

# VACCINE HEISTANCY UNDER THE MAGNIFYING GLASS

A SYSTEMATIC REVIEW OF THE USES AND MISUSES  
OF AN INREASINGLY POPULAR CONSTRUCT

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CoVAXCEN, WINTER 22

# COLLABORATORS



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**I'm  
hesitant  
about  
vaccines**



# VACCINE HESITANCY IS IN VOGUE

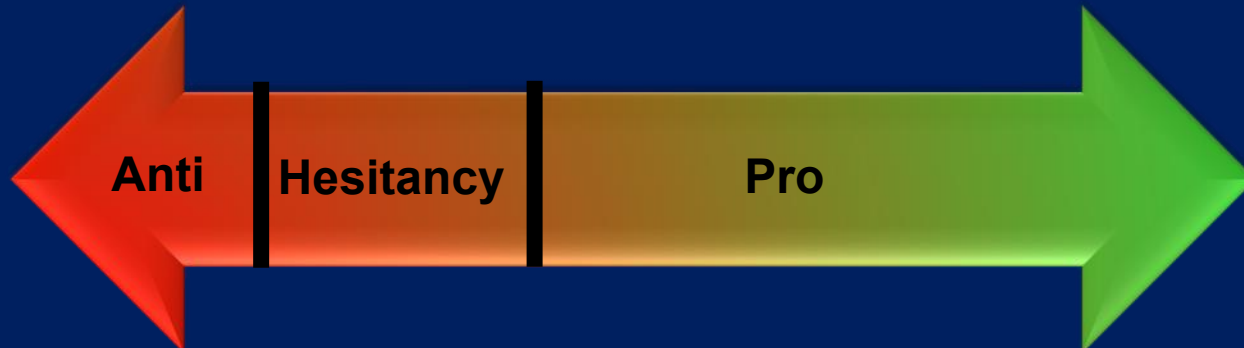
- The term has been adopted by mainstream media and official health organizations (WHO, CDC, NHS)
- One of the top ten threats to global health (WHO, 2019)
- WHO released an influential report by its Strategic Advisory Group of Experts on Immunization (SAGE)
- Distinction between a **choice not to vaccinate** and lower vaccine coverage due to cases where vaccines are *not available*, *difficult to obtain* or *unknown to the population*



# THE DEFINITION

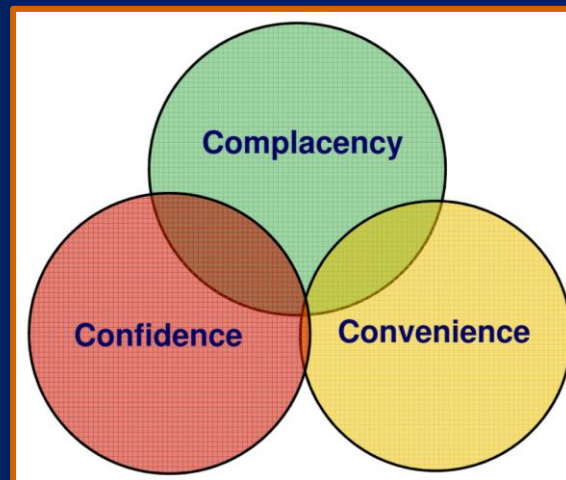


*Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccine services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence (SAGE Working Group)*



# A COMPLEX CONSTRUCT (3Cs)

- **Confidence** - trust in (a) the effectiveness and safety of vaccines; (b) the system that delivers them; and (c) the motivations of the policy-makers who decide on the needed vaccines
- **Complacency** - perceived risks of vaccine-preventable diseases and the necessity of vaccination as a preventive action
- **Convenience** - physical availability, affordability and willingness-to-pay, geographical accessibility, and ability to understand (language and health literacy)



# 5. MEASUREMENT TOOLS: VHS

**Table 3: Vaccine Hesitancy 5 point Likert scale questions**

**Vaccine Hesitancy 5 point Likert scale questions:**

scale 1 = strongly disagree to-scale 5 = strongly agree

	1	2	3	4	5
L1. Childhood vaccines important for my child's health					
L2. Childhood vaccines are effective					
L3. Having my child vaccinated is important for the health of others in my community					
L4. All childhood vaccines offered by the government program in my community are beneficial.					
L5. New vaccines carry more risks than older vaccines					
L6. The information I receive about vaccines from the vaccine program is reliable and trustworthy.					
L7. Getting vaccines is a good way to protect my child/children from disease.					
L8. Generally I do what my doctor or health care provider recommends about vaccines for my child/children.					
L9. I am concerned about serious adverse effects of vaccines.					
L10. My child/children does or do not need vaccines for diseases that are not common anymore.					

# 5. MEASUREMENT TOOLS: PACV

No.	Parent Attitudes about Childhood Vaccines Survey Item	Response
1	Have you ever delayed having your child get a shot for reasons other than illness or allergy?	Yes/No/ Don't Know
2	Have you ever decided not to have your child get a shot for reasons other than illness or allergy?	
3	How sure are you that following the recommended shot schedule is a good idea for your child?	0-10 scale
4	Children get more shots than are good for them.	Strongly agree – Strongly disagree
5	I believe that many of the illnesses that shots prevent are severe.	
6	It is better for my child to develop immunity by getting sick than to get a shot.	
7	It is better for children to get fewer vaccines at the same time.	Not at all concerned – Very concerned
8	How concerned are you that your child might have a serious side effect from a shot?	
9	How concerned are you that any one of the childhood shots might not be safe?	
10	How concerned are you that a shot might not prevent the disease?	Yes/No/ Don't Know
11	If you had another infant today, would you want him/her to get all the recommended shots?	
12	Overall, how hesitant about childhood shots would you consider yourself to be?	Not at all hesitant – Very hesitant
13	I trust the information I receive about shots.	Strongly agree – Strongly disagree
14	I am able to openly discuss my concerns about shots with my child's doctor.	
15	All things considered, how much do you trust your child's doctor? <small>© Opel</small>	0-10 scale

