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Response to Messages
about Chronic Wasting
Disease in Hunter Focus
Groups

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EXECUTIVE SUMMARY

Chronic wasting disease (CWD) is a contagious disease that infects deer and other cervids. The New York State Department of Environmental Conservation (DEC) is taking steps to educate hunters about CWD and to inform them about what they can do to keep CWD out of New York. In 2021, DEC was awarded funding to develop a research-based digital media campaign to reduce the risk of CWD introduction from anthropogenic activities. The Cornell Center for Conservation Social Sciences (CCSS) collaborated with DEC to conduct social science research needed to inform development of communication campaign materials. Here we report results from stage two of research for DEC's digital media campaign.

The objectives of this research were to: (1) assess hunters' response to DEC messages intended to promote behaviors that reduce risk of introducing or spreading CWD; and (2) gain insight on how NYS hunters would react to message components, such as word choice and uncertainty.

DEC staff recruited adult NYS deer hunters to participate in one of three focus groups, held virtually in June, 2021. Each group consisted of 9 to 11 participants; the majority had experience hunting deer outside NYS or using deer urine-based scent lures. Participants (n=31) were presented with five sets of statements related to CWD, then asked open-ended questions to ascertain how they interpreted the statements and the factors that affected their interpretations. We analyzed discussion comments to assess: whether hunters understood the intended message; how each message shaped hunters' beliefs about the threats of CWD and the consequences of their behaviors; factors that influenced the likelihood of adopting recommended behaviors; perceived credibility of different information sources; and preferred sources of CWD messages.

Key Findings, Conclusions, and Recommendations

- In general, participants were able to accurately identify the intended message in 4 out of the 5 sets of statements (i.e., the messages that CWD is an immediate threat, that the arrival of CWD will lead to restrictions on hunters, that hunters can and should take responsibility for preventing spread of CWD, and that there are easy ways for hunters to avoid bringing home the prions that cause CWD in deer taken outside New York State).
- Participants struggled to identify the intended message of the 5th set of statements, which was designed to communicate that natural urine-based scent lures should be avoided because they could contain the prions that cause CWD.
- Participants generally preferred that declarative statements and behavioral recommendations be stated in clear, objective, unambiguous terms and be well supported by empirical evidence. These comments echo some of the guiding principles of effective

communication (e.g., clarity, simplicity, credibility, trustworthiness) and should be considered across the CWD communication campaign.

- Some factual claims presented to the groups were questioned, including claims about: (a) the role that hunters can play in preventing the introduction of CWD, (b) how CWD would affect deer populations, and (c) whether hunters think natural scent lures are important for hunting success. Empirical evidence supporting factual claims could bolster the effectiveness of the overall CWD communication campaign. Multiple messages and message formats could provide both basic information about CWD and supporting evidence for factual claims.
- Hunters in the focus groups considered themselves more knowledgeable about CWD than rank and file hunters and highlighted the need to increase awareness of CWD across the entire hunter population. Taking their suggestion into consideration, the above messages could be paired with background information describing what CWD is, where it is found, and how it threatens deer and deer hunting in New York. Some messaging addressing these points was included in the messages tested in the focus groups, but more background information about CWD and its effects on hunters might be beneficial for communication with the full spectrum of hunting license holders.

Based on our observations, we suggest the following draft statements be included as part of DEC's communication outreach efforts:

- Statement 1: CWD is an immediate threat in NYS. It is easier to keep CWD out of NYS than to get rid of it after it arrives.
- Statement 2: The arrival of CWD will lead to more restrictions on hunters. Hunting practices will have to change to contain CWD. The DEC would identify areas where it would prohibit (a) taking a deer carcass out of the area, and (b) disposing carcass on the land.
- Statement 3: Hunters can and should take responsibility for keeping CWD outside NYS. Hunters pose a risk of introducing CWD when they use natural urine products or bring home carcasses or parts that may contain prions.
- Statement 4: CWD could be in any deer you kill outside NYS, but there are easy ways for you to reduce the risk of bringing home the prions that cause CWD. DEC prohibits bringing back whole carcasses or intact deer heads to NYS. Limiting the parts you bring back to venison, antlers, and cleaned skulls reduces the risk that you will bring anything containing CWD.
- Statement 5: Hunters should not use deer urine-based lures as they could contain prions that cause CWD. Artificial (synthetic) scent lures can be used instead as they do not risk introducing CWD to NYS.

