

Appendix 1 Search strategy

1. Rectal Neoplasms/ or Colorectal Neoplasms/ or Colonic Polyps/ or Colonic Neoplasms/
 2. (((colon* or rectal or colorectal) adj (cancer* or neoplas* or tumor* or tumour* or carcinoma* or sarcoma* or adenom* or adeno?carcinoma* or lesion* or polyp*)) or CRC or serrated).ti,ab.
 3. (physical activity or exercise or sport or motor activity or fitness or energy expenditure or metabolic equivalent).mp.
 4. (sedentary or sit* or watch* or screen* or computer work or television viewing or TV viewing) .mp.
 5. case-control studies/ or exp cohort studies/ or cross-sectional studies/
 6. (case control or cohort or cross-sectional or observational or epidemiologic or prospective or retrospective).mp.
 7. 1 or 2
 8. 3 or 4
 9. 5 or 6
 10. 7 and 8 and 9
 11. (Animals not (humans and animals)).sh.
 12. 10 not 11
 13. removed duplicates from 12
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Appendix 2 Quality assessment of all selected studies

Study	Study type	Sample size	Representativeness of sample	Ascertainment of physical activity	Assessment of physical activity (validity)	Ascertainment of colorectal neoplasia	Control for age or gender	Control additional factor	Sample size	Statistical test	Non-respondents rate	Definition of control	Same method of physical activity ascertainment for case and control	Colorectal neoplasia was not present at start of study	Enough follow up for colorectal neoplasia to appear	Adequate follow up rate (90%)	Sum of Newcastle Oxford Scales
Blanks 2015	1	628976	0	1	0	0	1	1	1	1	1						6
Botteri 2016	1	750	0	1	0	1	1	1	0	1	1						6
Boutron-Ruault 2001	2	1269	1	1	0	1	1	1			1	0	1				7
Brenner 2018	1	2496	0	1	1	1	1	1	0	1	1						7
Burnett-Hartman 2013	2	2506	1	1	0	1	1	1				0	1				7
Cao 2015	1	22851	1	1	1	0	1	1	1	1	1						8
Cao* 2015	1	31065	1	1	1	1	1	1	1	1	1						9
Carr 2017	1	15950	1	1	0	1	0	0	1	1	1						6
Chia 2007	2	348	1	1	0	1	0	0				0	1	1			5
Enger 1997	2	976	1	1	0	0	1	1			1	1	1				7
Frantz 2013	1	934	1	1	1	1	1	1	0	1	1						8
Giovannucci 1995	3	47723	1	1	1	0	1	1						0	1	1	7
Giovannucci 1996	3	13057	1	1	1	0	1	1						0	1	0	6
Hauret 2004	2	405	1	1	1	1	1	1			1	1	1				9
Hermann 2009	3	4519	1	1	1	0	1	1						1	1	1	8
Jung 2015	1	28504	1	1	0	1	1	1	1	1	1						8
Karaginni 2010	2	104	1	1	1	1	1	1			0	0	1				7
Kato 1990	2	1324	1	1	0	1	1	1			1	0	1				7
Kim 2011	3	1562	1	1	0	0	1	1						1	1	0	6
Knudsen 2016	1	14832	0	1	0	0	1	1	1	1	1						6
Kono 1999	1	803	1	1	0	0	1	1	0	1	1						6
Larsen 2006	1	6961	1	1	0	0	1	1	1	1	1						7
Liberman 2003	1	3121	1	1	1	1	1	1	1	1	1						9
Little 1993	2	476	1	1	0	0	1	1			1	0	1				6
Lubin 1997	2	392	1	1	0	1	1	1			0	1	1				7
Massa 2014	3	43641	1	1	0	1	1	1						0	1	1	7
Morimoto 2002	2	1502	1	1	0	1	1	1			1	1	1				8
Senchez 2012	1	982	1	1	0	1	1	1	0	1	1						7
Shinchi 1994	1	2228	1	1	0	0	1	1	0	1	1						6
Song 2013	1	1526	1	1	1	1	1	1	0	1	1						8
Waldmann 2016	1	25409	1	1	0	1	1	1	1	1	1						8
Yang 2017	1	70812	1	1	0	1	0	0	1	1	1						6

