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Neighborhood Walkability and Cardiovascular Risk: A Systematic Review

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BACKGROUND

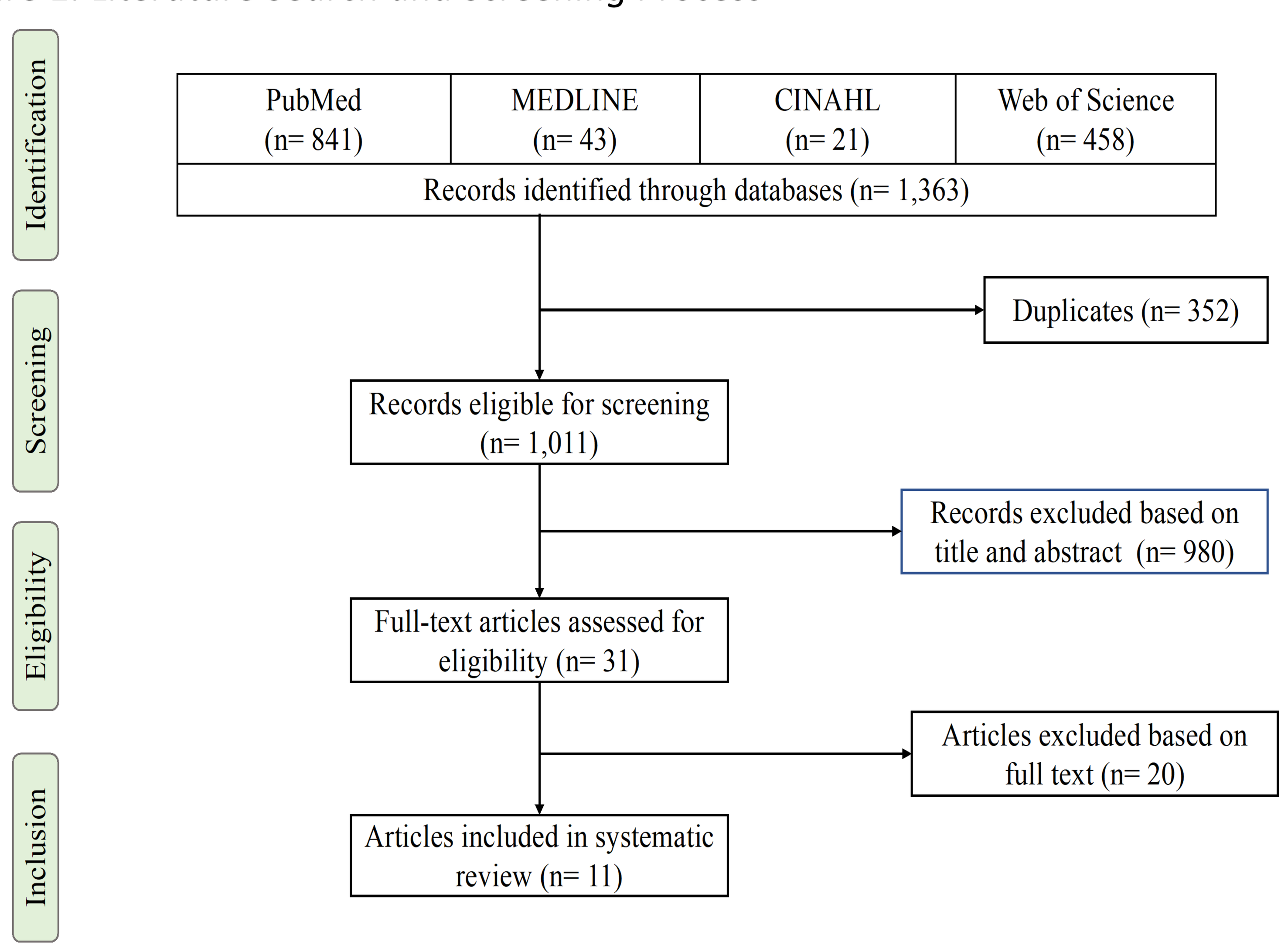
- Cardiovascular disease (CVD) is the leading cause of global mortality and was responsible for about 17.8 million deaths worldwide in 2017, corresponding to 330 million years of life lost and 35.6 million years of life lived with disability.[1]
- Neighborhood walkability, or the extent to which the built environment is accessible for utilitarian and leisure-time walking, is measured by using spatial and computational models to aggregate local features like street connectivity, land use mix, and residential density into a walkability index.[4]
- There is consistent evidence that higher neighborhood walkability scores are associated with higher levels of physical activity and that physical inactivity can independently increase one's risk of developing CVD. [3,5]