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INTRODUCTION

Chronic wasting disease (CWD) is a contagious and ultimately fatal prion disease that infects members of the cervid family, including deer, elk, and moose (Williams & Young, 1980). It is characterized by a prolonged incubation period (1.5 to 3 years in deer and elk) that heightens the risk of disease transmission (Miller, Wild, & Williams, 1998). CWD can be transmitted directly, through animal-to-animal contact, or indirectly as uninfected animals are exposed to prions in environments contaminated with excreta and biological fluids of infected animals (Miller et al., 2004; Saunder, Bartelt-Hunt, & Bartz, 2012). The prions that cause CWD can persist in the environment for an extended period of time. This makes it imperative to handle infectious material from harvested deer in a cautious manner to prevent further transmission of CWD (Gough & Maddison, 2010; Gillin & Mawdsley, 2018).

Wildlife managers are concerned about the potential of CWD reintroduction to New York State (NYS). Found in both captive and wild cervids in NYS in 2005, CWD was eradicated following intensive management efforts and has not been detected since. However, by 2021 CWD had been detected in free-ranging cervids in at least 26 states in the continental United States and four Canadian provinces. Many New York State (NYS) residents travel to CWD-positive areas to hunt deer or use deer urine-based scent lures; both behaviors raise the risk that the prions which cause CWD will be reintroduced to wild deer in NYS. The DEC has been working to promote hunting behaviors that reduce the risk of CWD introduction and spread. Yet, a survey found that many NYS hunters did not follow DEC's behavior recommendations (Siemer et al., 2021). About two-thirds of respondents were uncertain whether, or disagreed that, CWD was likely to appear in NYS within the next five years; these beliefs may help explain limited adoption of recommended CWD prevention behaviors (Siemer et al., 2021).

To continue building its capacity to communicate with hunters about CWD, DEC sought and was awarded funding from the U.S. Department of Agriculture Animal Plant Health Inspection Service (USDA APHIS) to develop a research-based digital media campaign to reduce the risk of CWD introduction from anthropogenic activities. The Cornell Center for Conservation Social Sciences (CCSS) collaborated with DEC to conduct social science research needed to inform development of campaign materials. The APHIS-funded project will have four stages of research; here we report results research stage two.

In research stage two, we conducted focus groups to test hunter reactions to sets of statements about CWD-related topics. The primary objectives of the focus groups were to: (1) assess hunters' response to different components of messages encouraging CWD risk management behaviors; and (2) make judgments about message components most likely to be effective in digital media interventions.

By clarifying how hunters interpret and respond to the messages, the focus group discussions were intended to help the study team make decisions about messages to be tested in the third stage of research. Specifically, the findings allowed us to determine whether hunters understood the statements in the manner that DEC intended, how these statements shaped CWD threat perceptions, and the extent to which these statements enhanced likelihood of adopting recommended behaviors. This research provided a foundation for developing hypotheses about the types of digital media interventions that would encourage hunters to adopt CWD prevention behaviors recommended by DEC.

Additionally, the focus groups allowed us to identify characteristics of the messages that caused hunters to respond in a particular way. Past risk communication research has shown that a variety of message characteristics can influence response in target audiences, including: word choice, tone, how uncertainty is described, and other factors. By understanding which of these characteristics influenced the response of hunters—and how they influenced those responses—the focus group data can help managers increase message effectiveness.

METHODS

Qualitative Approach

We chose focus groups as the approach to gather data for the initial stage of the study. Focus groups rely on open-ended questions and provide avenues for interpersonal interaction and debate, which facilitates in-depth cognitive processing and extensive deliberation of related topic areas. Although focus groups are not designed to derive representative data (Berdahl et al., 2016; Lock et al., 2014), they are effective for gauging public attitudes due to the spontaneous and free-flowing nature of such discussions. Focus groups also provide high validity by closely mirroring everyday conversations through participant-led discussions (Lock et al., 2014).

