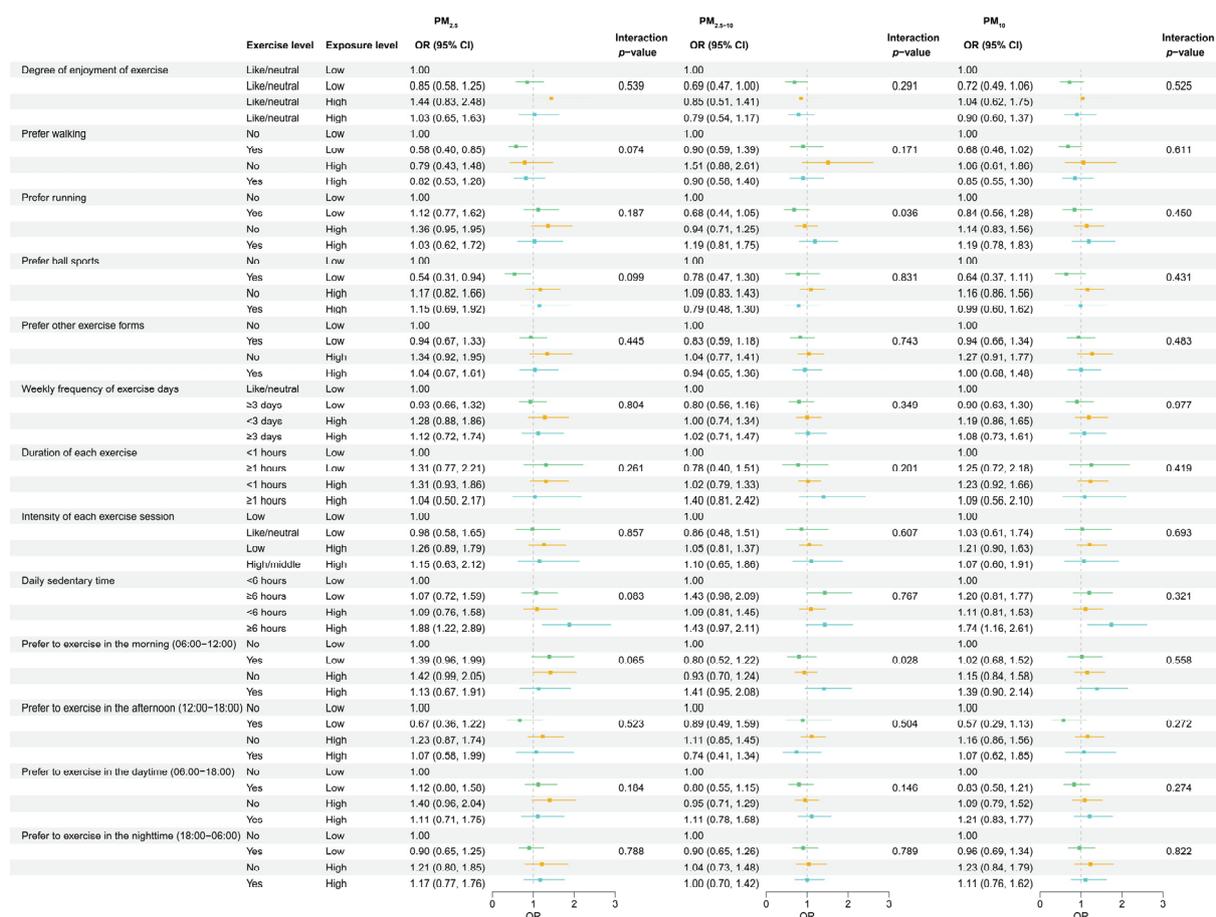


Figure S21a. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during first year of life on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during first year of life. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