*A threshold of PACV  $\geq$  50 for vaccine hesitancy*



# VACCINE HESITANCY AS A BONE OF CONTENTION

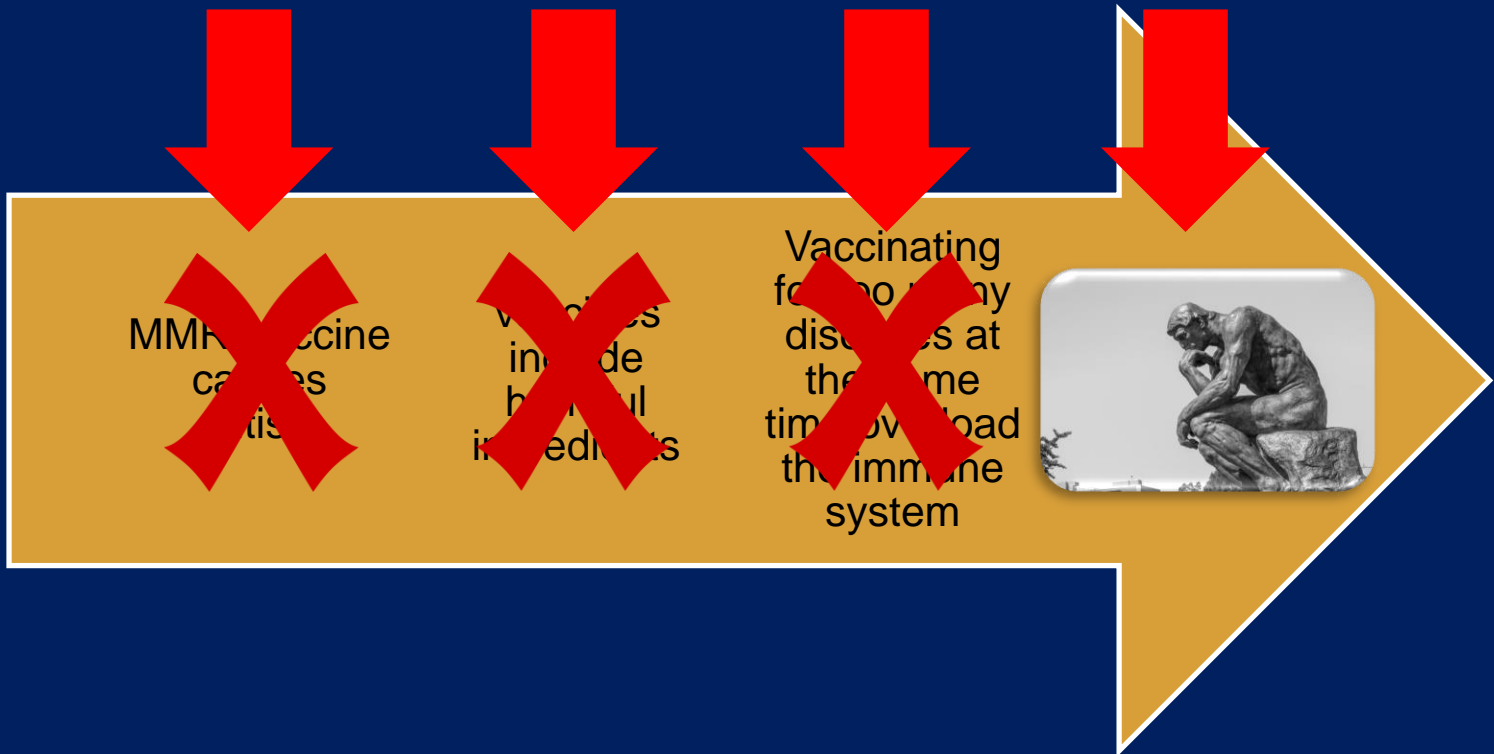
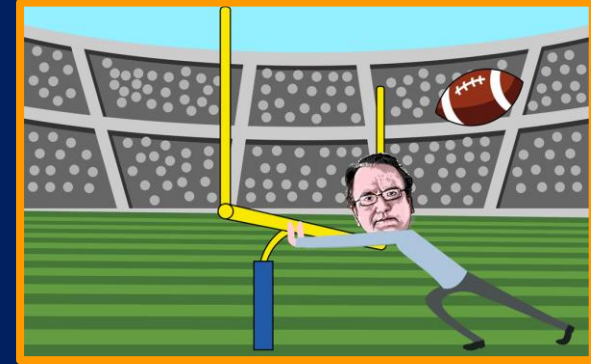


- An empowering stance in an era of institutional mistrust
- More informed consumers of health
- A way to restore trust in public institutions

- Legalizing anti-social attitudes and behaviors that contradict the scientific consensus
- Selfish and irresponsible position that has become a mammoth challenge standing in the way of population immunity

# MOVING THE GOALPOST

- After evidence is presented in response to a specific claim, some other (often greater) evidence is demanded



MMR vaccine causes autism

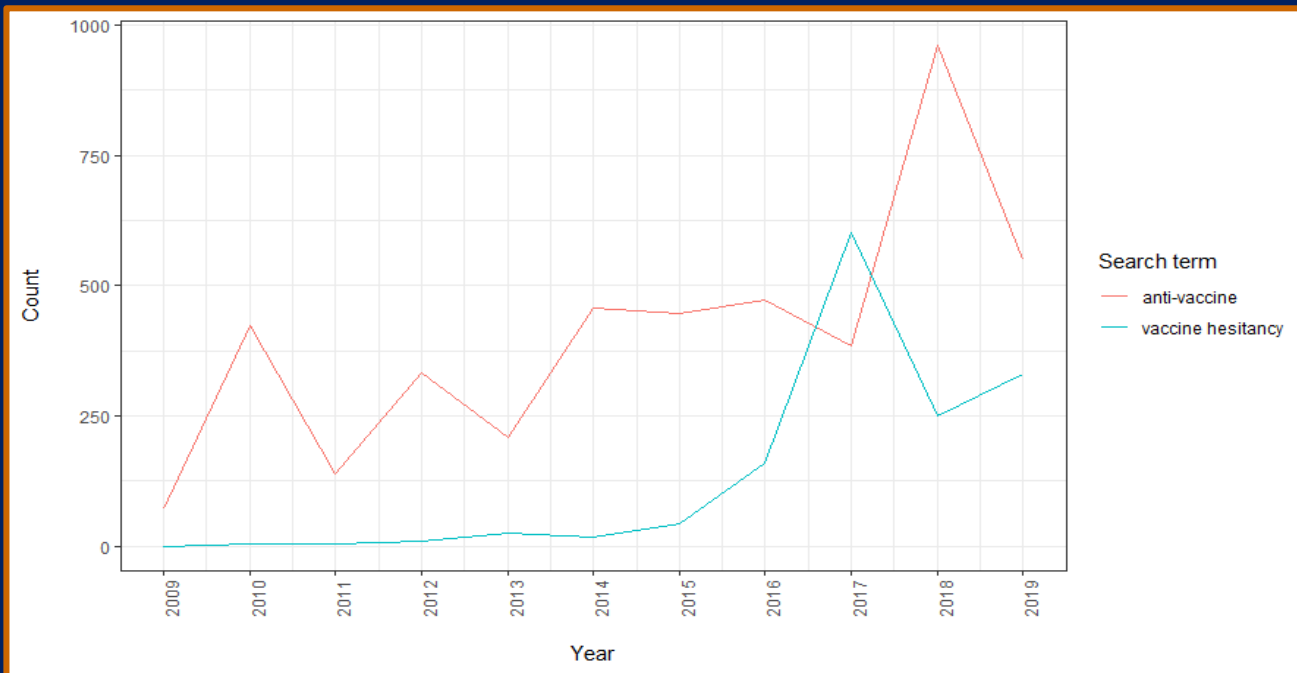
Vaccines include harmful ingredients

Vaccinating for too many diseases at the same time overload the immune system



# THE HISTORY OF VACCINE HESITANCY AS A CONCEPT

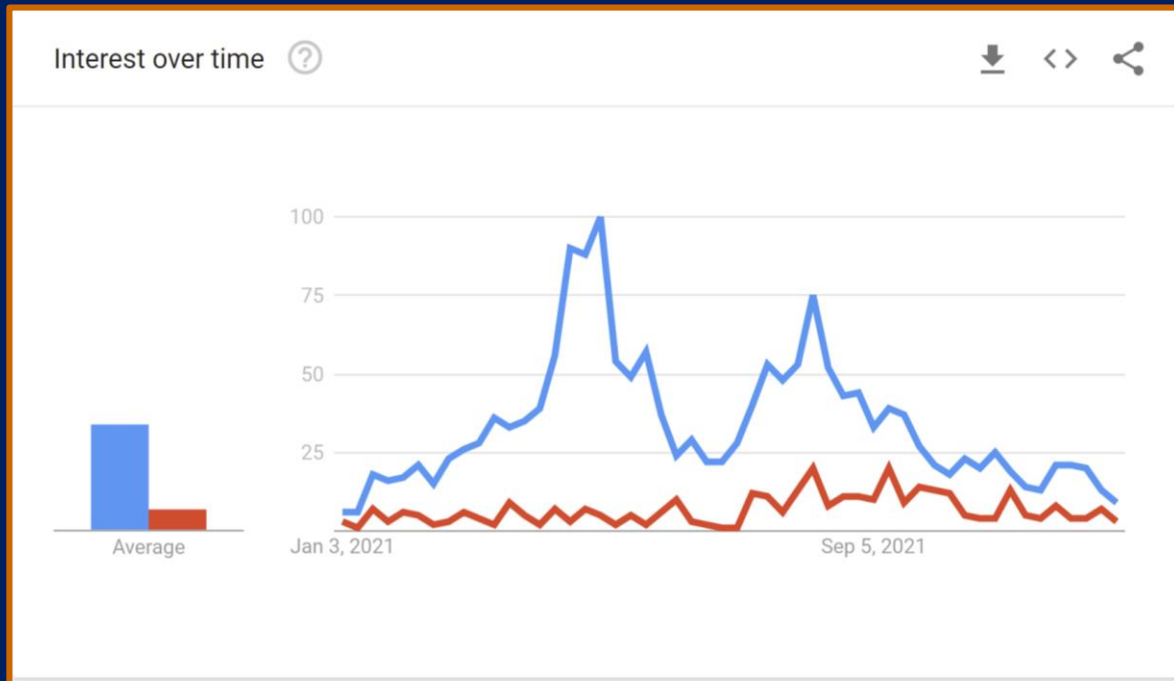
*Used in the 1990s to describe doctors or healthcare providers who were hesitant about vaccinating their patients*