This approach allowed us to explore aspects of CWD of interest to the hunting community, as well as to identify a priori the characteristics of CWD messages that might influence target audiences' interpretation. It also provided the opportunity to gain more insight regarding trusted information sources to use for the digital intervention. Focus groups allowed us to explore various factors that play a crucial role in shaping subsequent message construction and mode of message transmission.

Sampling and Recruitment

We recruited adult deer hunters (aged 18 and above) in NYS to participate in three focus groups. Participants were recruited from respondents to a previous email survey focused on

CWD (Siemer et al. 2021). Each group included some participants who had hunted deer outside NYS or had used deer urine-based scent lures. Focus group meetings took place between June 7, and June 10, 2021. We recruited 12 to 16 hunters to participate in each group. Our goal was to have approximately 12 participants in each meeting.

Discussion Moderation and Analysis

In each group, we presented participants with five sets of statements. Each statement was comprised of 4 to 5 bullet points that contributed to the main point wildlife managers wished to communicate to hunters (Appendix A). After presenting each statement, we asked open-ended questions to ascertain how participants interpreted the message and the factors that affected their interpretation. Finally, we presented participants with a slide that summarized intended messages from statements 1 through 5 (Appendix A) and guided discussion about the main points from each statement.

We facilitated group discussion using a semi-structured interview guide (Appendix B). The interview questions probed several topics of interest to the research team, including: participants' interpretation of the main message, questions they had about the message, how the messages influenced their perceptions of the threat and consequences of CWD, identification of key statements within each set of messages, and sources of information about CWD. The focus group discussions were audio- and video-recorded, as well as automatically transcribed through Zoom. We relied predominantly on deductive coding to analyze the data, by predetermining categories based on the moderator's guide and extant literature (Braun & Clarke, 2006). We analyzed comments from each focus group individually. Then, we compared findings across the three groups to identify broader patterns that may be present among NYS hunters. We labeled comments according to the focus group from which they were drawn (i.e., group 1 = G1, group 2 = G2, group 3 = G3).

RESULTS

Participant Characteristics

We had 31 participants across the 3 focus groups. Group size ranged from 9 to 11 hunters per meeting (the number of actual participants was lower than the number of hunters recruited, due to cancelations and unexplained absences). All the participants were white males. Mean age of participants was 53 years old (range 32 to 74). Twenty-nine percent of participants were less than 45 years old; 35% were age 60 or older. All participants had hunted in NYS and 58% had hunted deer outside NYS. Seventy-four percent of participants had used scent lures at least once while deer hunting.

Statement Set 1

- CWD is in Pennsylvania and other states near New York.
- It could appear anywhere in NY at any time, but no one knows when it will appear.
- If CWD appears in NY, it may not be possible to get rid of it.
- It is easier to keep CWD out of NY than to get rid of it after it arrives.

Interpretation of statement

In general, participants were able to accurately identify the key message intended by DEC—that CWD is an immediate threat to NYS. Specifically, participants identified two key themes DEC intended to communicate: (a) CWD would bring about adverse consequences for NYS, and (b) it is crucial to take preventive measures to keep CWD out of NYS.

After reading statement set 1, multiple participants from all three groups characterized CWD as a serious issue, thought it was highly likely to appear in NYS in the future, and believed introduction of CWD would bring about adverse consequences for NYS.

A matter of when and not if it's going to show up and what steps that this state can take to slow the process down. (G1)

Who knows when or where it'll show up next so that's a concern and it's definitely easier to keep it out than it is to get rid of it. (G2)

If you're not following the rules you better start, because once it's here it's going to be a big problem. (G3)

Consequently, many participants stressed the importance of taking preventive action to avoid introducing/re-introducing CWD to NYS. Prevention of CWD was argued to be more effective than trying to manage CWD after it has arrived.

...keeping it out will be easier than anything. (G1)

It's going to arrive at some point but let's try to mitigate the opportunity to do so. (G1)

It is easier to keep CWD out of New York than it is to get rid of it after it's been here. (G2)

CWD, that's some serious carnage that I want no part of in New York and if I can be a part of keeping it out of New York I'd like to be. (G2)

...too costly to try and clean things up, if we do get it. (G3)

There were also meeting participants who were aware of CWD as a deer management issue, and reading statement set 1 did not change their perception of CWD as a risk to deer hunting.

