Revisione di letteratura su esiti di salute connessi a molestia olfattiva

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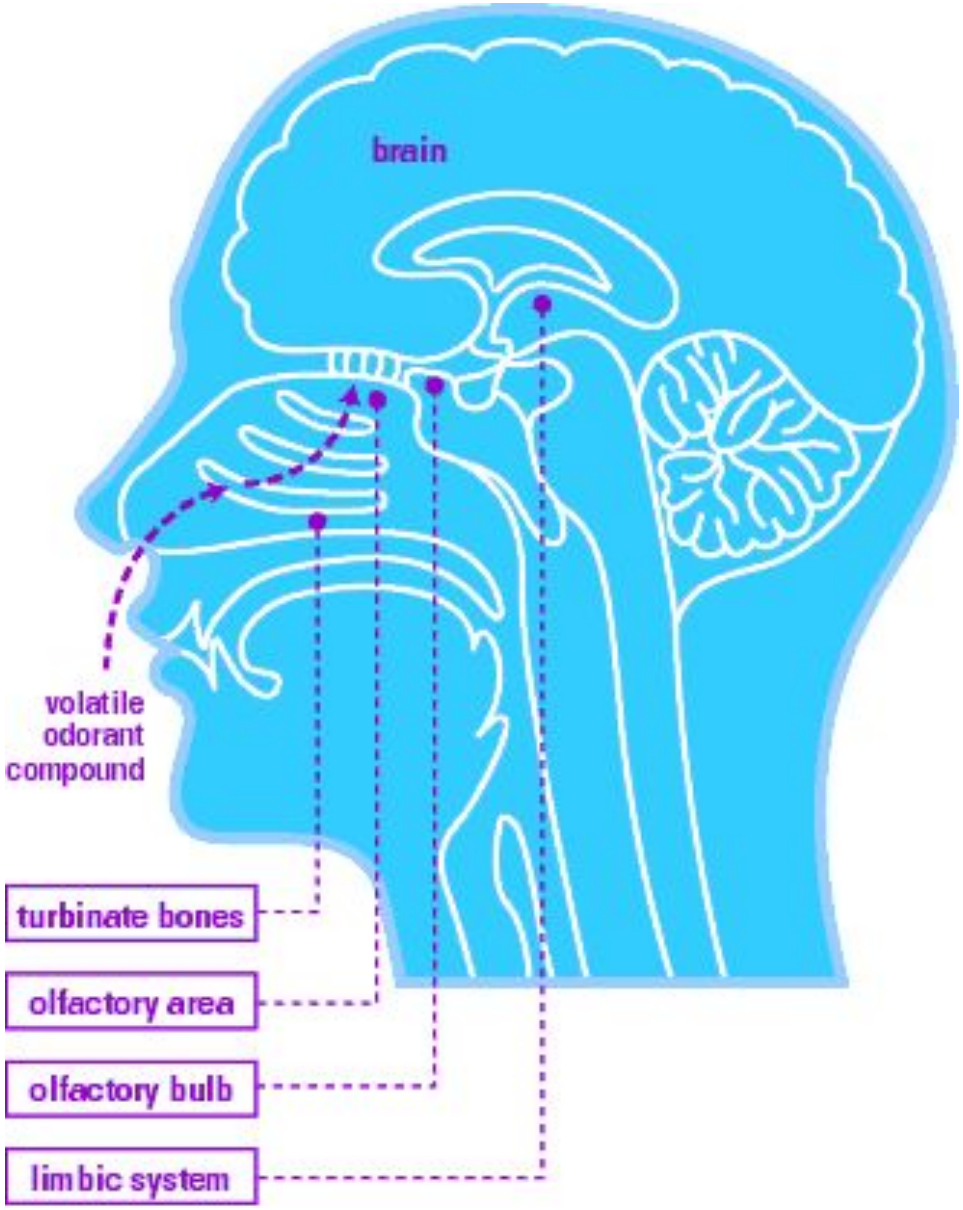

brain
volatile
odorant
compound
turbinate bones
olfactory area
olfactory bulb
limbic system

La molestia olfattiva è un problema di sanità pubblica?

ODORI

Stimulation of trigeminal nerve

Irritation and laryngeal stimulation

sintomi respiratori, mal di testa, irritazioni agli occhi

Emotional stressful response

Annoyance*

Sintomi psicologici, Sintomi gastrointestinali, nausea

Nonostante la quantità di ricerche condotte per valutare l'impatto degli odori sulle comunità, non è stato ancora definito un metodo standard per stimare la concentrazione degli odori e valutare gli effetti sulla salute

È stata condotta una revisione sistematica per sintetizzare tutte le evidenze disponibili da studi epidemiologici sull'associazione tra esposizione residenziale o professionale a breve e lungo termine all'inquinamento da odori da fonti industriali e lo stato di salute della popolazione esposta.

PROSPERO 2018 (registration number: CRD42018117449)

PECO

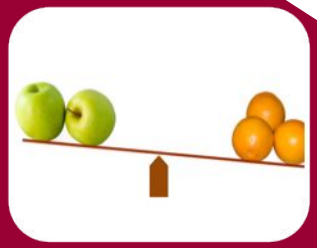
Population

People (any age) living near industrial sources or exposed to odour pollution in their workplace

The use of **PECO statements** in the SR process. **Systematic review** (SR) is a rigorous, protocol-driven approach designed to minimise error and bias when summarising the body of research evidence relevant to a specific scientific question.

