

**#SB277: Communications on
Twitter about California's law
eliminating non-medical
exemptions for childhood
vaccinations**

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Goals of SB277 Project

- Analyze Twitter communications about SB277 with respect to:
 - 1) Communication theories, i.e., Multi-level Model of Meme Diffusion (Spitzberg, 2014)
 - 2) Social Network Analysis
 - 3) Behavioral Health Analysis
 - 4) Integration of these analytic methods and perspectives

Mandatory Vaccinations
are Un-Constitutional
and Unethical!

It's
AMERICA
not
A-MERCK-A!



CALIFORNIA REPUBLIC

If there is a
RISK
There must be a
CHOICE
NO on SB 277
www.sb277.org



Reason #3 I want SB277 to pass:
**Uniformly high vaccine uptake
rates help protect those who
cannot be vaccinated.**



If anti-vaxxers think their children
should be able to avoid **vaccines**
no matter how small the risk,
shouldn't I be able to
avoid **unvaccinated children**
no matter how small the risk?

YES
on
SB277

Vaccine Exemption SMART dashboard

<http://vision.sdsu.edu/hdma/smart/vaccineExemption>



Behavioral Health Analysis

Overview of Behavioral Health Analysis

- Purpose – to understand the sources, sentiments, and content of tweets on SB277
- Apply health behavior frameworks & theories to analyze tweets on SB277
 - To what extent do behavioral theory constructs occur in Twitter communications about SB277?
 - What factors are associated with the occurrence of behavioral theory constructs in Twitter messages about SB277?

Steps of the Process

- 1) Literature review to identify behavior theories that predict whether parents vaccinate their children
 - **Health Belief Model** (Most commonly used)
 - **Theory of Reasoned Action/Planned Behavior**
- 2) Develop a code book to code SB277 tweets on key variables
 - **Source characteristics** (e.g., individual vs. orgs)
 - **Sentiments** (e.g., tone)
 - **Content information** (e.g., behavioral theory constructs)
 - **Multi-level Model of Meme Diffusion** domains