Google Books Ngram data for “vaccine hesitancy” (blue) and anti-vaccine (red) between 2009 and 2019

# THE HISTORY OF VACCINE HESITANCY AS A CONCEPT

*Used in the 1990s to describe doctors or healthcare providers who were hesitant about vaccinating their patients*



*Google Trends data for “vaccine hesitancy” (blue) and anti-vaccine (red) in 2021*



# THE PRESENT STUDY

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# THE PRESENT STUDY

- A systematic literature review of the conceptual and operational definitions of vaccine hesitancy
- All quantitative studies that assessed vaccine hesitancy using self-report measures, from 2000 to 2021
- Why is it important?
  1. Our understanding of the prevalence of vaccine hesitancy across populations and geographical areas is largely dependent on research that measures and quantifies the breadth and depth of this phenomenon
  2. Valid and reliable definitions are required to accurately evaluate vaccine refusal and delay, and design effective interventions to ameliorate its detrimental impact on public health

Ophir, Y., Walter, N., Walter, D., Velho, R., Lokmanoglu, A. D., Prudent, M. L., Andrews, E. A. (in press). Vaccine hesitancy under the magnifying glass: A systematic review of the uses and misuses of an increasingly popular construct. *Health Communication*.

# SELECTION OF STUDIES

## ➤ Literature search:

- 1) Relevant electronic databases
- 2) Reference lists
- 3) Conference programs
- 4) 12 leading experts

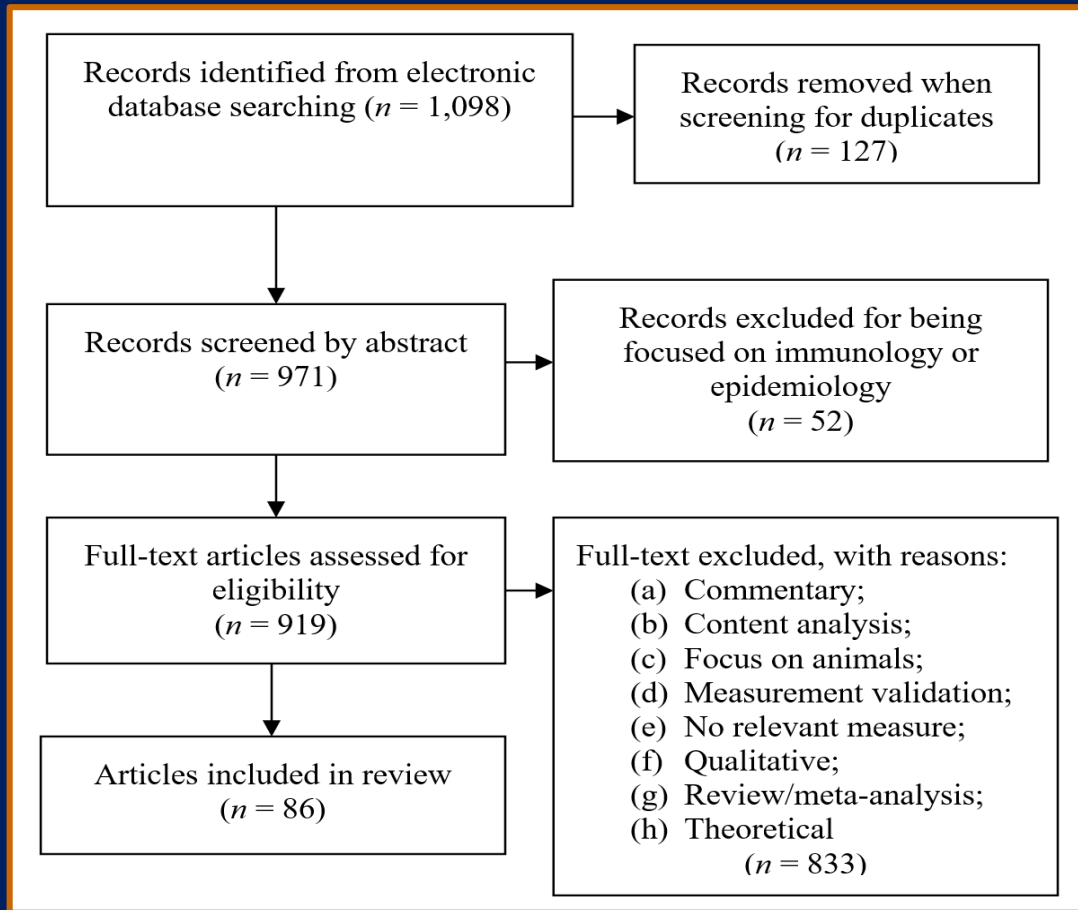
## ➤ Inclusion criteria:

- 1) Published between 2000 to 2021
- 2) Available in English
- 3) Focus on vaccine-related decision-making for humans
- 4) Empirical inquiries that rely on self-report

## **5) Explicit measures of vaccine hesitancy**

Ophir, Y., Walter, N., Walter, D., Velho, R., Lokmanoglu, A. D., Prudent, M. L., Andrews, E. A. (in press). Vaccine hesitancy under the magnifying glass: A systematic review of the uses and misuses of an increasingly popular construct. *Health Communication*.

# SEARCH STRATEGY FLOW-CHART



**Included:**

$K = 86$

$N = 191,670$

$M = 2,254$

$SD = 4,255$

Ophir, Y., Walter, N., Walter, D., Velho, R., Lokmanoglu, A. D., Prudent, M. L., Andrews, E. A. (in press). Vaccine hesitancy under the magnifying glass: A systematic review of the uses and misuses of an increasingly popular construct. *Health Communication*.



# CODING OF MODERATORS 1/2

- **Research design** (experiment/quasi-experiment/survey)
- **Conceptualization of hesitancy** (specific diseases/general threat)
- **The subject of vaccination** (self/one's children/others or general population)
- **Operationalization of hesitancy** (actual behavior; behavioral intent; attitude or belief; social norm)
- **Measurement of hesitancy** (binary/categorical/continuous)
- **Sample type** (general population/specific racial/ethnic group/specific age group)
- **Sample characteristics** (age, country, race/ethnicity, level of education, parents, income)