Exposure

Any measure of exposure (odour perception, proximity..) related to an environmental odour from IS



Comparison group

Any alternative or studies without comparator

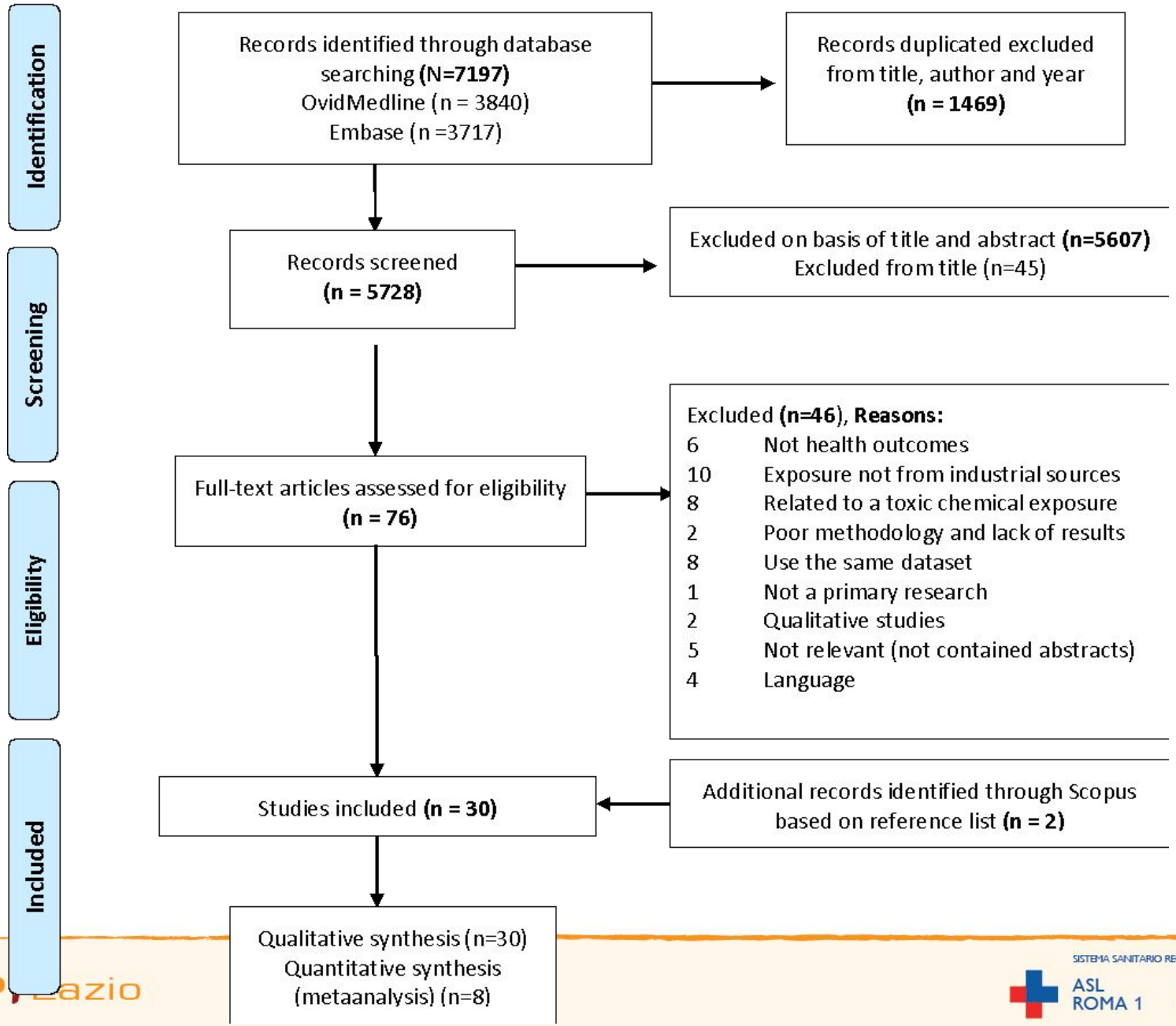
Outcomes

Primary reported outcomes: respiratory tract and gastrointestinal symptoms, mood states, membrane irritation

Secondary outcomes: cardiovascular problems, skin disorders, general ill feeling, access to healthcare.

