

# The impact of the urban exposome on the mental health of children and adolescents: An umbrella review

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## Background

**Mental health** is shaped from early life, with childhood and adolescence representing particularly sensitive developmental windows. Growing evidence links a broad range of **physical and social environmental exposures** to mental health outcomes, but the evidence remains fragmented. Therefore, a comprehensive synthesis of the evidence was needed.

(Kolb, 2025; Hodel, 2018; Sakhvidi, et al., 2023)

## Objective

This umbrella review aims to provide a holistic overview of how the urban physical and social environment (the **socioenvironmental exposome**) shapes child and adolescent mental health.

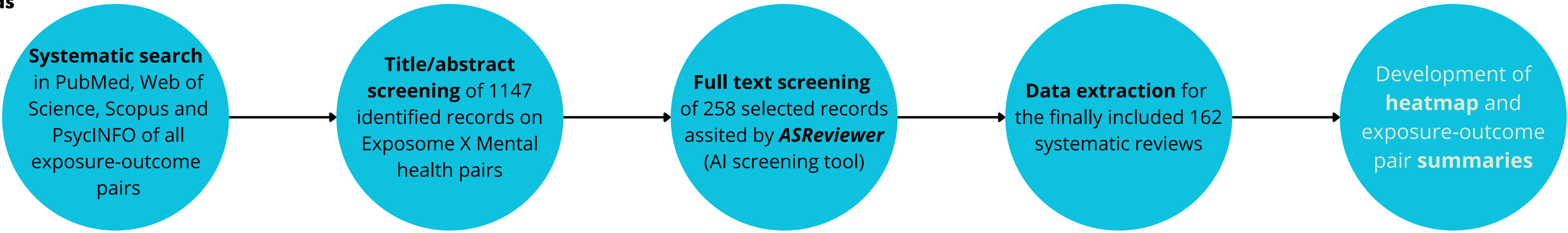
## Methods

- Expert consensus determined the list of relevant exposures and outcomes.
- 15 researchers from 8 institutions developed the list of keywords, and searches for the **“Exposome X Mental health”** 10 exposure and 15 outcome pairs (150 pairs).
- Eligibility criteria: school-aged children and adolescents; environmental and social exposures; any mental health outcome; published 2015-2025

**10 included exposure groups:** Air Pollution, Light Pollution, Noise Pollution, Temperature (Heat), Access To Green Spaces, Access To Blue Spaces, Built Environment, Neighbourhood Socioeconomic Position (SEP), Family SEP, and Immigration Status.

**15 included outcomes:** Anxiety Symptoms, Depressive Symptoms, Conduct Problems, Impulsive Behaviors, Emotion (Dys)Regulation, Hyperactivity Symptoms, Attentional Problems, Prosocial Behavior, Loneliness & Social Isolation, Self-Esteem, Self-Image & Body Image, Disordered Eating, Perceived General Mental Health / Subjective Mental Wellbeing, Life Satisfaction, and Stress.

## Methods



## Results

**Depressive and anxiety symptoms** were the most **frequently** studied (36 and 32, respectively) in relation to the exposome. Furthermore, **stress (perceived stress and distress)** was the most **widely** studied outcome across 6 of 10 exposure groups. **Family SEP** was the exposure most **frequently** reviewed (71) and studied across the **most outcomes** (9/15). This was followed by **access to green spaces** in number of reviews (57) and by **immigration status** in most outcomes (7/15).

Heatmap of number of reviews identified for each Exposome X Mental health pairs

|                                                                           | Depressive Symptoms | Anxiety Symptoms | Stress (Inc. Perceived Stress And Distress) | Perceived General Mental Health / Subjective Mental Wellbeing | Conduct Problems (e.g., Aggression, Bullying Others, Antisocial, Oppositional, Deliant) | Life Satisfaction | Hyperactivity Symptoms | Impulsive Behaviors | Self-Esteem | Emotion (Dys)Regulation (e.g., Irritability) | Attentional Problems | Loneliness & Social Isolation | Self-Image And Body Image |     |
|---------------------------------------------------------------------------|---------------------|------------------|---------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|------------------------|---------------------|-------------|----------------------------------------------|----------------------|-------------------------------|---------------------------|-----|
| Family SEP (e.g., Family Income, Parental Education)                      | 16                  | 14               | 8                                           | 4                                                             | 15                                                                                      |                   | 6                      | 5                   | 1           | 2                                            |                      |                               |                           | 71  |
| Access To Green Spaces                                                    | 10                  | 11               | 10                                          | 15                                                            |                                                                                         | 11                |                        |                     |             |                                              |                      |                               |                           | 57  |
| Immigration Status                                                        | 10                  | 7                | 3                                           | 2                                                             |                                                                                         |                   |                        |                     | 1           |                                              | 1                    |                               | 1                         | 25  |
| Built Environment (e.g., Opportunities for physical activity, Urbanicity) |                     |                  | 2                                           |                                                               |                                                                                         | 1                 |                        |                     | 1           |                                              |                      | 1                             |                           | 5   |
| Neighbourhood SEP (Including Neighbourhood Safety, crime rates)           |                     |                  |                                             |                                                               |                                                                                         | 1                 |                        |                     | 1           |                                              |                      |                               |                           | 2   |
| Noise Pollution                                                           |                     |                  | 1                                           |                                                               |                                                                                         |                   |                        |                     |             |                                              |                      |                               |                           | 1   |
| Temperature (Heat)                                                        |                     |                  | 1                                           |                                                               |                                                                                         |                   |                        |                     |             |                                              |                      |                               |                           | 1   |
|                                                                           | 36                  | 32               | 25                                          | 21                                                            | 15                                                                                      | 13                | 6                      | 5                   | 4           | 2                                            | 1                    | 1                             | 1                         | 162 |