# CODING OF MODERATORS 2/2

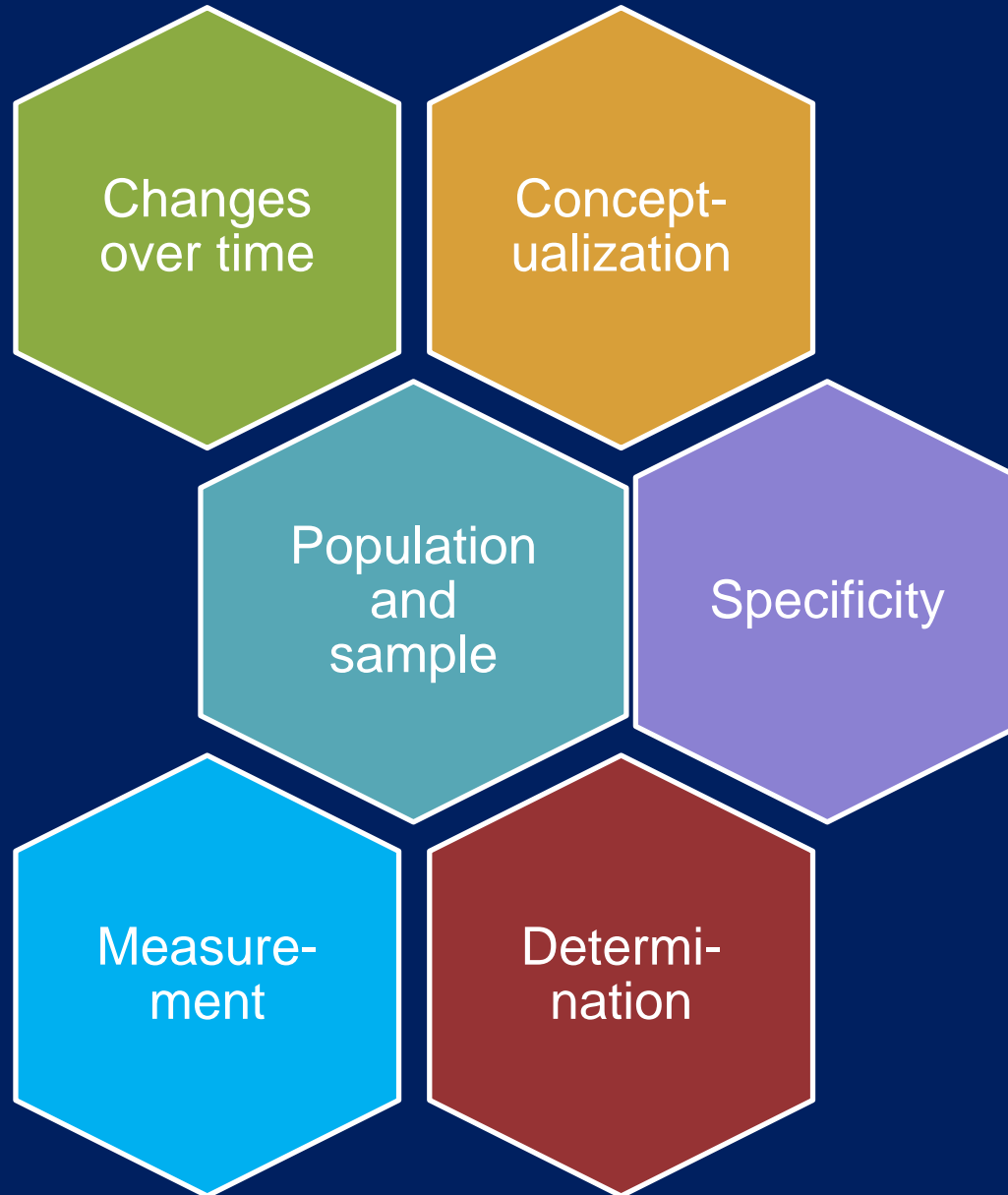
- **Accessibility/affordability** (did the measure consider the cost of the vaccine?)
- **The reality of the disease/virus** (current threat/theoretical threat/hypothetical threat)
- **Availability of vaccine** (available/in development/unavailable)
- **Focus of hesitancy** (single vaccine/multiple vaccines/vaccines in general)
- **Measurement items** (single-item/scale/unclear)
- **Scale validity** (is there any indication that the vaccine hesitancy measure is validated?)
- **Means and standard deviation of vaccine hesitancy**

# INTERCODER RELIABILITY

- Following best practices in content analysis (Lacy et al., 2015), coders practiced using the codebook on similar non-study articles before beginning to code the actual corpus
- Two coders independently coded 23 studies (26.7%), resulting in acceptable agreement coefficients, with *Krippendorff's alpha*, ranging from .79 to 1.00
- Discrepancies that arose during the coding process were resolved through discussion between the coders

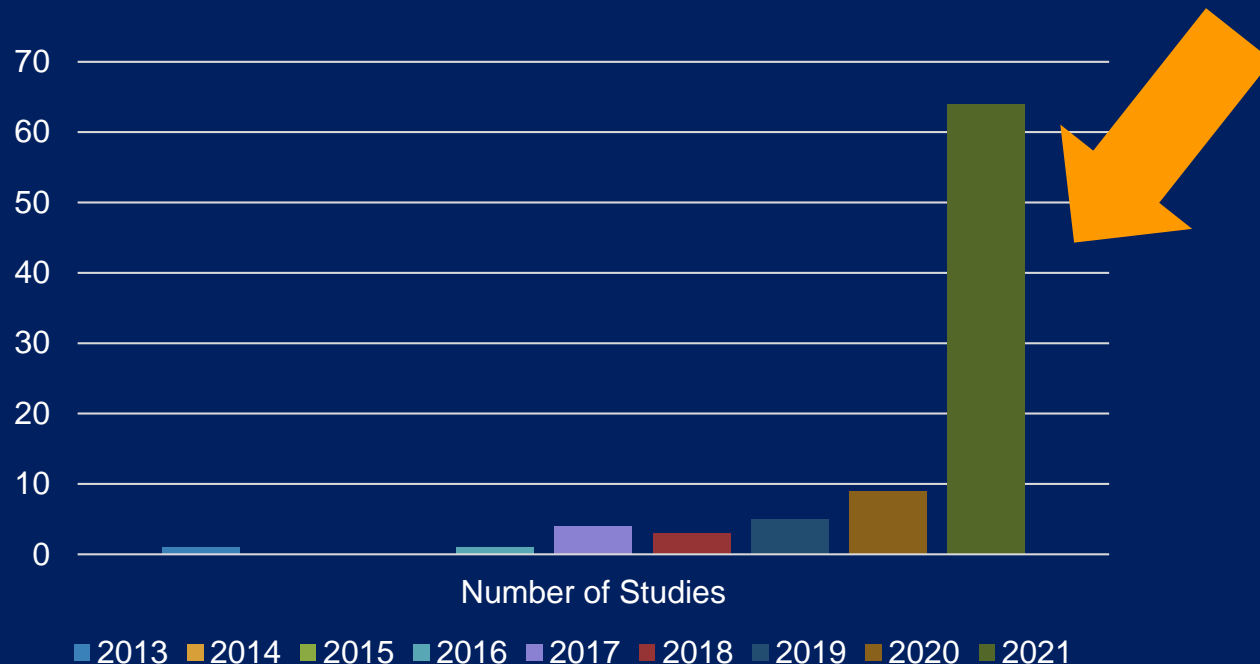
# RESULTS

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# 1. TEMPORAL AND DISCIPLINARY FINDINGS

- In 2013, only one study explicitly measured vaccine hesitancy, and then no survey or experiment-based work using self-reports was published again until 2016
- Starting from 2018, there has been a steady increase in research
- The vast majority of work comes from medical journals (72) and the rest comes from social science (14)