RISULTATI

Ottobre 2018



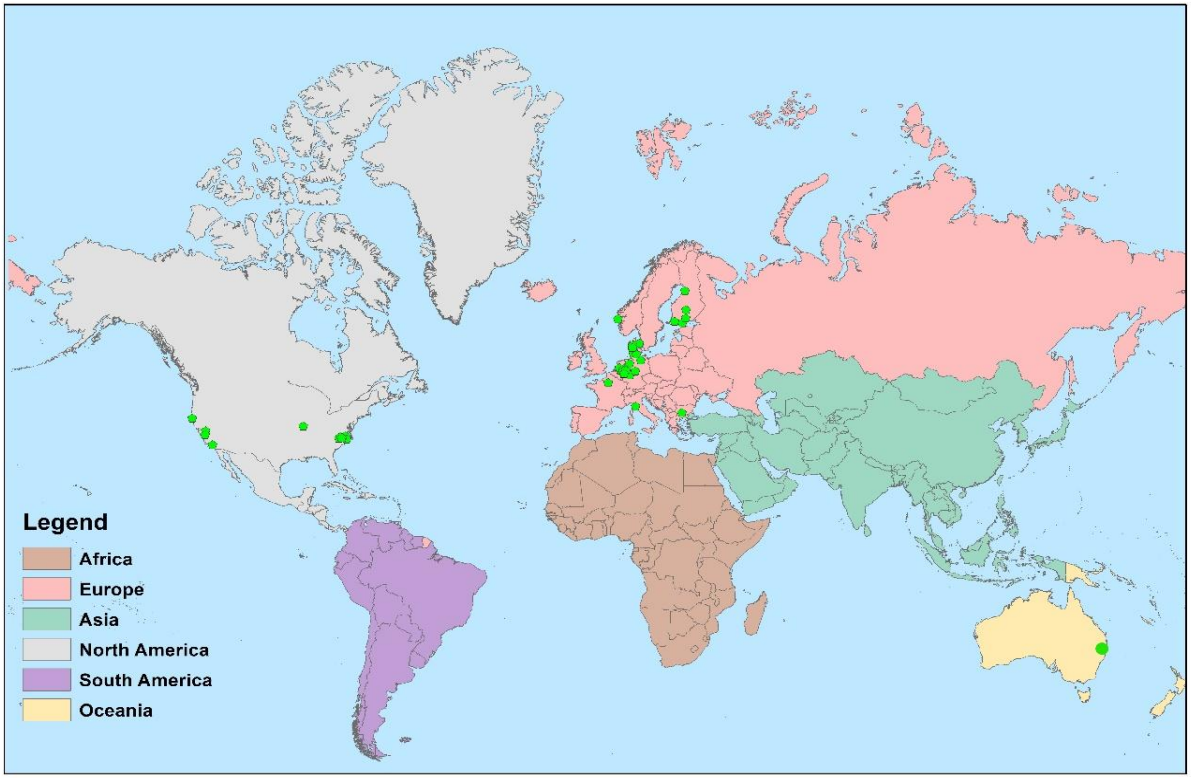
RISULTATI

12

10

2 impianti complessi

6 altro



RISULTATI

30 studi inclusi:
23 cross-sectional, 7 temporal changes (5 case-crossover, 2 panel)

sample sizes 15 - 58.169

- **Solo due studi occupazionali**

Adults

Only Mirabelli M., et al. involved a sample of school-age children (age range: 12-14 years).

Table 1. Summary of characteristics of studies included in the systematic review and meta-analysis.

Study, Country, Study design	Industrial source	Study population, age group	Exposure assessment	Outcome assessment	Statistical analysis	Adjustment for confounders
Kret 2018 **USA** **Cross-sectional**	Waste (landfill)	N=343 adults households within a 3.2-km radius (173 exposed; 170 non-exposed)	Distance (km)	Questionnaire: self-reported prevalence of diseases and 12 months symptoms; odour annoyance (5-point Likert scale) **Groups:** Odour nuisances Lower respiratory symptoms Upper respiratory symptoms Gastrointestinal symptoms Mucus irritation General ill feeling	**Model:** n.a **Effect estimated:** n.a Weighted prevalence (95%CI)	Analysis were stratified by landfill and comparison households
Hayes 2017 **Australia** **Cross-sectional**	Wastewater treatment Plant	N=153 residents within a 3-km radius on two exposed (with a history of high or low number of complaints) and one control sites	Questionnaire (presence/absence of bad smells and odours impacting community)	Questionnaire: Self-reported psychological symptoms; odour annoyance (10-point scale) **Groups:** Mood states	**Model:** Chi-square test, ANOVA **Effect estimated:** None	Social readjustment scale by Holmes and Rahe 1967(Holmes and Rahe 1967)
Tjalvin 2017 **Norway** **Panel**	**Chemical Industry (Chemical explosion in an Industrial harbour)**	**N=486 workers employed in 2008 (18% present during the explosion), in 2010 (n=379), 2012 (n=252)**	**Questionnaire: Low/high odour score (% of months each participant noticed the odour in 2008)**	**Questionnaire: Subjective Health Complaints Inventory (SHC) previous month; Impact of Event Scale-Revised (IES-R) previous 7 days** **Groups:** **General ill feeling**	**Model: Linear mixed effects models with random intercept and slope**	**Age, gender, smoking habits, educational level, absence/presence during the explosion (> 1 km or ≤ 1 km)**