[the threat of CWD] Doesn't seem urgent aside from the 2005 case; but reading this makes it seem so. (G1)

...I think it's along the same lines of what I [have] read and what I [already] believe. (G3)

There was a sense among participants that the issue of CWD is not salient among rank and file hunters and that many hunters lack awareness of the issue. Some participants suggested that the second bullet point in statement 1 (i.e., It could appear anywhere in NY at any time, but no one knows when it will appear) made CWD appear to be a distant rather than an immediate threat to deer in NYS.

Many [hunters I know] did not know it has been spreading quite a bit. (G1)

Don't think that the average hunter spends a lot of time thinking about CWD in New York. (G2)

There's an unknown of how it can get here or how easily it could get here ...people don't realize that it could be brought in fairly easily from neighboring states or Canada. (G3)

Message characteristics

Some participants assumed that the research team would only include one of the bulleted items for each statement, which was not what was intended. Nevertheless, for statement 1, participants expressed a preference for the fourth bullet point (It is easier to keep CWD out of NY than to get rid of it after it arrives). In all 3 focus groups, participants perceived the fourth statement as being the most impactful in garnering public attention and motivating behavior change.

4 is the cleanest of the four messages. You know that's going to have the highest priority anybody that's had to deal with it. (G3)

fourth one was ... a really good tagline a real good educational piece... it's quick it's easy and it, I think it resonates and is easy to understand.(G3)

Combine the first and last statements to increase sense of urgency. (G1)

Statement Set 2

- If CWD appears in NY, it would threaten deer populations and hunting heritage.
- The disease itself would lead to a decrease in the deer population.
- DEC would reduce local deer populations to control the spread of the disease.
- Hunting practices would have to change. To contain CWD, DEC would identify areas where it would prohibit: taking a deer carcass out of the area, and disposing of a deer carcass on the land.

Interpretation of statement

Overall, participants were able to grasp the intended message from the bullet points (i.e., that the arrival of CWD will lead to fewer deer and more restrictions on hunters). Specifically, participants received the message that CWD would impact all hunters, which makes it imperative for hunters to play a role in managing CWD and keeping it outside NYS.

We have to deal with it, everyone will be impacted no matter where you are on the hunting spectrum. (G1)

If CWD affects hunting opportunity it is more likely to gain attention and elicit change. (G1)

...hunting practices would have to change to contain CWD (G2)

It would drastically impact your flexibility or your freedoms in your hunting practices compared to what we do now... (G3)

this is how it's really going to impact you, so we all need to play a role in in managing it and keeping it away. (G3)

[To change people's behavior], I would explain to people that it would heavily impact what they enjoy at the current time. (G3)

However, participants were unclear or skeptical about the accuracy of the claim that CWD would reduce deer populations.

I heard contradictory statements...someone said, there is no effect on the deer hunting or the deer population. This [statement] says that there is a threat to the deer population, so that would immediately raise a question in my mind... (G2)

...I didn't realize that, in addition to just the deer getting the disease and dying off I didn't realize that CWD would also kind of reduce the herd so I'm not sure if others are aware of that point. (G3)

It was also noteworthy that participants did not hold a uniform understanding of the term hunting heritage. In group 1, participants focused on the social aspect of hunting and tended to describe hunting heritage in terms of hunting as a family tradition. Specifically, the threat of CWD on hunting heritage was perceived as something that varies depending one's hunting habits. In contrast, participants in group 3 perceived hunting heritage as broadly referring to hunting practices and methods in general.