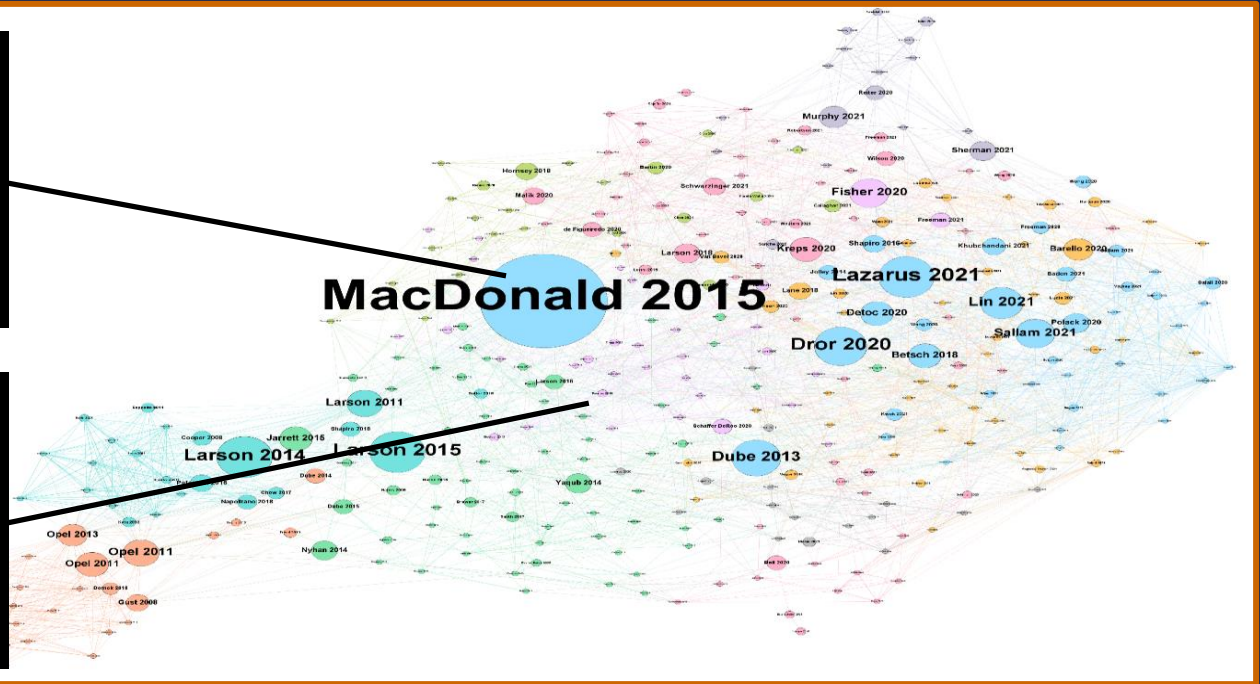


# CO-CITATION NETWORK

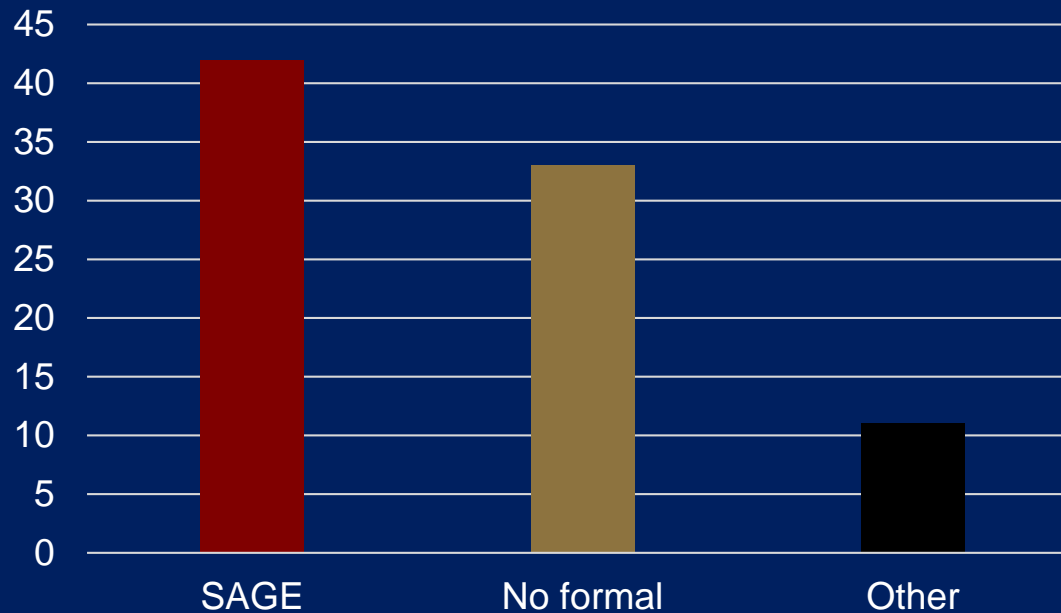
- An ancillary co-citation network analysis to identify the degree of overlap in the vaccine hesitancy literature
- A community detection algorithm, Louvain (Blondel et al., 2008), was used to identify clusters of cited papers, operationalized as “schools of thought” (Pasadeos et al., 2010, p. 138)
- Louvain community detection separates the network into clusters of nodes (articles) that share more links between them than with nodes in other communities

The most influential papers in our networks were those presenting influential definitions to hesitancy or measurement tools

The segmented structure of the co-citation network suggests that the academic study of hesitancy is made up of distinct academic silos



## 2. CONCEPTUALIZATION



### The “Other Category”

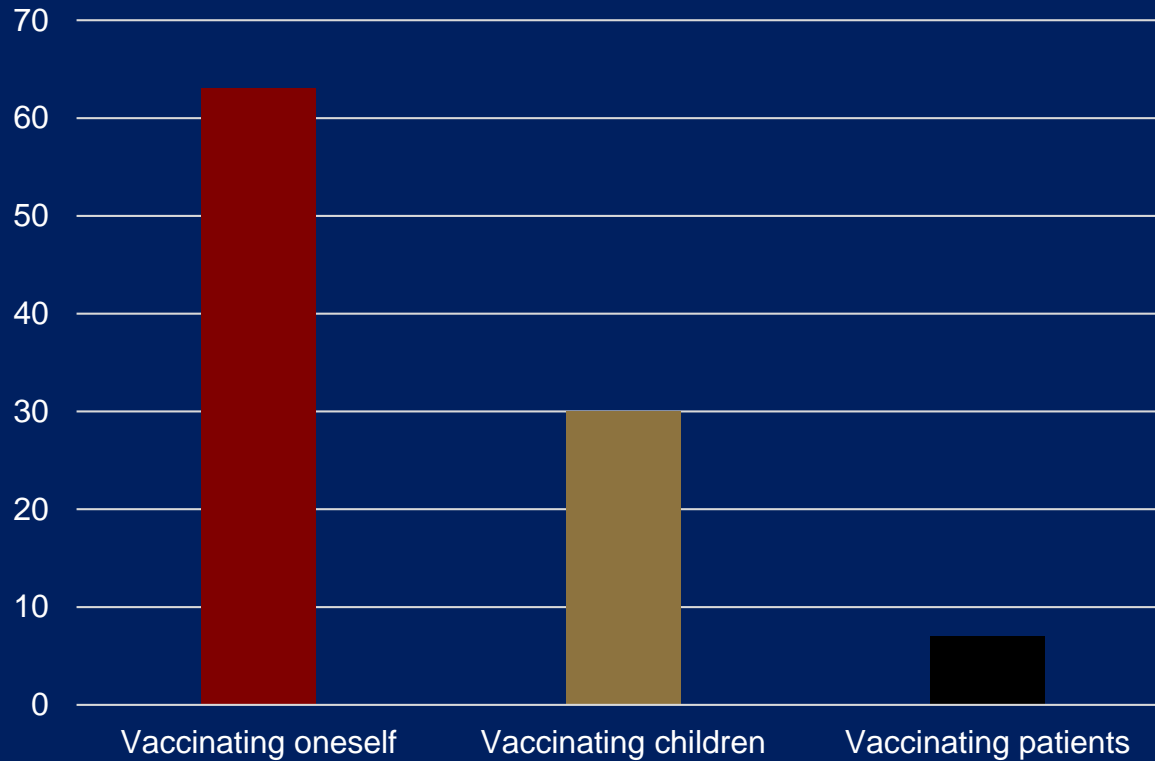
- Interchangeably moving between hesitancy, rejection, and intentions
- **Overly broad definitions** - “individuals with various degrees of concerns about vaccination who may refuse some vaccines, but agree to others, delay vaccination or accept vaccination although feeling ambivalent about doing so”