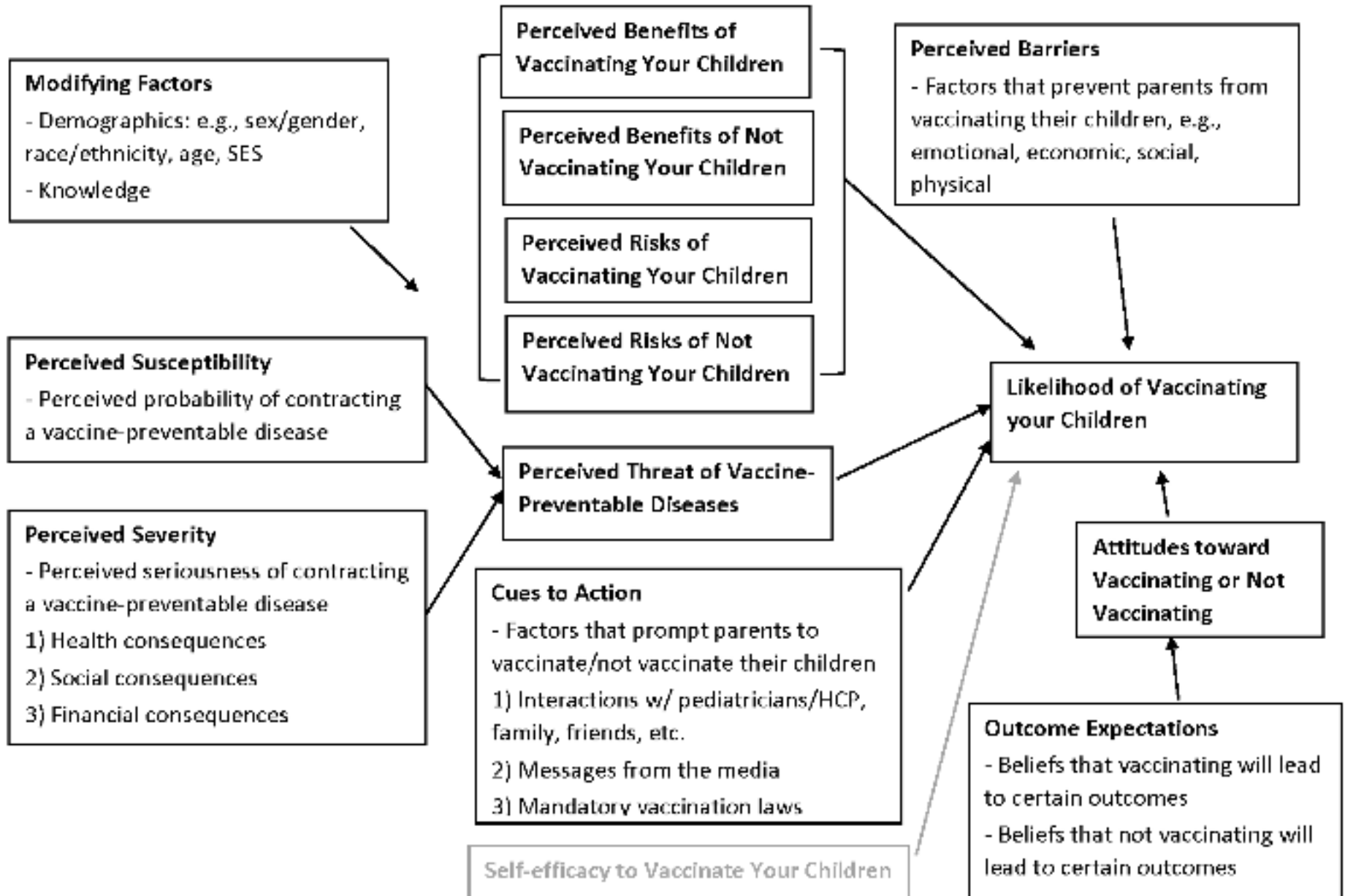
Steps of the Process

- 3) Select tweets for analysis – determine inclusion and sampling criteria

- 4) Code and analyze tweets
 - Analyze tweets in conjunction with Social Network Analysis
 - Analyze a representative sample of individual tweets to understand individuals' communications about SB277

- 5) Write paper for peer-review publication

Vaccine Behavioral Model



Four Events from the SB277 Timeline Selected for Analysis

Date	Event
2/19/15	SB277 introduced by Richard Pan, MD
6/25/15	SB277 passed CA Assembly floor
6/29/15	SB277 passed CA Senate floor
6/30/15	CA governor Davis signed SB277 into law
7/28/15	Dr. Pan battled recall by anti-vaccine activists
9/16/15	Trump linked child vaccines to autism in Republican primary debate
9/30/15	Referendum to repeal SB277 failed to get enough signatures
10/13/15	CA governor Davis signed SB792
1/11/16	Mark Zuckerberg posted picture of daughter being vaccinated
2/10/16	Anti-vaccine billboards go up to coincide with Super Bowl 50
4/13/16	Robert De Niro supported anti-vaccine movement on TV
7/1/16	SB277 went into effect

Sampling Tweets

- 5 days of collection for each event – same day and 2 days before and after the event
- Total N=25,681 tweets collected with this method
- Equivalence classes created to filter out duplicate tweets (retweets) to facilitate annotation and coding
- Tweets sampled from equivalence classes

Event	Collection Dates	Tweets Collected N	Tweets Sampled N	Tweets Sampled %
Governor signs SB277	June 28-July 2, 2015	23,488	985	41.6
Trump references autism	Sept. 14-18, 2015	721	475	20.1
Referendum fails	Sept. 28-Oct. 2, 2015	1,150	662	28.0
SB277 goes into effect	June 29-July 3, 2016	322	244	10.3
Total		25,681	2,366	100

Coding and Analysis of Tweets

- Tweets were manually coded for each domain specified in the codebook
- Two annotators coded the behavioral domains
 - Reliability: Kappa scores $\geq .87$
- Basic frequencies of the variables were computed
- Qualitative text was reviewed for themes

Distribution of the Tweets: Sentiment of SB277

	N	%
Against SB277	1846	78.0
Supportive of SB277	295	12.5
Ambiguous	225	9.5
Total	2366	100

Frequencies of the Behavioral Health Variables (Preliminary)