OBJECTIVE

To systematically review the current body of evidence assessing the relationship between neighborhood walkability and risk of cardiovascular disease in adults, as well as evaluate the strength of the evidence based on the methodological quality of the included studies.

METHODOLOGY

Figure 1. Literature Search and Screening Process



Rating the Quality and Strength of Evidence

The quality and strength of the evidence was determined using methodology outlined by the Navigation Guide.[2] The risk of bias was evaluated for each included study and incorporated into the quality of evidence decision, which was based on numerical scores given to several downgrading and upgrading adjustment factors. Finally, the strength of the evidence across all included studies was evaluated based on Navigation Guide criteria to determine whether the evidence was sufficient to support a relationship between the exposure and the outcome.

RESULTS

Figure 2. Risk of Bias Judgments for the Included Studies

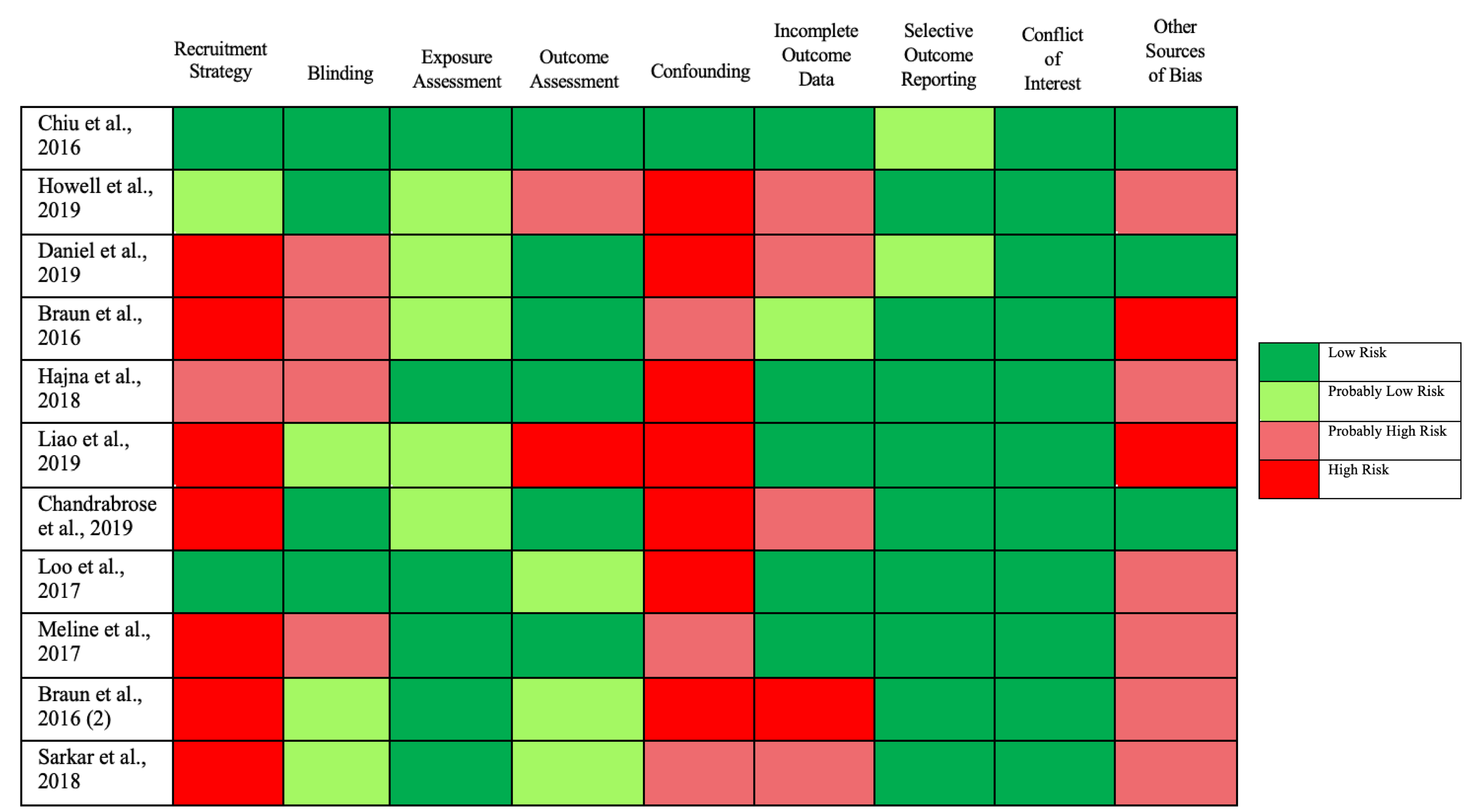


Figure 3: Analysis of the Quality and Strength of Evidence

Quality Factor	Rating	Justification
Downgrade		
Risk of bias across studies	-1	Evidence of substantial risk of bias, particularly in the failure to address outstanding confounders and selection biases.
Indirectness	0	All studies assessed the population, exposure, and outcome of interest.
Inconsistency	-1	4 of the 11 included studies found no significant relationship, while the remaining 7 demonstrated negative associations.
Imprecision	0	Studies with effect estimates incorporating CIs were sufficiently narrow.
Publication bias	0	No publication bias expected.
Upgrade		
Large magnitude of effect	0	Most of the studies were found to have a high risk of confounding bias, reducing the magnitude of the effect. Unlikely to explain the entire effect.
Dose response	0	The relationship between the dose and the response was not consistent across all studies.