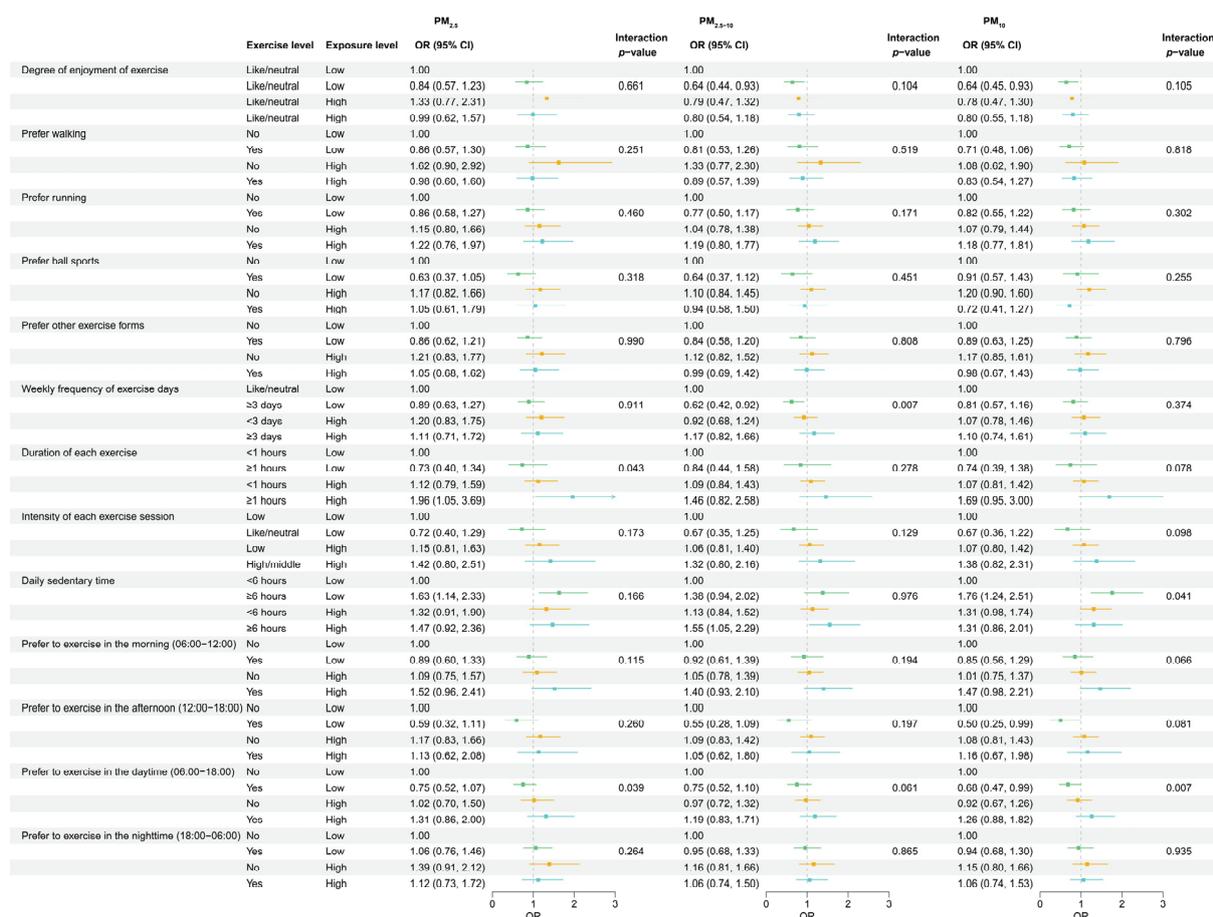


Figure S21b. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during past year on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during past year. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.

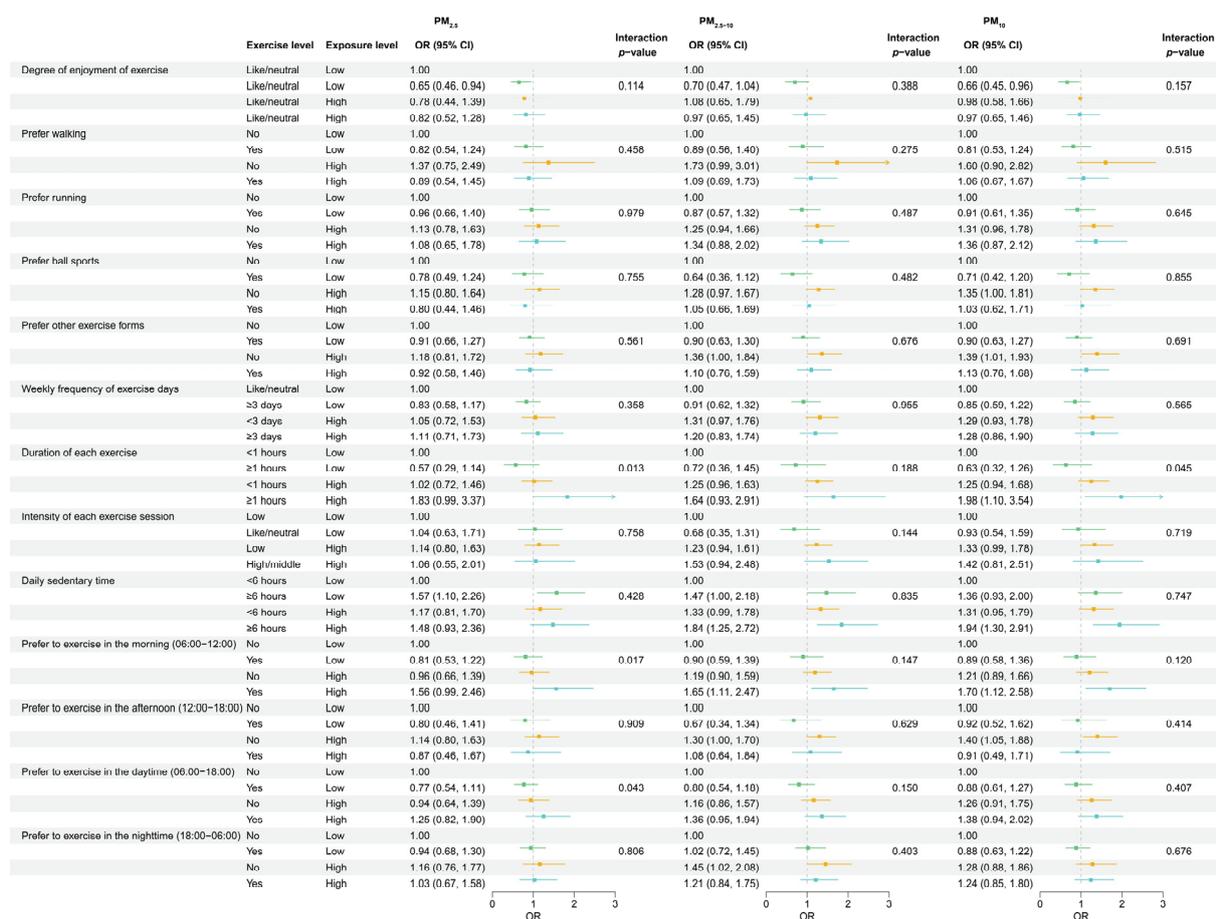


Figure S21c. Interaction (OR [95% CI]) of childhood exercise and individual exposure to particulate matters (PM_{2.5}, PM_{2.5-10} and PM₁₀) during entire postnatal period on childhood physician-diagnosed wheeze. ORs were calculated after adjusting for the covariates, individual exposure to outdoor NO₂ and temperature during entire postnatal period. *p*-value for OR less than 0.05 indicates statistical significance, and interaction *p*-value less than 0.1 is considered statistically significant.