RISULTATI

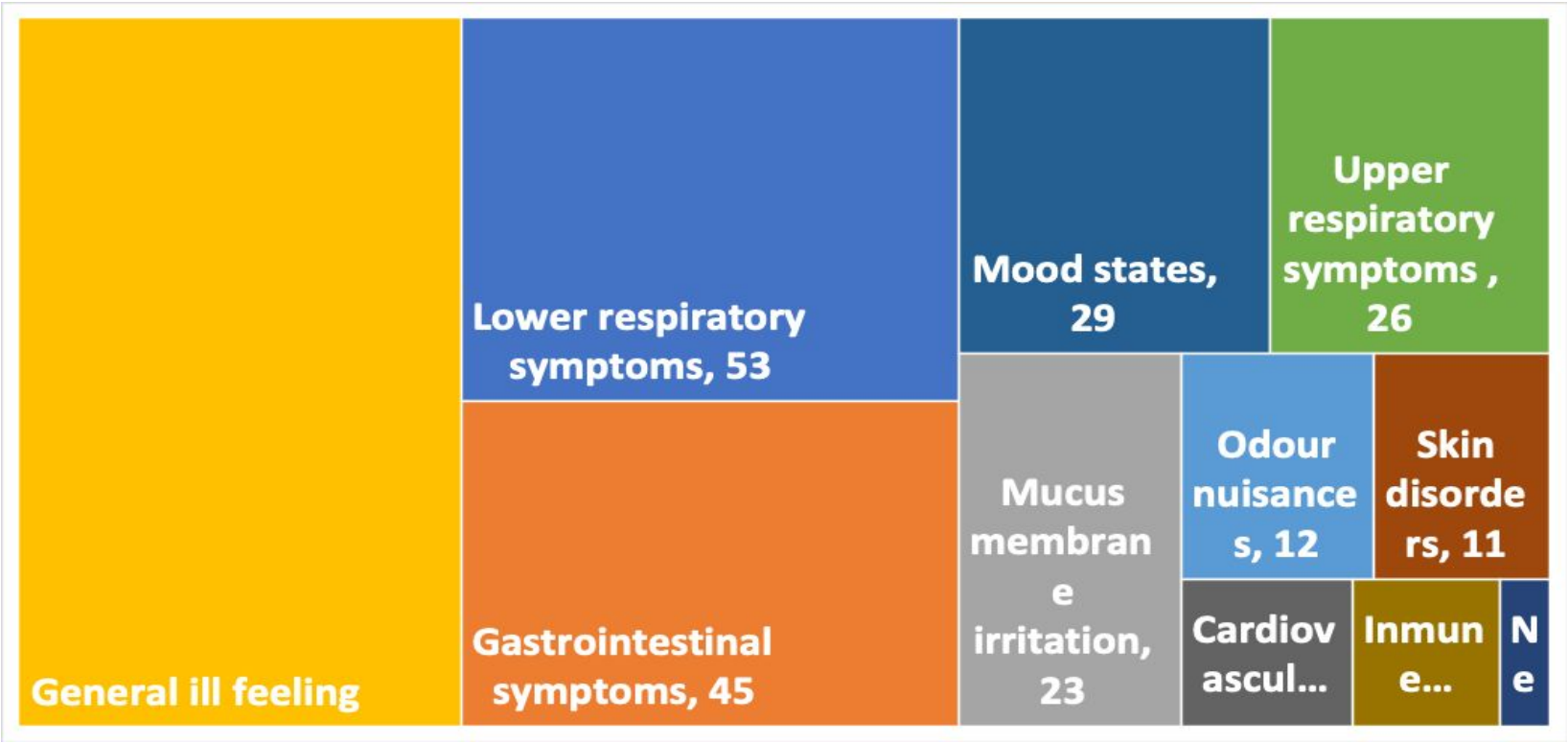
Approcci (oggettivo vs soggettivo)

Valutazione dell'esposizione: informazioni autoriportate, distanza dalla fonte, concentrazioni stimate da modello

Valutazione dell'esito: informazioni soggettive, esami di laboratorio, misure cliniche (eg, misura di IgE,spirometria, livelli pressori)

Controllo del confondimento*:* età , sesso, fumo, istruzione, Casecrossover (da disegno). Sette studi non fanno alcun aggiustamento

