Transparency and fairness are crucial components in scientific pursuits, particularly in the context of artificial intelligence (AI) and machine learning (ML). **Transparency** ensures that the workings of AI systems are comprehensible to humans, providing explanations for decision-making processes and clarifying the data used for system training. This principle is essential for maintaining fairness, as it

helps identify biases and ensures that systems operate impartially, treating all stakeholders equally without favoring any party.

Factors Motivating Transparency and Fairness

- **Fairness and Accountability:** Transparency is critical for ensuring fairness and
  accountability in AI systems. It helps uncover decision-making processes, identify biases, and hold systems accountable for failures.

- **Ethical Principles:** Transparency intersects with ethical principles such as autonomy, which demands that systems protect individual independence, treat users respectfully, and secure informed consent.

- **Open Science Movement:** The open science movement emphasizes transparency, openness, and reproducibility as mechanisms to align scientific practice with scientific ideals, accelerate scientific discovery, and broaden access to scientific knowledge.

Challenges and Approaches

- **Balancing Transparency and Privacy:** Ensuring transparency while protecting individual privacy is a significant challenge. For instance, in the analysis of mental health data, the
  difficulty lies in the application of these data rather than pinpointing user-specific attributes.

- **Metrics for Assessing Transparency:** Metrics such as **equal opportunity** and **equalized odds** are used to evaluate the fairness of AI and ML models.

- **Computational Methods and Approaches:** Strategies for achieving fairness include data preprocessing, postprocessing, adversarial training, and decision tree use. Algorithmic
  transparency can be enhanced through feature importance analysis, interpretability techniques for models, and the generation of explanations.

- **Ethical Considerations:** Ethical considerations include ensuring that AI systems do not manifest any unexpected discriminatory practices and that fairness is promoted through various approaches and techniques.

Transparency and Fairness in scientific pursuits:

> There is growing interest among prevention scientists in the potential for transparency, openness, and reproducibility to facilitate this mission by providing opportunities to align scientific practice with scientific ideals, accelerate scientific discovery, and broaden access to scientific knowledge.

> The overarching goal of this manuscript is to serve as a primer introducing and providing an overview of open science for prevention researchers.

> In this, we discuss factors motivating interest in transparency and reproducibility, research practices associated with open science, and stakeholders engaged in and impacted by open science reform efforts.

> In addition, we discuss how and why different types of prevention research could incorporate open science practices, as well as ways that prevention science tools and methods could be leveraged to advance the wider open science movement.

> To promote further discussion, we conclude with potential reservations and challenges for the field of prevention science to address as it transitions to greater transparency, openness, and reproducibility.

> Throughout, we identify activities that aim to strengthen the reliability and efficiency of prevention science, facilitate access to its products and outputs, and promote collaborative

and inclusive participation in research activities.

➢ By embracing principles of transparency, openness, and reproducibility, prevention science can better achieve its mission to advance evidence-based solutions to promote individual and collective well-being.

Transparency and fairness are essential components in scientific pursuits, particularly in AI and ML. Ensuring transparency helps identify biases, maintain accountability, and uphold ethical principles.The open science movement emphasizes transparency, openness, and reproducibility to accelerate scientific discovery ad broaden access to scientific knowledge.