### 3. POPULATION AND SAMPLING TECHNIQUES

- Only a few studies used nationally representative samples
- Most studies relied on a combination of convenience and purposive sampling techniques, including surveying university students, physicians, parents, residents of specific communities or people with specific preexisting conditions
- The generalizability of the findings is brought into question when relying on convenience samples such as *visitors to the Forum Palermo shopping center in Italy across two Saturdays* or simply collecting *snowball data over Facebook, Twitter, and LinkedIn*

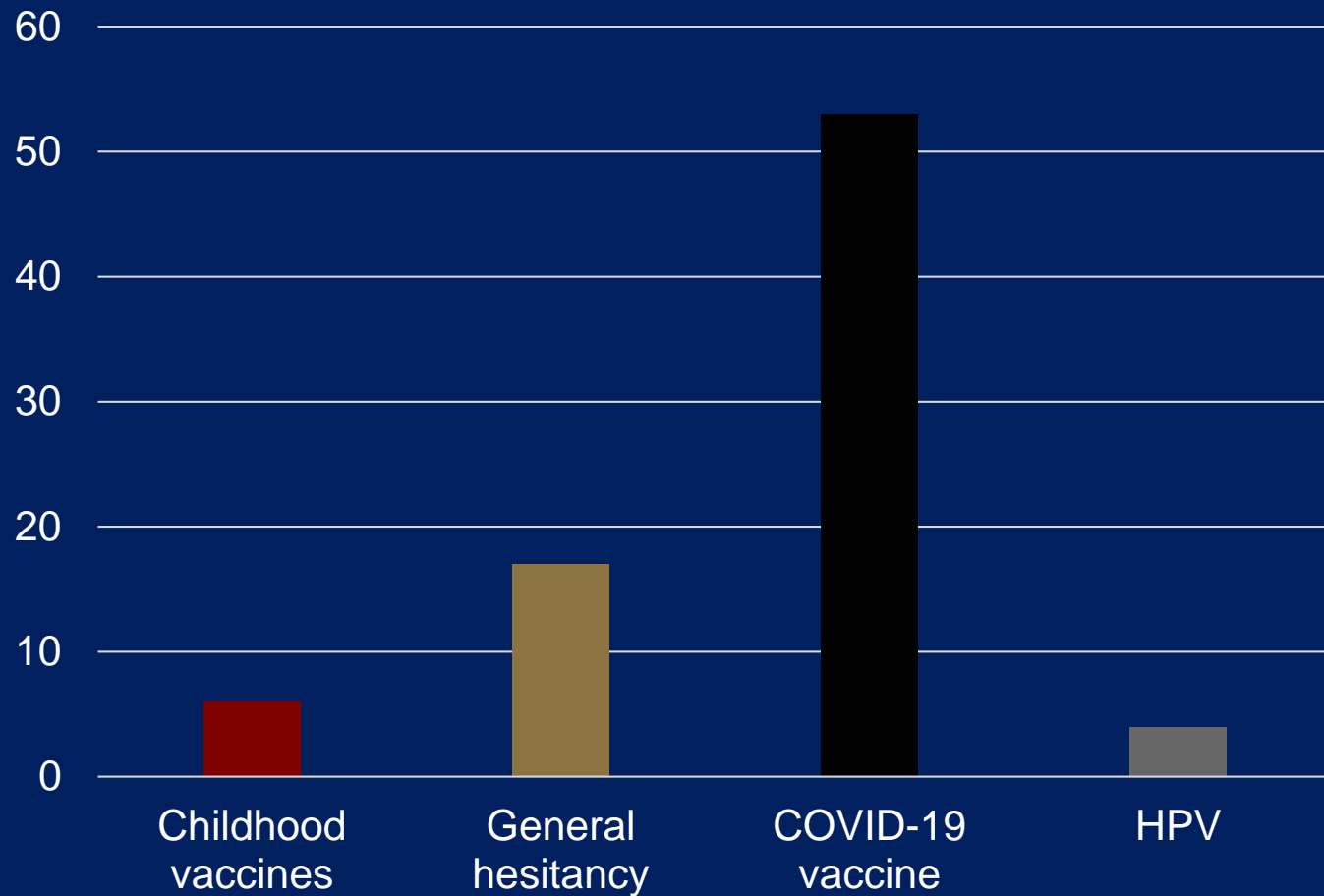
# 3. POPULATION AND SAMPLING TECHNIQUES



## The Vaccinating children category:

- “If you had a child today...”
- Age range 18 - 82

## 4. GENERAL AND SPECIFIC HESITANCY

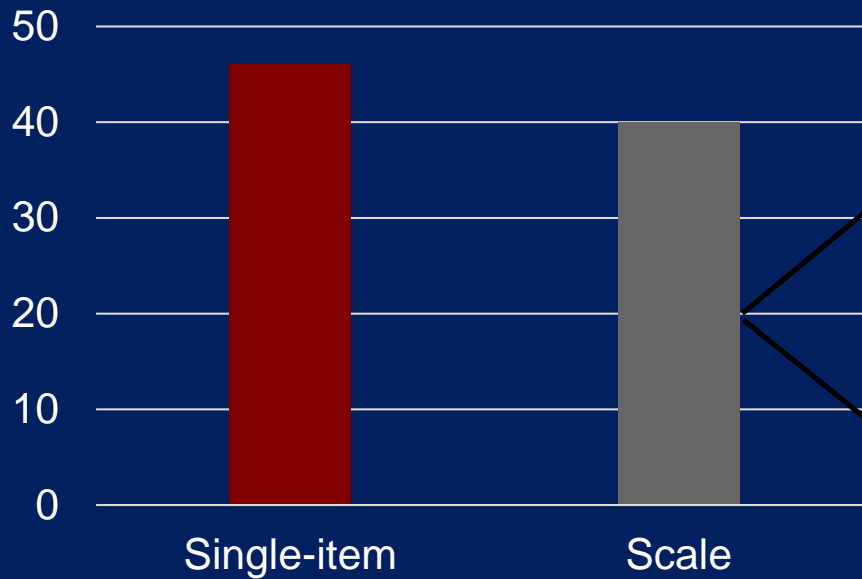


## 4. GENERAL AND SPECIFIC HESITANCY

### Studies often asked participants about a future COVID-19 vaccine

1. Findings indicated that 78% of those coded as hesitant stated they had little or conflicting information about the vaccines whereas 69% reported doubting its effectiveness and worrying about side-effect
2. Jordanian students were asked about their intention to get vaccinated against COVID-19. The survey was conducted in late 2020, months before a vaccine would be approved for use. Nevertheless, those who answered “maybe” to the one-item hesitancy measure were classified as “hesitant”
3. French participants were asked about their intention to use a COVID-19 vaccine in March 2020, almost a year before a vaccine became available
4. Japanese parents to children ages 3-14 years old were classified as “hesitant” despite the fact that at the time of the study vaccines were approved in Japan only for children 12 and older

# 5. MEASUREMENT TOOLS



PACV scale by Opel and colleagues (Opel et al., 2011). 15-item PACV scale measures a number of dimensions including behavior, safety, and efficacy

WHO SAGE Working Group on Vaccine Hesitancy Survey (VHS) tool (Larson et al., 2015). The VHS scale consists of nine or ten Likert scale questions (depending on the version), combining questions about beliefs, trust, and knowledge

