

In July of 2020, researchers from the University of Arizona's scoping review was published in the [Journal of Applied Microbiology](#).

Who were the researchers?

The researchers work at the [Zuckerman College of Public Health at the University of Arizona](#). Kelly A. Reynolds, PhD, Jonathan D. Sexton, PhD, Ashton Norman, D. Jean McClelland, MLS

Name of their study / scoping review:

An Overview of Hygienic Properties of Hand Dryer versus Paper Towel Use: State of the Science

What is a scoping review?:

A scoping review is a type of research that seeks to examine and clarify broad areas to identify gaps in the evidence, clarify key concepts, and report on the types of evidence that address and inform practice in a topic area. In other words, if a number of studies exist on a particular topic, and those results are varied or conflicting, a scoping review can help simplify something otherwise complex.

In the instance of hand dryers vs paper towels, the University of Arizona's scoping review helped to identify which hand drying studies are credible and should be consulted for their results and recommendations.

What did they study?

The researchers studied available and previously published scientific studies and grey literature including social media posts and news stories to answer the following questions:

- Are hand dryers more hygienic than paper towels?
- Are paper towels safer than hand dryers relative to human infection risks?

What did their findings uncover?

- Hand dryers and paper towels were both found to be suitable hand drying solutions.
- Data in available research studies does not support one hand drying method over another from a health or safety perspective.
- Importance of completely drying hands was universal.
- The majority of the studies were sponsored by industries with potentially biased interests. Five studies favoring paper towels were funded by The European Tissue Symposium, a trade association that represents the majority of tissue paper producers throughout Europe. Additionally, 4 of these 5 studies were conducted by the same research collaborators.
- Few were conducted using real-world scenarios.
- Many studies lacked scientific rigor, meaning their findings weren't based on scientific findings so much as generalizations or personal feelings.
- Grey literature including social media posts and news stories were often found to be one-sided and written in a manner to either sensationalize—illicit fear—or both. The researchers found that they do not tell the whole story or share the whole truth, and are not credible.
- A common observation in the researcher's analysis is that most of studies, regardless of conclusion, lacked sufficient scientific rigor to form defensible conclusions.



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- The study that was found to have the highest rigor score of 11 (as determined through the review) was published in 2000 by the Mayo Clinic, [*Effects of 4 Hand-Drying Methods for Removing Bacteria From Washed Hands: A Randomized Trial*](#), the text of which reports no significant difference among hand drying methods. "...there is no difference in bacteria counts when drying with paper towels or hand dryers."

How did they come to these conclusions?

The researchers categorized and prioritized studies based on their scientific rigor in study design, and considering such factors as sample size, methodology, data quality and whether or not the study was set up to mimic a real-world scenario. In short: they looked at the credibility of the findings of these previous studies and identified each study's strengths and weaknesses.

Now what?

The researchers outlined a basis for future studies and ways to test how different hand drying methods could potentially affect human health.

Overview of the findings:

Although numerous studies have been published evaluating the "best" method for hand drying, "best" has been defined in a variety of ways relative to bacterial removal efficacy, environmental contamination potentials, ecological or cost benefits, noise and more. **To date, no study has examined the "best" drying method or shared empirical data to support one hand drying method over another from a health and safety perspective.**

In short, hand dryers and paper towels have been found to be equally hygienic through a review of available results of scientific research studies.

Parameters of the study:

(1) Researchers identified the research questions:

- Are hand dryers more hygienic than paper towels?
- Are paper towels safer than hand dryers relative to human infection risks?

(2) Relevant studies were identified: Full-text articles and reports were selected if they met the following inclusion criteria: 1) involved quantitative assessments; 2) utilized sampling for environmental microbes or tracers; 3) evaluated one or more hand-drying methods; 4) published in peer-reviewed literature.

Case studies, reviews, systematic reviews and opinion articles were excluded from the quantitative synthesis but may have been included in the summary of gray literature, i.e., media reports and internet blogs), if they showcased analytical rigor and reported conclusions to identify gaps and future research needs.

(3) Studies were selected for inclusion: A search yielded 293 studies. Once this count was reviewed, duplicate references and studies found to be irrelevant to the topic were removed. Inclusion criteria, as outlined above, was then applied to the full text of 38 articles. Of these, 23 met the full set of criteria and were included in the final review.



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(4) Data was charted: Study categories included the following: sample size, variable consistency, methodology, realistic conditions, data quality, other and funding source. Each study category was scored quantitatively as positive/+, neutral, or negative/-, using a scoring system of 2, 1, and 0, respectively. Once the scores in each category were tallied, the study received a score for its rigor; the higher the score, the more credible the findings.

(5) Results were collated, summarized, and reported: Once the studies were assigned scores relative to their rigor, the researchers were able to answer the research questions identified in the first parameter, provide an articulate conclusion of their findings, and recommend future studies on the topic of hand-drying methods and human health outcomes.



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