ESITI

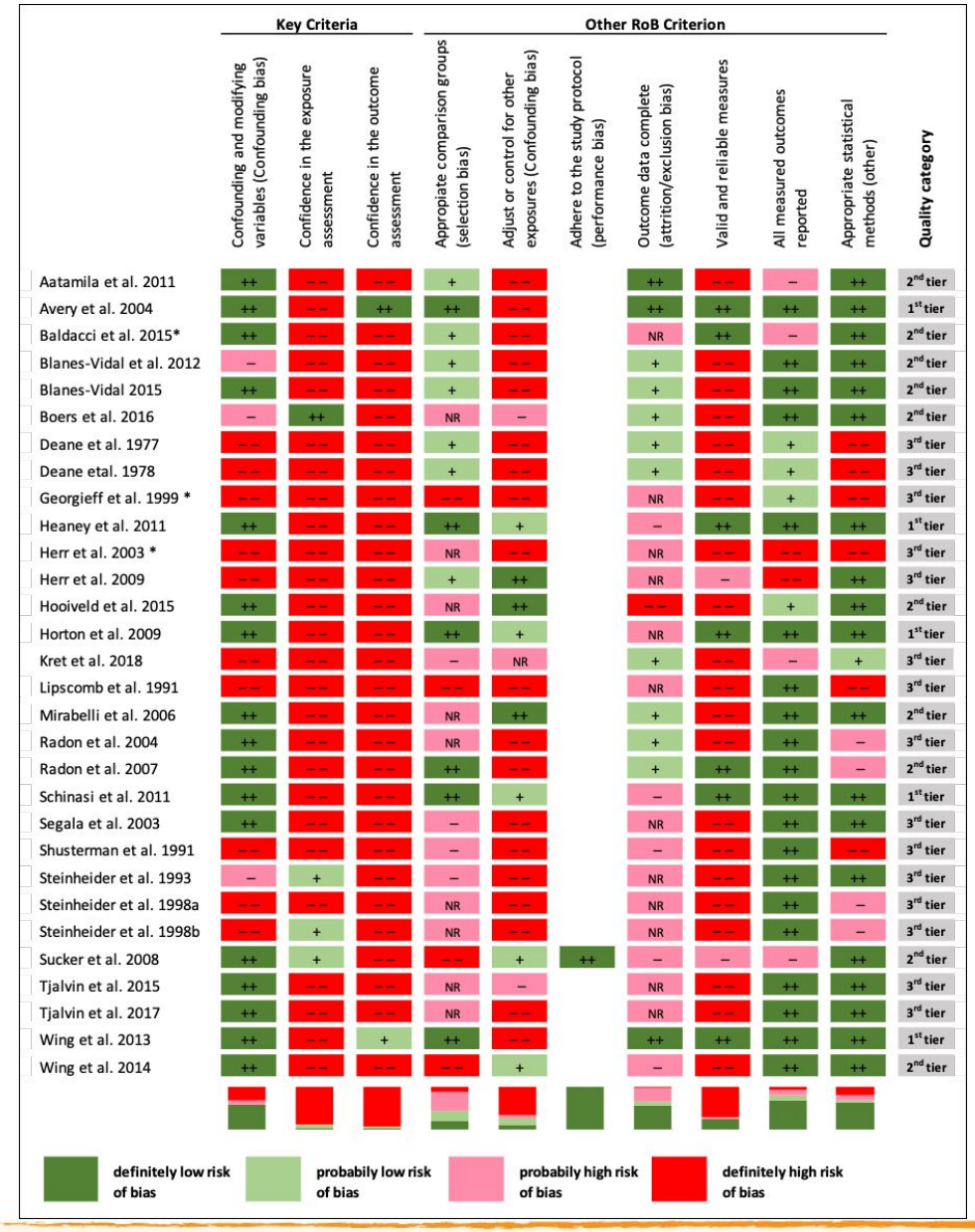


Esiti in studio: 96

Esiti principali: mal di testa, nausea/vomito, irritazioni oculari, tosse

Misure di Effetto (ORs, coefficiente B, PRs): 21 studi

Assessment of risk of bias



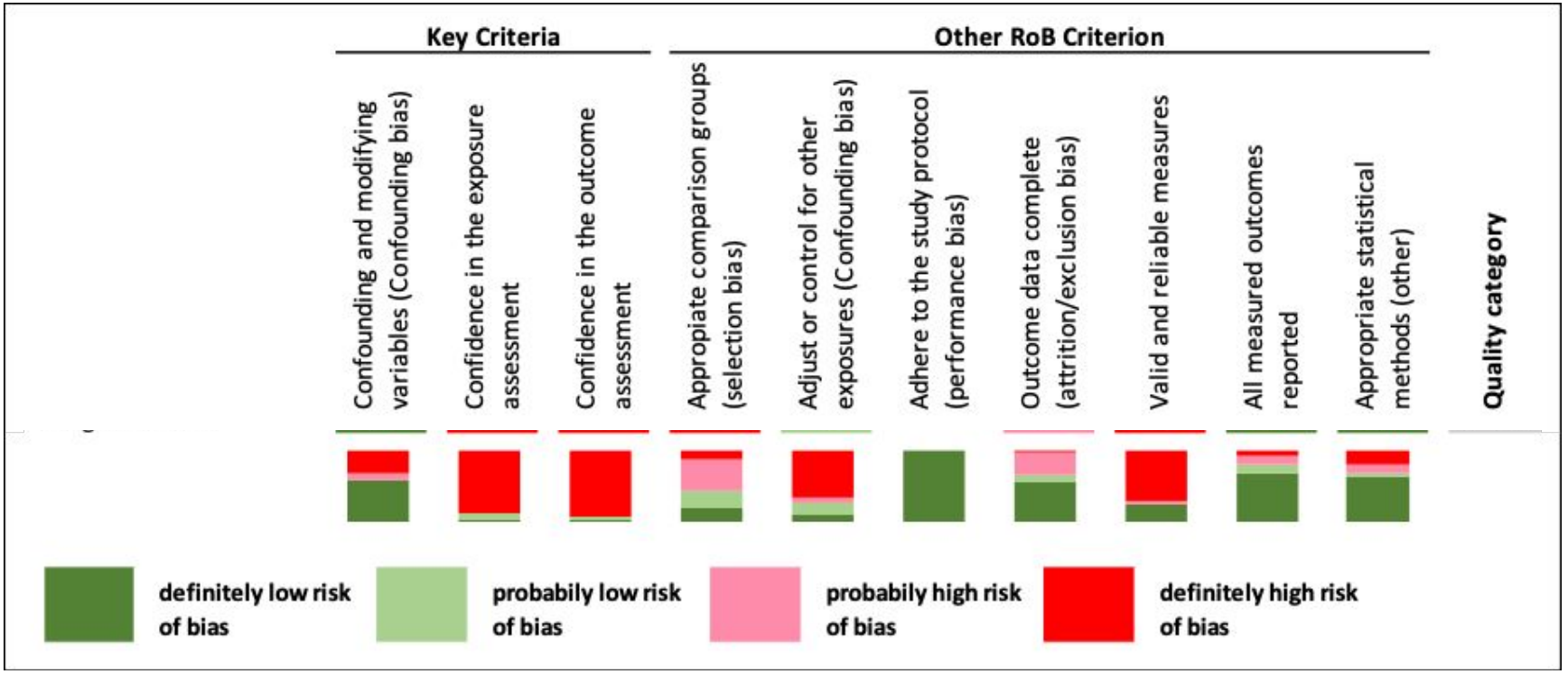
Exposure and outcome assessment: Self-reporting information of the exposure and outcome was frequently used. There was a high risk of bias due to measurement error and misclassification.