My son who is in his early 20s grew up in a hunting family, but if I look at a bunch of his friends who are in their early 20s, maybe late teens, they don't necessarily have that hunting heritage, they aren't necessarily hunting with family, they're hunting with groups of friends. So I don't know that it translates to everybody the same way. (G1)

I'm reading 'hunting heritage' as the way that we have today, and then that's going to change drastically, what we appreciate today and how it all works. (G3)

...seeing it [hunting heritage] as the traditions and the hunting practices we've been able to use, and traditions was hunting camps and hunting methods and hunting freedoms that we've had; [that is] threatened by how we hunt, how we bring the meat out, that sort of thing. (G3)

Many participants perceived CWD as a serious threat to hunting quality and opportunity. But it was noteworthy that some participants in group 2 expressed uncertainty about whether and how much CWD would affect deer populations; they did not perceive CWD as a threat. When this point was discussed, some participants recognized that management decisions might lead to a decrease in deer population, but rejected the idea that CWD would have a direct negative impact on deer population size.

"...message two may be scientifically incorrect and so, in that sense it's a problem having that as a set because probably, if it's intentional,... it's then leading hundreds to believe, if I do have chronic wasting disease, I can't maintain deer populations at a high level ... that's also a weird twist that I don't feel is appropriate, because there's no evidence to suggest that we will have fewer here, [that] there will be more dead deer, ... we all know how quickly deer can colonize empty landscapes." (G2)

"our bigger problem is the concentration of deer in certain areas, whether it's areas where there's a lot of private property or developments where ...nobody's killing the [deer] ...they just ...die of old age or get hit by cars." (G2)

Some participants in group 2 attributed CWD risk to deer farms and were skeptical about the claims that CWD would impact deer populations. They emphasized that to convince them, it would be important to include evidence to support the bullet points that claimed CWD would have a negative impact on the deer population and that engaging in the recommended behaviors would help curb CWD.

...this is a very problematic slide for me...because I think they're not borne [statements are not supported] by any evidence... (G2)

Is there proof? ... I feel we need to make statements that are backed up with facts and make sure we're not trying to use scare tactics, I guess, for lack of better terminology. (G2)

At least for me, what I want is some sort of evidence that this, this has been shown to increase the number, the amount of chronic wasting disease, I mean to me, you can say it, I guess it passing it sounds like it might be logical. Is there some statistical evidence somewhere that says that this is this has an impact on chronic wasting disease?...As a hunter I just want some fact based research that tells me that we need to do this... (G2)

we'd want to see decisions that are made based on facts with proof, so we can spread the word based on fact when we start talking, or we start trying to back up theories on how we're going to prevent this, or what we need to do to prevent this, I also think we need to really work on bringing the public into this, as far as awareness. (G2)

This contrasts with the tone among group 3 participants who commented about the lack of awareness about this issue and the need for more public education to understand how CWD occurs in order to encourage behavior change.

one of the things we run into [with hunters] is it's a little bit of out of sight out of mind. It's not happening here, so why are we [hunters] worrying about it? ...You know this constant repetitive information [the messages presented to focus groups] may start ... [telling us] how it's going to actually impact us, other than it being a disease that's happening someplace else,... now that we have these statements [telling us] this is how it's really going to impact you so we all need to play a role in managing it and keeping it away. (G3)

...I go out with people in their 30s or 20s to our hunting stuff and a lot of this stuff is not talked about, not a whole lot of information, a lot of people talk about it, but none of us [hunters] really know what it is, how it spreads, moving around and what to do about it. (G3)

Message characteristics

For statement set 2, participants expressed preference for the fourth bullet point (Hunting practices will have to change. To contain CWD, DEC would identify areas where it would prohibit (a) taking a deer carcass out of the area, and (b) disposing a carcass on land). Similar to statement 1, some participants selected these statements based on the assumption that only one statement would be included, which was not what was intended. Nonetheless, participants seemed to find the last point most salient due to the personal relevance it has for themselves, and that the statements were worded in an actionable manner that tells them exactly what to do.

Want to highlight the third and fourth so people know what to do. (G1)

It hurts, it's the type of statements you need to make; when you read three and four, it has (personal relevance); negative effects. (G1)

the last sentence, where the hunting practices would have to change to contain CWD ... all the other things may be true, but they're not I don't think they would have the impact on the hunters as much as the last one. (G2)

Statement [bullet] four seems to be the most impactful. (G3)

Statement Set 3

- Hunters play a vital role in keeping CWD out of NY by not introducing the prions that cause CWD through deer carcasses and hunting products.
- While captive deer facilities can introduce CWD, too, the primary risks from these facilities are being addressed by DEC and the Department of Ag & Markets.
- Hunters pose a risk of introducing CWD when they use natural urine products or moving carcasses or parts that may contain prions.
- You can help other hunters keep CWD out of New York.