Confounding minimizes effect	1	Confounders: self-selection into walkable neighborhoods based on propensity to use active transportation, health-seeking behaviors such as dietary choices, physical activity levels, and primary health care utilization.
Overall Quality of Evidence		**Low**
Strength Considerations		
Quality of body of evidence		Low
Direction of effect estimate		Negative association for 6 of the 11 studies, with only one large effect estimate. One study demonstrated a positive association, but with a small effect estimate.
Confidence in effect estimate		Likely that the effect estimate of a new study of higher quality and better assessment of potential confounding would present conflicting evidence to the current body of literature.
Other compelling attributes that may influence certainty		Evidence provided by previous systematic reviews support the negative association between neighborhood walkability and CVD risk. Cross-sectional nature of most studies reduces assessment of temporality.
Overall Strength of Evidence		**Insufficient**

CONCLUSIONS

The body of evidence included in this review was determined to be "insufficient" in conclusively supporting a negative association between neighborhood walkability and risk of CVD.

Limitations/Knowledge Gaps:

- Over half of the included studies were cross-sectional, so they could not support causal inferences between neighborhood walkability and CVD.
- The lack of standardized walkability measures that can be used across different data systems and settings
- Variation in the assessment of cardiovascular risk outcomes
- Unaddressed confounders: self-selection into walkable neighborhoods and health-seeking behaviors

This review compellingly accentuates the need for the development of longitudinal studies that use the limitations of this evidence as a guide to more accurately define the complex relationship between neighborhood walkability and risk of CVD.

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