The exposures *Air Pollution*, *Access To Blue Spaces*, and *Light Pollution*, and the outcomes *Prosocial Behavior*, and *Disordered Eating*, hadn't been synthesized in any review at the time.

## Summaries for the Exposome X Mental health pairs

**↓ Family SEP →**

↑ \* Depression & anxiety<sup>1,2,5</sup>  
↑ \* Conduct problems<sup>11,12,5</sup> [Especially in adolescents]  
↑ ↑ \* ADHD symptomatology<sup>4,5,14,15</sup>  
↑ ↑ \* Emotional regulation (ER)<sup>15</sup> [↑ ↑ ↑ \* in adolescence]  
↑ Stress (Distress)  
[mediated by other family factors<sup>4,7,8,9,10</sup> and moderated by ethnicity<sup>4</sup>]  
↓ Mental health and wellbeing<sup>3,6,13</sup> [influenced by ethnicity]

**Family SEP** indicators ranged from *parental education or employment*, to *food insecurity, poverty or financial stress*. Relationship strength varied depending on the specific measure of family status (especially, parental education), on developmental age (mostly younger children, except for ER, adolescents more), and weakly on gender.

**↑ Access to green spaces →**

↓ ↓ ↓ \* Depressive and anxiety symptoms<sup>16,17,26,27</sup> [particularly in lower-income areas<sup>19,20,21,23</sup>]  
High heterogeneity in assesment and study quality<sup>18,19,20,21</sup>, and showed mixed effects (e.g. residential greenness metric like NDVI)<sup>22,24</sup>.  
↑ \* Wellbeing<sup>17,20,21,23,25,28,29</sup>, Perceived mental health<sup>37</sup>, Life satisfaction<sup>26,27</sup> [often ↑ ↑ in children and disadvantaged groups<sup>23</sup>]  
↓ \* Stress (Distress)<sup>26,30</sup> [stronger for adolescents<sup>21,23,24,27,31,32</sup>]

**Immigrant youth → (Europe)**

Mixed and context-dependent evidence for internalizing symptoms (depressive and anxiety): ↓ \*<sup>33,41</sup> and ↑<sup>37,38,39,40,42</sup>  
[↑ especially in, *unaccompanied refugee minors*<sup>34</sup>, *children in immigration detention*<sup>35</sup>, *children left behind by migrant parents*<sup>36</sup>, and ↑ ↑ \* in Western Europe<sup>33,43</sup>]  
↑ Risk for mental disorders<sup>42</sup>

Other **immigration related risk factors**, like *first-generation immigrants*<sup>39</sup>, or *accumulated stress*, together with age and sex, moderated the associations.

\* significant association by meta-analysis  
↑, ↑ ↑, ↑ ↑ ↑ size of the effect

## Strongest evidence concentrated on green spaces

2 **umbrella reviews** were found in the whole Exposome X Mental health review of reviews, both of them on green spaces<sup>27,37</sup>, which focused on the general population rather than children and adolescents. These found robust evidence for reduced *depressive symptoms*, reduced *perceived stress*, and improved *wellbeing* of the children and adolescents.

## Evidence gaps for specific exposure-outcome pairs

- For several exposure–outcome pairs, evidence was insufficient or absent to draw conclusions. For example, associations for *Self-esteem*, *Attentional problems*, or *Body image* remain largely limited and insufficient to make a judgment.
- Evidence for other urban environmental exposures, including *Built environment* characteristics, *Noise*, and *Temperature*, was generally insufficient. Existing studies focused more on climate-related events, limiting conclusions about their effects on mental health.

## References

References from the background and the records on this umbrella review can be found in the electronic version of this poster, please visit the QR code.  
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