Study type: 1=cross-sectional,2=case-control,3= cohort

Quality assessment

The Newcastle-Ottawa Scale (NOS) was employed to evaluate the quality of the selected studies by two independent reviewers (JJW, LWH). This quality assessment tool has been widely used in previous meta-analyses on risk factors of colorectal neoplasia (CN) (1, 2). It included the most important indicators to evaluate the quality of different types of observational studies, using an aggregate total score to quantify study quality. For all types of observation studies, four common items were assessed with scores ranging from 0-6:

- (1) representativeness of the samples: one point was given if the subjects were sampled from population-based design as asymptomatic or average-risk subjects (29);
- (2) ascertainment of exposure: one point was assigned if the definition of physical activity(PA) was clearly stated. If the data of PA were derived by validated tools, including (a). validated questionnaire (e.g., international physical questionnaire, IPAQ); (b). physical activity index (e.g., Cambridge Physical Activity Index, CPA); or (c). objective measures (e.g., accelerometer), one extra point was added (3);
- (3) ascertainment of the outcome: one point was assigned if all CN were confirmed with histology or medical documentation after colonoscopy test,;
- (4) comparability: one point for studies that controlled for age/gender; if any other potential confounders were adjusted, one more point was given.

For cross-sectional studies, one point was assigned for each of the following item, respectively, if (1) the total subjects were over 3,000; (2) its statistics was robust (e.g., using p value to assess the significance and 95% CI to report the precision of the association); (3) its non-response rate was less than 15%.

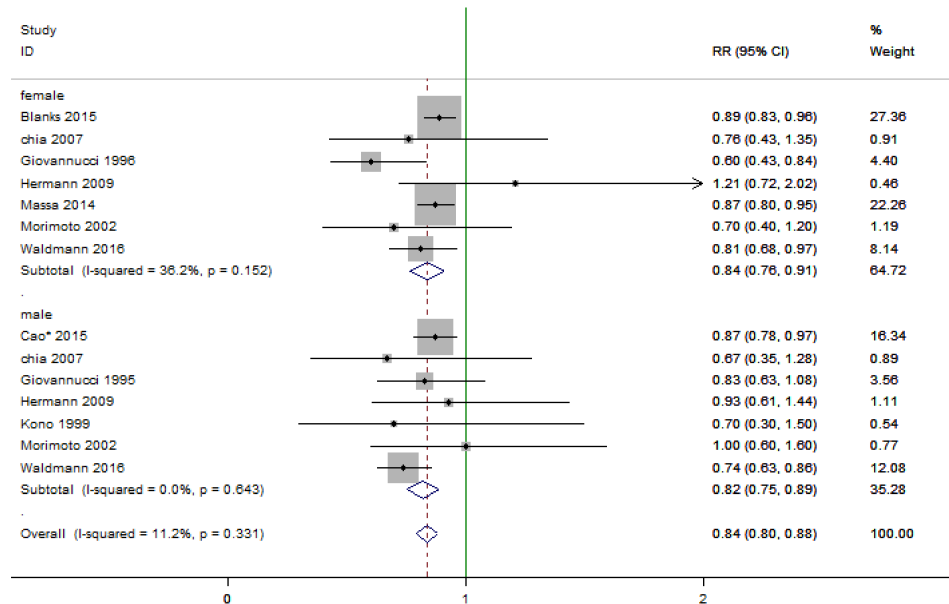
For case-control studies, one point was given to each of the three criteria, including (1) definition of control: if the subjects of control group were also asymptomatic or represent average-risk population; (2) same method of ascertainment for case and control: if the subjects in control group also received colonoscopy that showed normal findings; (3) non-response rate: if the rate was less than 15% in both groups.

For cohort studies, one point was assigned for each of the three criteria: (1) demonstration that the outcome of interest was not present at study commencement: if all the subjects had histological or medical documents indicating that they did not have any CN before study enrolment; (2) Adequate follow-up time for the outcomes to occur (≥ 5 years); (3) rate of follow-up adequacy for cohorts: the follow-up rate should be over 90%.