Confounding bias was rated based on the minimum list mentioned previously. Seven studies that did not account for any confounders were graded as "definitely high" risk of bias. ***The self-matching in case-crossover studies reduces the posibility of cofounding bias.***

Source: Rooney et al. 2014; NTP/OHAT 2019

Assessment of RoB

Source: Rooney et al. 2014; NTP/OHAT 2019



Exposure and outcome assessment: high risk of bias due to self-report information.

Confounding bias 7 studies that did not account for any confounders. Some study designs (e.g. case-crossover) prevented this bias.

ODORI E FASTIDIO

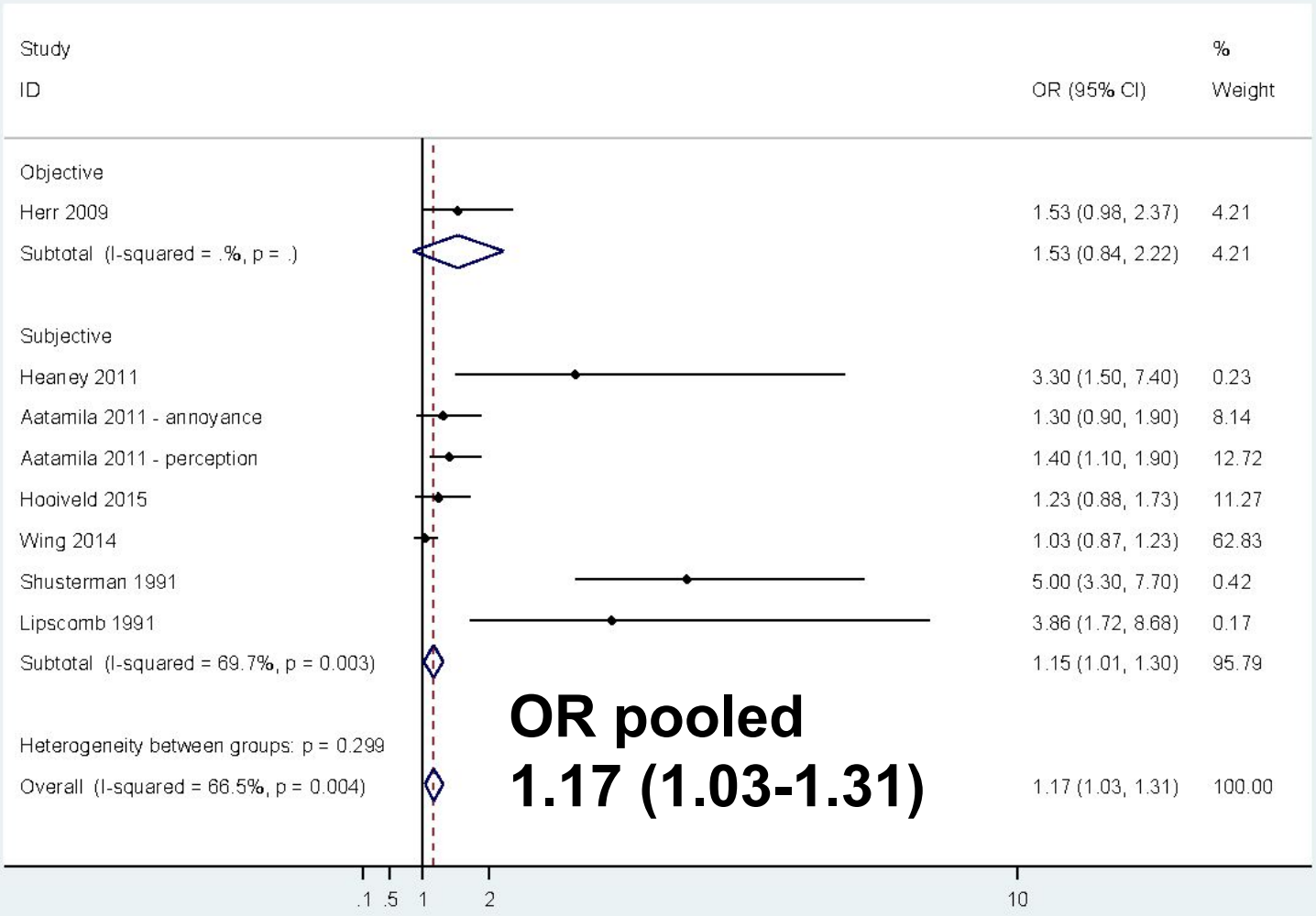
- Thirteen papers investigated odour nuisances in the population in relation to their proximity to industries, odour perception, odour frequency or intensity, and NH3 exposure.
- There were significant trends across exposure groups (high/low exposed and comparison) and environmental worry categories (χ^2 tests)

ODORI E FASTIDIO

- Participants exposed to NH3 concentrations of 2–3 μg/m^3 and >3 μg/m^3 were significantly more likely to report annoyance caused by odours compared to residents exposed to NH3 concentrations <2 μg/m^3 (OR = 2.50 for 2–3 μg/m^3; and OR= 4.17 for >3 μg/m^3). (Blanes-Vidal 2015).
- A significant dose–response association between odour (frequency, intensity) and percentage of residents annoyed (OR 1.6) and seriously annoyed (OR= 1.9) (Sucker, Both et al. 2008).