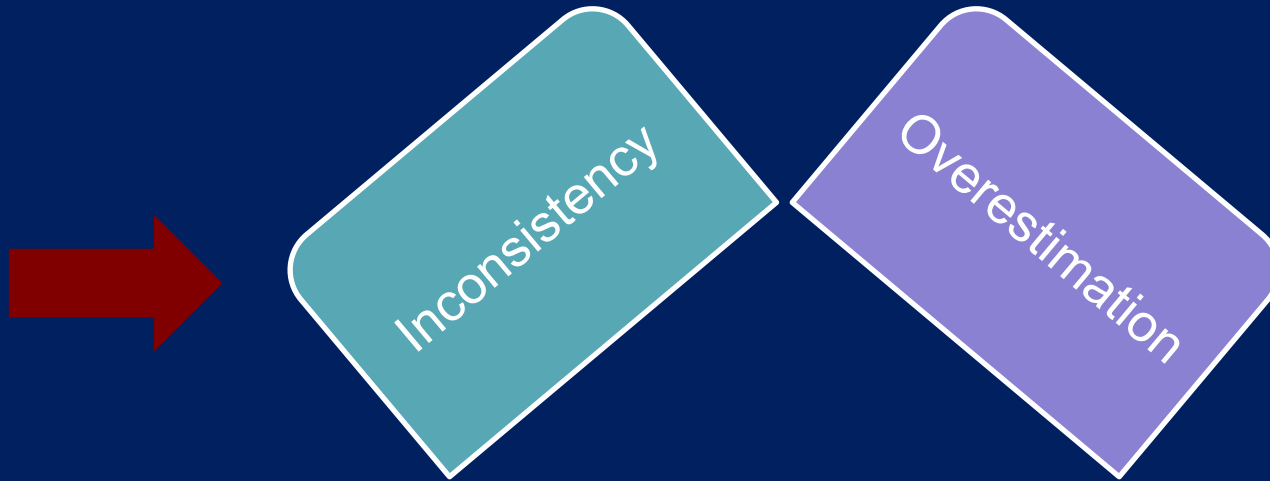
*Only 13 studies included questions about accessibility and affordability of vaccines, an important prerequisite of hesitancy according to most definitions*

# 5. MEASUREMENT TOOLS

## Common problems:

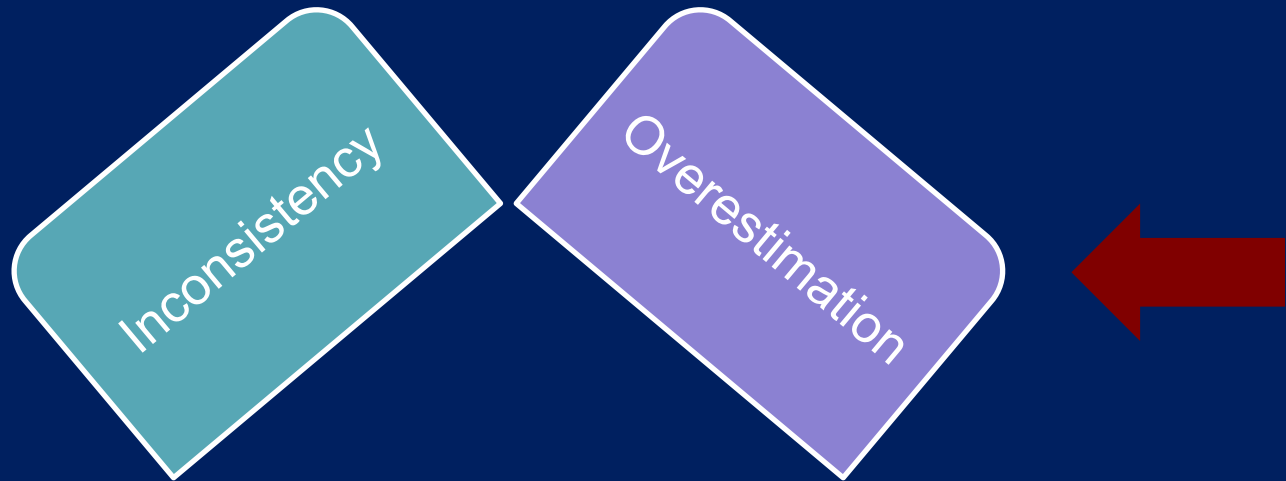
1. Priming - “I understand that the HPV vaccine is very expensive so I will not vaccinate my child”
2. Double-barreled questions - “Vaccinations are unnecessary and harmful”/ “Vaccines are harmful and expose to various diseases”/ “Vaccines hurt a lot, I am not afraid of vaccines”
3. Unrelated items - “Needles do not bother me”/ “I can talk to my doctor about my concerns about shots”/ “I don’t think I will get a sexually transmitted disease (STD) or genital warts”

## 6. DETERMINATION OF HESITANCY



- **Inconsistencies in determination of hesitancy were apparent even among studies using the same measurement tool**
- Some studies used a threshold of PACV  $\geq 50$ , while others used  $\geq 25$ , and  $\geq 20$
- Some studies proposed using PACV but considered parents' hesitancy to be a spectrum, ranging from "very pro" to "anti-vaccine"

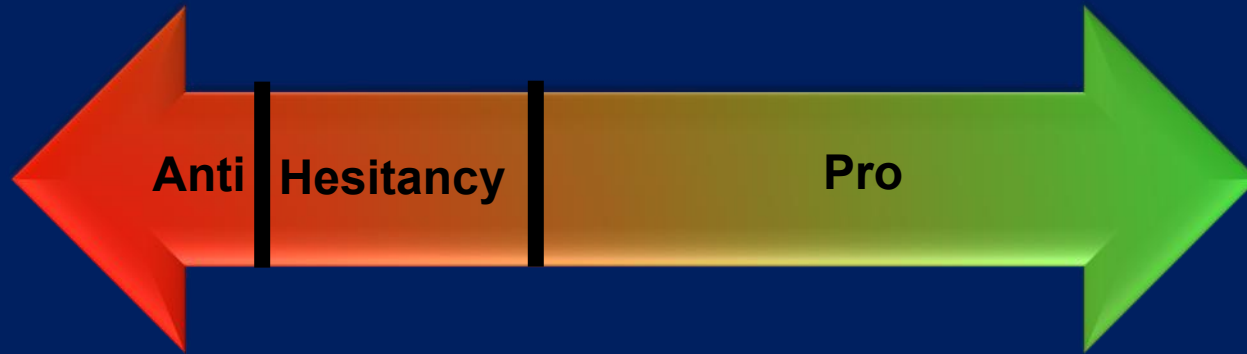
## 6. DETERMINATION OF HESITANCY



- **Some studies did not allow participants to state they were not vaccine hesitant**
- Participants were classified as low, medium or high hesitancy only, with no option for lack of hesitancy being offered
- Participants received “hesitancy points” when answering “don’t know”
- Some studies considered those claiming they “will probably get vaccinated” as hesitant (thus not separating them from those saying they will probably not get vaccinated and those not sure)
- Other studies considered those saying they will “eventually get the vaccine, but wait a while first” as hesitant as those saying they will not get it
- Some studies gauged participants’ intention to vaccinate against COVID-19 with a Likert scale of 1-10, and considered all but those who chose 10 (definitely) as “having some degree of hesitancy”



# DISCUSSION – THE GOOD




- The term **vaccine hesitancy** was introduced in an attempt to employ a more nuanced definition that could characterize those who sit between the extremes of the anti- and pro-vaccine continuum
- We find encouraging evidence for its application on varied populations around the world, albeit, using convenience samples