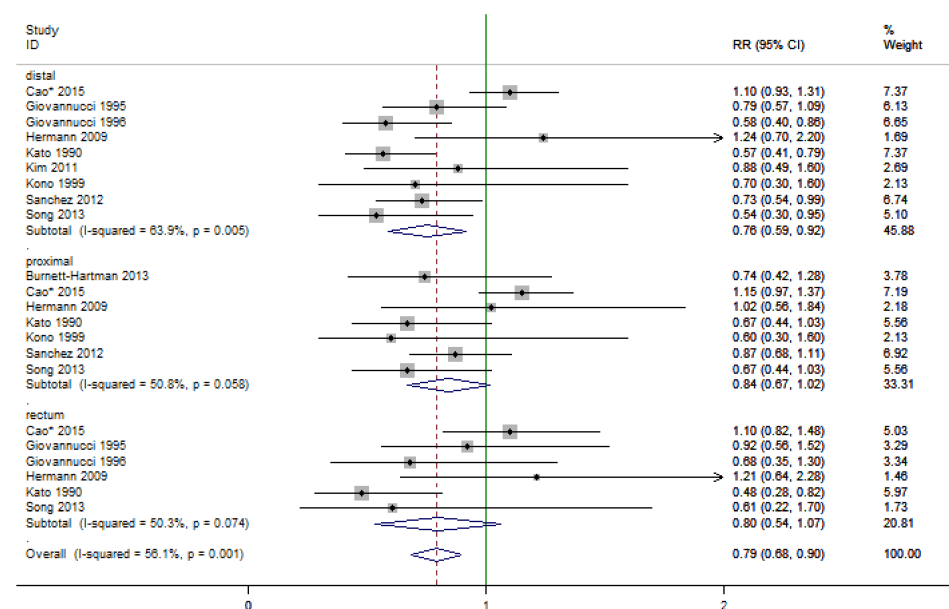
Thus, the overall score range was 0-9 points for all studies. Similar to a previous publication (1), we considered studies with scores ≥ 7 as high quality and those with scores < 7 as low quality.

Reference:

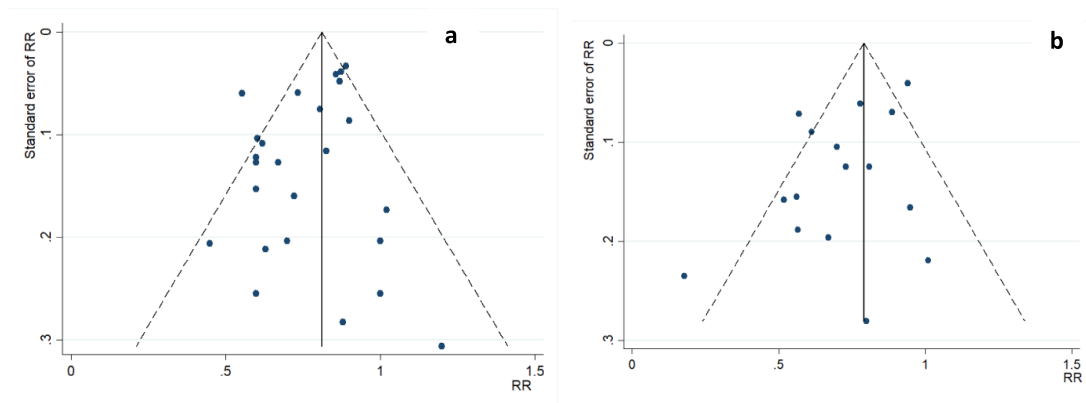
1. Wong, C. S., Chan, C. H., Cheung, W., Fung, D. H., Liang, M., & Huang, L. W., et al. Association between investigator-measured body-mass index and colorectal adenoma: a systematic review and meta-analysis of 168,201 subjects. *European Journal of Epidemiology*, 2018, 33, 15-26.
2. Okabayashi K, Ashrafian H, Hasegawa H, et al. Body mass index category as a risk factor for colorectal adenomas: a systematic review and meta-analysis. *The American journal of gastroenterology* 2012;107:1175.
3. Craig CL, Marshall AL, Sjostrom M, et al. International Physical Activity Questionnaire: 12-Country Reliability and Validity. *Medicine & Science in Sports & Exercise* 2003;35:1381-1395.



Appendix 3 The association between physical activity and any-type colorectal neoplasia according to gender (random effect)



Appendix 4 The association between physical activity and any-type colorectal neoplasia according to colorectal location (random effect)



Appendix 5 Funnel plots for selected studies with (a) colorectal neoplasia and (b) advanced colorectal neoplasia as outcomes