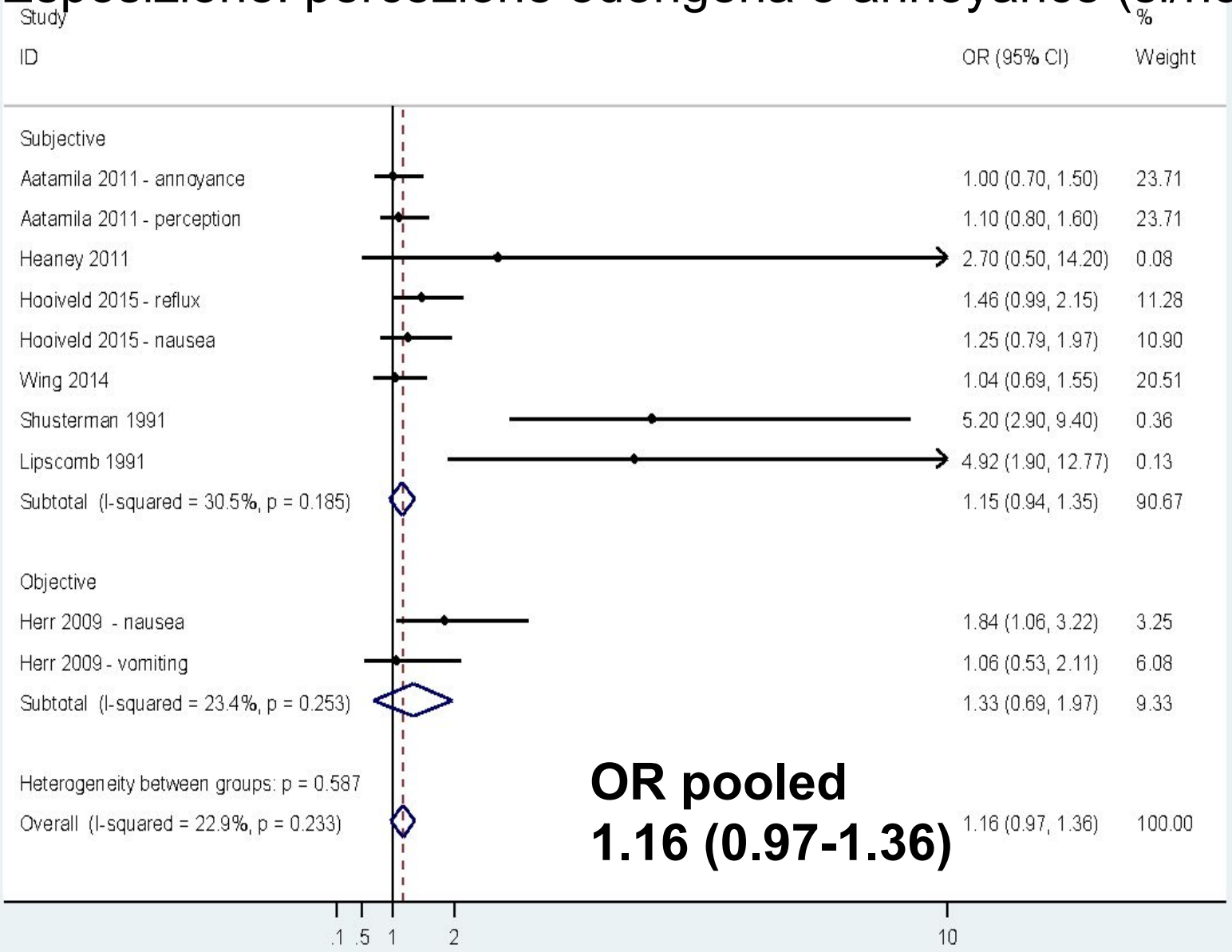
MAL DI TESTA

Esposizione: percezione odorigena o annoyance (si/no)



