



Skills for science: incorporating evidence into your writing

An essential part of your science degree is learning how to find, read and incorporate scientific evidence into your writing. In the sciences, **paraphrasing is the default method of integrating evidence into your writing; quoting is almost never used**. This is because the exact words another scientist has chosen is not the primary unit of analysis. Rather, their data, and any interpretation of that data, is what we are most interested in.

Remember: It is expected that you will incorporate scientific findings published in academic journals. You can access these journal articles through OneSearch, Google Scholar, Web of Science, and other discipline-specific databases. The UWA Library has a range of resources on how best to [find and evaluate information](#).

Paraphrasing in the sciences: how to do it

For most forms of scientific writing, it is expected that you will find a range of recent, relevant journal articles to support your claims. These sources may serve different purposes within your assignment, and therefore call for different forms of paraphrasing, but in general you will need to organise your writing to show:

- trends or patterns across multiple studies
- how different studies relate to each other
- contrasting findings from different studies
- what has been well-established in an area of investigation
- what is under-researched.

Below are 3 examples of how you might integrate sources into your writing, each with slightly different purposes.

Example 1: Introducing a body of literature

Sleep is an essential biological process and has long been recognised as a crucial determinant of physical and mental health (1). Well-controlled sleep studies have shown that short-term sleep deprivation leads to a number of adverse effects such as changes in glucose metabolism (2), heightened stress reactivity (3), and impaired cognition (4). Similarly, chronic sleep deprivation has been implicated in the development of cardiovascular and metabolic disease (5,6), in addition to an elevated lifetime risk of all-cause mortality (7).

You might notice the use of several references in this paragraph. This is typical for an opening paragraph to a piece of scientific writing, because it usually needs to cover a lot of ground to show what has been well-established in the area.

Sometimes it's hard to know which sources to cite. There may be hundreds of studies demonstrating the association between sleep deprivation and cardiovascular disease, for example, but you would likely pick one or two indicative studies (even better if it is a recent review or meta-analysis) to generalise about what is known.

References

1. Ramar K, Malhotra RK, Carden KA, Martin JL, Abbasi-Feinberg F, Aurora RN, et al. Sleep is essential to health: An American Academy of Sleep Medicine position statement. *J Clin Sleep Med*. 2021;17(10): 2115-9.
2. Spiegel K, Tasali E, Leproult R, Van Cauter E. Effects of poor and short sleep on glucose metabolism and obesity risk. *Nat Rev Endocrinol*. 2009;5(5): 253-61.
3. Liu JCJ, Verhulst S, Massar SAA, Chee MWL. Sleep deprived and sweating it out: The effects of total sleep deprivation on skin conductance reactivity to psychosocial stress. *Sleep*. 2015;38(1): 155-9.
4. Khan MA, Al-Jahdali H. The consequences of sleep deprivation on cognitive performance. *Neurosciences (Riyadh)*. 2023;28(2): 91-9.
5. Tobaldini E, Costantino G, Solbiati M, Cogliati C, Kara T, Nobili L, et al. Sleep, sleep deprivation, autonomic nervous system and cardiovascular diseases. *Neurosci and Biobehav Rev*. 2017;74(B): 321-9.

6. Pan Y, Zhou Y, Shi X, He S, Lai W. The association between sleep deprivation and the risk of cardiovascular diseases: A systematic meta-analysis. *Biomed Rep.* 2023;19(5).
7. Liew SC, Aung T. Sleep deprivation and its association with diseases - a review. *Sleep Med.* 2021;77: 192-204.

Example 2: Describing a gap in the literature

A recent study conducted by Bowers and colleagues (2020) demonstrated that repeated sleep disturbance alters gut microbiota composition in rodents. However, no research thus far has examined whether this effect extends to humans.

In this example, only one study is cited to show what has been established in past research in order to justify why new research is warranted.

References

Bowers, S. J., Vargas, F., González, A., He, S., Jiang, P., Dorrestein, P. C., ... & Turek, F. W. (2020). Repeated sleep disruption in mice leads to persistent shifts in the fecal microbiome and metabolome. *PloS one*, 15(2), e0229001. <https://doi.org/10.1371/journal.pone.0229001>

Example 3: Showing a contradiction in the literature

The gut microbiota is increasingly recognised to play a role in the link between sleep disturbance and adverse health outcomes (1). Indeed, some recent studies have demonstrated that sleep deprivation alters gut microbiota composition in rodents (2,3). However, other studies have found that gut microbiota remains unchanged following acute periods of sleep deprivation (e.g. 4).

References

1. Yang DF, Huang WC, Wu CW, Huang CY, Yang YCSH, Tung YT. Acute sleep deprivation exacerbates systemic inflammation and psychiatry disorders through gut microbiota dysbiosis and disruption of circadian rhythms. *Microbiol Res.* 2023;268.
2. Zhang M, Zhang M, Kou G, Li Y. The relationship between gut microbiota and inflammatory response, learning and memory in mice by sleep deprivation. *Front Cell Infect Microbiol.* 2023;13.
3. El Aidy S, Bolsius YG, Raven F, Havekes R. A brief period of sleep deprivation leads to subtle changes in mouse gut microbiota. *J Sleep Res.* 2020;29(6):e12920.
4. Zhang SL, Bai L, Goel N, Bailey A, Jang CJ, Bushman FD, et al. Human and rat gut microbiome composition is maintained following sleep restriction. *Proc Natl Acad Sci U S A.* 2017;114(8): E1564-E1571.

Integrating evidence: a phrase bank

The more you read in your field of study, the more you will notice similar phrases used by researchers to guide their readers through the state of evidence in a given area. You can use these in your writing too. Look at the examples below for ideas.

Well-established findings

- *There is a wealth of research to suggest that...*
- *Much research has focused on...*
- *A robust body of research now shows...*
- *One of the most consistent effects appears to be...*
- *It is generally agreed that...*

Newer and/or more tentative findings

- *Research on the link between [x and y] is still in its infancy.*
- *Several studies have provided preliminary evidence for...*
- *It appears that...*
- *These studies suggest the possibility of...*
- *More recently, it has been proposed that...*

Inconsistencies in the literature

- *More recently, a direct link between [x and y] has been established, which calls into question...*
- *Recent studies have cast doubt on...*
- *However, this literature has yielded inconsistent findings.*
- *However, several recent studies failed to find this effect.*

Referring to the study design when describing research

- *Epidemiological and laboratory studies have consistently demonstrated that...*
- *Several cross-sectional studies have also shown...*
- *Well-controlled studies have shown that...*
- *Longitudinal studies have demonstrated a link between [x and y].*

Establishing a research gap

- *While much research has examined the relationship between [x and y], no study thus far has examined...*
- *Despite an increased interest in [x], little attention has been given to [y].*

In sum

The primary mode of integrating sources in the sciences is by paraphrasing; quoting is almost never used.

You should organise your writing so it is clear to your reader how you want them to think about a particular piece of evidence, or body of evidence. This means you will summarise, synthesise, comment on, and analyse the evidence you cite.

Referencing guidance

For information about how to reference sources, visit [an introduction to referencing at UWA](#).