# DISCUSSION – THE BAD

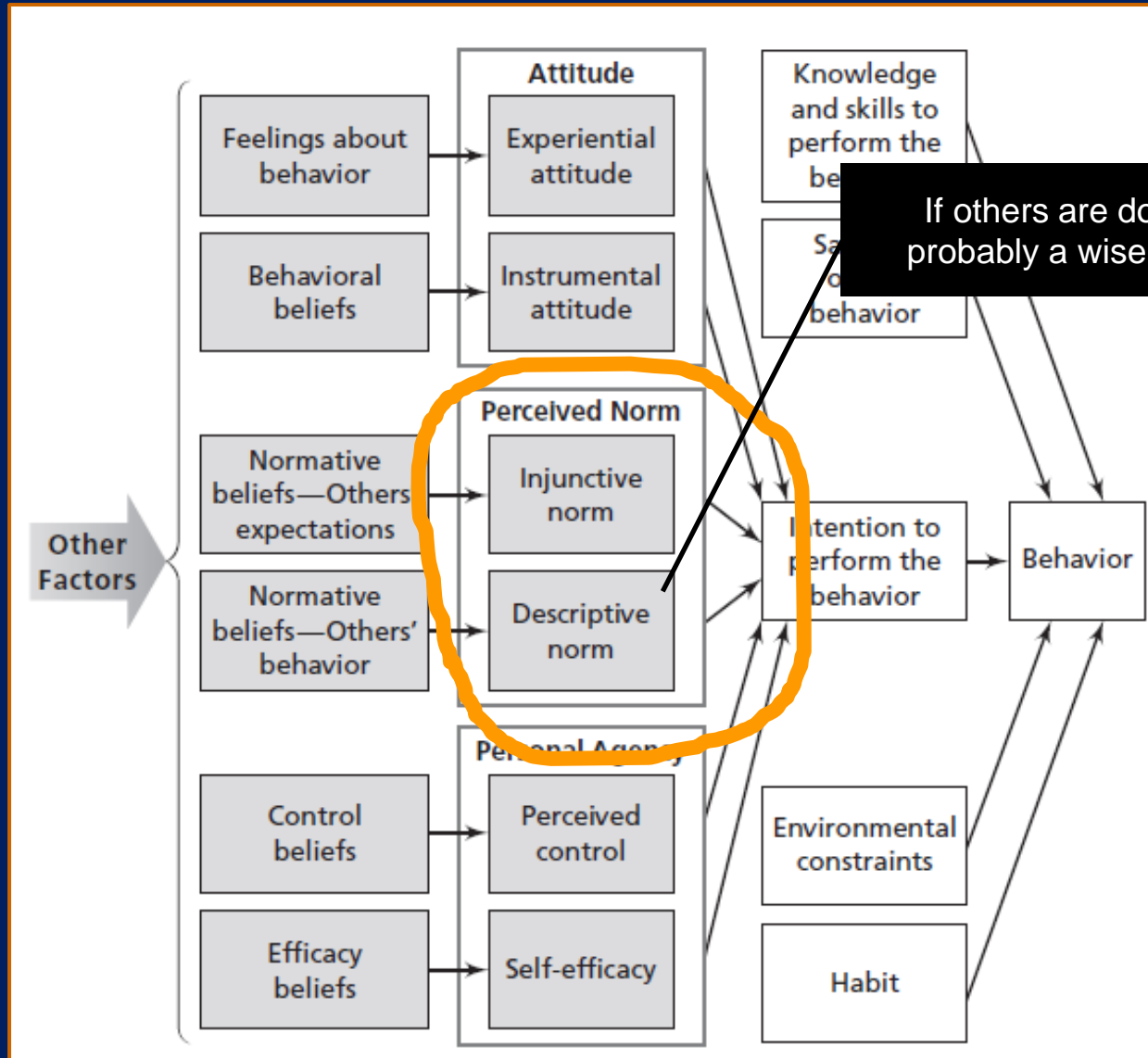


- It appears that research systematically over-estimates the prevalence of vaccine hesitancy across populations
- Many studies did so by:
  1. Reducing the threshold of hesitancy;
  2. Asking about currently unavailable/unapproved vaccines;
  3. Using items that prime individuals to think about risks;
  4. Collecting data from less relevant populations.

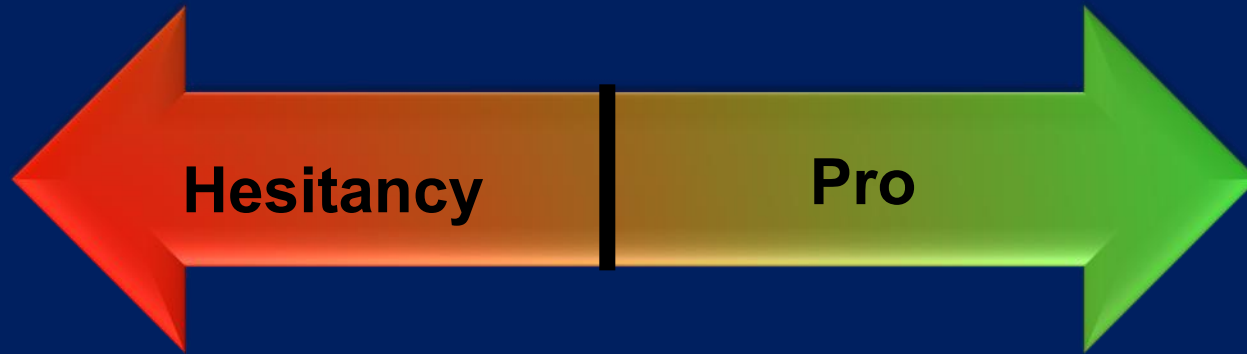


**WHAT'S THE PROBLEM WITH  
OVERESTIMATING THE  
PREVALENCE OF  
HESITANCY?**


# MODELS OF VOLITIONAL HEALTH BEHAVIOR: INTEGRATED BEHAVIOR MODEL



# DISCUSSION – THE BAD



- Other studies do not distinguish between uncertainty and outright resistance
- Many studies did so by:
  1. Artificially dichotomizing continuous measures;
  2. Claiming that acknowledgement of any level of uncertainty is an indicator that the science is untrustworthy.



**WHAT'S THE PROBLEM WITH  
FAILING TO DISTINGUISH  
HESITANCY AND  
REJECTION?**

# FRAMING AFFECTS HOW PEOPLE INTERPRET AND REACT TO THE PAINTING



# WHETHER THE PLANET IS WARMING DEPENDS ON ITS FRAMING (“GLOBAL WARMING” VS. “CLIMATE CHANGE”)?

**Table 2. Distribution of Existence Beliefs by Political Self-identification and Question Wording (GW = “global warming”; CC = “climate change”)**

Reported Existence Belief	Overall		Republicans		Democrats		Independents		Others	
	GW	CC	GW	CC	GW	CC	GW	CC	GW	CC
1 = Definitely has not been happening	6.6%	3.9%	12.7%	5.1%	1.9%	1.3%	6.6%	5.4%	4.7%	5.7%
2 = Probably has not been happening	8.4%	6.8%	18.2%	14.3%	2.6%	1.0%	6.2%	5.4%	3.7%	4.8%
3 = Leaning has not been happening	8.2%	7.6%	14.1%	11.4%	2.9%	5.2%	9.2%	6.6%	6.5%	5.7%
4 = Unsure	9.0%	7.8%	11.0%	8.9%	5.7%	6.0%	8.5%	8.7%	16.8%	6.7%
5 = Leaning has been happening	13.9%	15.7%	14.1%	17.0%	12.1%	13.6%	15.1%	15.7%	17.8%	18.1%
6 = Probably has been happening	25.6%	27.8%	20.2%	28.9%	29.2%	27.0%	27.9%	28.5%	23.4%	25.7%
7 = Definitely has been happening	28.2%	30.5%	9.7%	14.3%	45.6%	45.8%	26.5%	29.8%	27.1%	33.3%
% High Belief (≥ 5)	67.7%	74.0%	44.0%	60.2%	86.9%	86.4%	69.5%	74.0%	68.3%	77.1%
Mean Belief	5.05	5.30	3.95	4.62	5.94	5.94	5.09	5.29	5.18	5.37
N	1162	1099	362	370	421	382	272	242	107	105

Republicans are nearly three times as likely to accept “global warming” if it’s framed as “climate change”



# LIMITATIONS

- Exclusive focus on self-report data
- Exclusive focus on quantitative research
- No focus on correlations and/or effects of vaccine hesitancy

# CONCLUSION

- Overall, the literature on vaccine hesitancy that relies on self-report is in a bad spot, as indicated by a less-than-optimal conceptualization and operationalization
- Too much focus on ambiguous definitions may come at the expense of other topics like **mistrust** among **specific sub-populations** or issues of **affordability and accessibility**
- It is possible that the oversized public attention given to hesitancy, via academic research, public debates, and media discussions keeps the idea that large segments of the population are vaccine hesitant on the public agenda

# Thank you!

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