NAUSEA /VOMITO

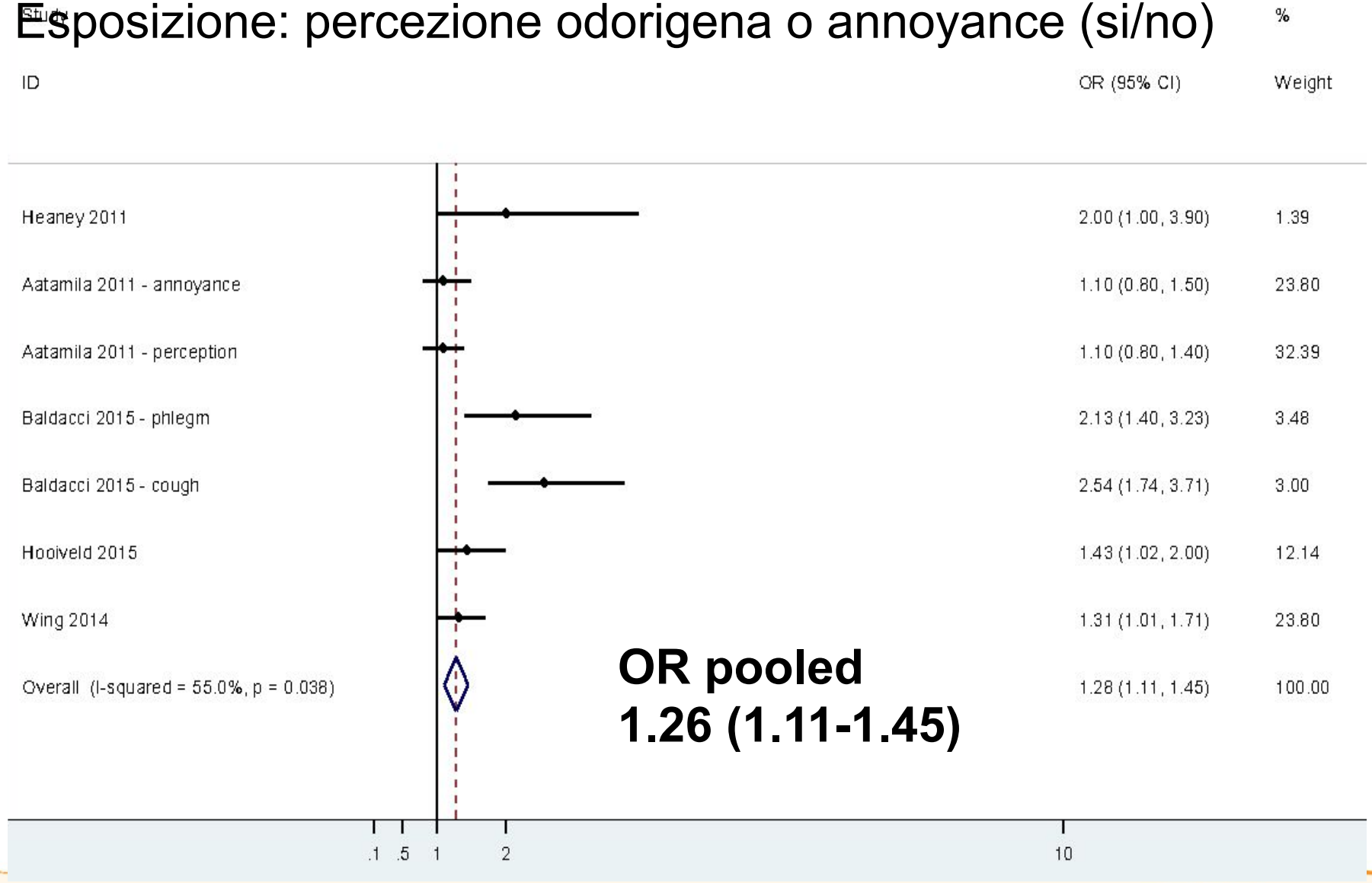
Esposizione: percezione odorigena o annoyance (si/no)



OR pooled
1.16 (0.97-1.36)

TOSSE

Esposizione: percezione odorigena o annoyance (si/no)



OR pooled
1.26 (1.11-1.45)

SINTESI NARRATIVA DEI RISULTATI

- malessere generale,
- sintomi gastrointestinali,
- sintomi respiratori inferiori e superiori,
- alterazioni dello stato dell'umore,
- problemi cardiovascolari,
- irritazione delle mucose,
- disturbi della pelle,
- alterazioni funzione immunitaria / allergia,
- annoyance.

PRESSIONE ARTERIOSA

Three studies compared the associations between cardiovascular disease symptoms (list which ones) and self-reported odour annoyance. Each unit of reported odour increase on an 8-point scale was associated with increases of OR=1.1; 95%CI:0.87-1.40 and OR=1.26; 95%CI:1.08-1,47 mmHg for SBP and DBP, respectively (Wing, Lowman et al. 2014).

Two studies used objective exposure, but results were inconsistent (Segala, Poizeau et al. 2003, Herr, Zur Nieden et al. 2009).

Alterazione dell'umore

Twelve studies considered malodour from industrial activities as an environmental stressor, affecting mood. Higher reported stress-related symptoms were observed in participants reporting odour annoyance (Lipscomb, Goldman et al. 1991, Horton, Wing et al. 2009, Heaney, Wing et al. 2011, Hooiveld, van Dijk et al. 2015). The mean of emotional wellness through SF-12 score (12-item Health Survey) decreased with increasing level of odour annoyance (Radon, Peters et al. 2004). Significant decreased of subjective distress through IES-R score, was observed during a 4-year follow-up to malodorous environmental pollution in the aftermath of the explosion (Tjalvin, Mageroy et al. 2017).

There was evidence of a relation between the level of odour annoyance and difficulty concentrating, e.g. residents that were moderately annoyed (OR_{adj} = 5.06; 95% CI: 1.63–15.7) (Blanes-Vidal 2015), but not in the study of *Heaney et al. 2011* (Heaney, Wing et al. 2011)

Considering studies with objectively measured exposure, high exposed residents were related to confusion (OR=2.78; 95% CI: 1.17-6.7)(Lipscomb, Goldman et al. 1991), while no significant effect in concentration was observed when increasing NH_3 concentration, used as a proxy of odour exposure (Blanes-Vidal 2015)

PROBLEMI PRINCIPALI

- **Esposizione:** **mancanza di metodo standardizzato pe definire l'esposizione della popolazione (modelli di dispersione vs distanza dalla fonte)**
- **Esiti: per lo più self reported (questionari – recall bias, response bias)**
- **Qualità delle evidenze:** **RoB**

CONCLUSIONE

- **Effetto degli odori su mal di testa, nausea e tosse**
- **L'impatto complessivo sulle comunità delle emissioni odorigene non è chiaro**
- **Sono necessari studi epidemiologici che includano anche sottogruppi più vulnerabili quali bambini, anziani, donne in gravidanza, persone con patologie pregresse**

Ringraziamenti

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