Variable	N	%
Perceived susceptibility of getting a preventable disease	29	1.2
Perceived severity of getting a preventable disease	33	1.4
Perceived risk of vaccinating	162	6.9
Perceived risk not vaccinating	15	0.7
Perceived benefits of vaccinating	98	4.1
Perceived benefits of not vaccinating	16	0.7
Cues to vaccinate	77	3.3
Cues to not vaccinate	103	4.4
Outcome expectations for vaccinating	67	2.8
Outcome expectation for not vaccinating	85	3.6
Any health behavior variable	531	22.4

Example Quotes

Perceived Susceptibility

RT @sheryllanepphoto:
#HearUs We are
healthy. We are mostly
vaccinated. We don't
deserve #segregation
.@JerryBrownGov VETO
#SB277

@kath2cats How does my
unvaccinated kid with no
desease or sickness what
so ever put you're
vaccinated loved ones at
risk? Explain?

#SB277 NO POLIO,
NO MEASLES, NO
VACCINES - Diseases
gone b4 vaccines

Perceived Severity

Measles Outbreak in
Democratic Republic of
Congo Kills 400
<http://t.co/SUSIF8bvNY>
#sb277 #vaxfax
#teamvax
#vaccineswork

RT @Not_Sure1313:
Measles vaccine kills more
people than Measles. We
have traded benign
diseases for things we
can't treat. NO #SB277

RT @chadhayesmd: I wish
we didn't need bills like
#SB277. But when kids are
dying from preventable
diseases, it's time to stop
wishing

Perceived Risk of Not Vaccinating

A little boy has died of diphtheria in Spain. He was unvaccinated. Diphtheria is the D in the TDaP shot SB277...

I'm so happy for #SB277 to help keep my 10 nieces & nephews (not to mention my immunocompromised husband) safe! Thx @DrPanMD @VaccinateCal

Physicians said immunization levels have fallen too low to keep Californians safe from disease.

Perceived Risk of Vaccinating

RT @itsmepanda1: So,
670 cases of vaccine
derived polio, that can
lead to paralysis???
You. Don't. Say. #SB277
#CDCwhistleblower

RT @ShamrockTTMR:
@realDonaldTrump
Thank you for standing
up for our kids: 2 many, 2
soon! Even the pediatric
neurologist agreed!!

Merck admits #vaccines cause
Autism @JerryBrownGov
please veto #SB277
@BroTonyMuhammad
@SB277Recalls
#WakeUpAmerica

Cues to Vaccinate

New study on infant macaques: thimerosal, MMR still don't cause autism. #SB277
#VaccinesWork
<http://t.co/cYMFrsx6DT>

RT @doritmi:
@JoanneSpracklen
@lizditz I have read inserts & understand them. I also know vaccines are safe.

RT @lizditz: Thanks to
@familydocwolk and
@cafp_familydocs for
strong statement in support
of #SB277 & public health.
#VaccinesWork

Cues to Not Vaccinate

RT @MARS0411: Most parents of vaccine injured children & many others are disappointed & appalled at his support of #SB277.

RT @LaLaRueFrench75: "MORE Evidence Hepatitis B Vaccines Cause Multiple Sclerosis [amongst other serious conditions]"

RT @FelixWankel125: .@jerrybrowngov I will not go against my religious beliefs, please don't take school away from my child. Veto #sb277

Outcome Expectations of Vaccinating

732,000: American Lives
Saved by Vaccination
<http://t.co/Vlh7hHZuBM>
#teamvax #vaccineswork
#sb277

Vaccines keep our
campus safe. Vidette
Online #sb277
#vaccineswork
#teamvax #iamtheherd
<http://t.co/07QABcofMg>

@DoctorYasmin CA dept
of health: 89% of those
infected with pertussis
were fully vaccinated.
#CDCwhistleblower
#sb277

Summary

- A significant minority of tweets contained information that could be mapped onto Health Belief Model and Theory of Planned Behavior domains
- Information on perceived risks of not vaccinating and severity of vaccine preventable diseases was sparse – possible area for public health to exploit
- Information on perceived risks of vaccinations was most common

Next Steps

- Further qualitative analyses will group these messages into themes
- Further quantitative analyses will correlate behavioral health variables to other variables
 - e.g., - social network domains, sentiment, linguistic analysis, multi-level model of meme diffusion