Interpretation of statement

Generally, participants were able to identify the intended message in statement set 3– that hunters can and should take responsibility for keeping CWD outside New York.

...these statements say to me [that] this is a hunter issue to deal with... (G2)

we as hunters can, could be the source of it [CWD] if we're not careful.(G3)

Some argued that the bullet points needed to provide more information for hunters to better understand specifically what they should do if DEC hoped to elicit behavior change. However, there were some misunderstandings in relation to the first bullet point (i.e., Hunters play a vital role in keeping CWD out of NY by not introducing the prions that cause CWD through deer carcasses and hunting products). Some participants misunderstood this bullet point as referring to the removal of whole carcasses from the place where it was killed inside NYS, when it was intended to refer how hunters should handle a deer when returning to NYS with a deer taken in another state. In turn, they highlighted the impracticality of the suggested behavior (e.g., lack of facility for easy disposal of a carcass, lack of knowledge about parts of deer that contributes to CWD).

Need to offer a suggestion of what to do. For example, bring it [the carcass] to a landfill or a deer processor). (G1)

More education needed...CWD is not in the intestine or stomach but in the spinal column and glands/brain matter. New York State can emphasize that there are important bits of the animal to not leave in the woods or to be more careful when transporting them. (G1)

I think it's up to the DEC be proactive... they should really do a heavy campaign and let everybody know... send out flyers, broadcast it out their emails ... send stuff out there, let New York hunters know that it's out there... (G2)

it's like what do you do with it, where do you bring it? What do you dispose and how do you dispose of this that is bad? How do you clean up any remains on the ground that you know that have come from this item? (G3)

...you know, understanding the actual transference from the prions if it's in the meat or if it's just in the bones, you know how that actual transference occurs. That would be important as part of these messages. (G3)

When discussing the threat of CWD, participants from group 2 expressed concerns about whether the risks of deer farms were being adequately addressed. Some perceived deer farms to be the key source of CWD, and that all hunters' efforts to prevent it would be futile if nothing is done about risks associated with deer farms.

same situation is what just happened in Pennsylvania here about a month ago, or so where they found a deer farm that was infected with it [CWD] within five miles of the New York border. (G2)

More than likely when it shows up in New York it's going to be a domesticated deer farm that's going to start it. And bang, that's just exactly what happened [2005 CWD case]. (G2)

We know from all the research that is being done that's how you get it, you get the deer being shipped to you [the captive cervid owner] with chronic wasting disease that you cannot identify unless you fully sample them but once the symptoms appear that's pretty far along in chronic wasting disease... and there never is a safe way of [farmers] keeping deer in, they always find a way out, one way or the other... 90%–95% of the chances are if we get it in New York it's going to show up on the deer farm. Our discussions here, what we are concerned about it may not affect the appearance of chronic wasting disease in the state unless we get the deer industry in line, and right now that doesn't seem to be the case. (G2)

Several participants in group 2 expressed discomfort and criticized bullet points in statement 2 for placing all the responsibility of CWD spread solely on hunters. This could be because they perceived deer farms to be the main contributor of CWD as opposed to hunters.

these statements here collectively produced, put the onus on hunters which I think is absolutely incorrect. (G2)

I take issue with number three because it says that we're the problem [hunters] and we have to take responsibility, rather than we can be a part of the solution and we can contribute... number three says it's our problem and we're contributing towards so we have to fix it. (G2)

I take issue with two and three because, again, the onus is on the hunters, where I don't think that will be correct ... they may play a role, but it's not the primary one. It's more the farming of the deer. (G2)

Message characteristics

For statement set 3, participants expressed preference for the third bullet point (i.e., Hunters pose a risk of introducing CWD when they use natural urine products or dispose of carcasses or parts that may contain prions). They also expressed a preference for actionable statements that tell them exactly what to do and the reasons and significance of such behavior. Similar to the earlier statements, some participants selected these statements based on the assumption that only one statement would be included, which was not what was intended. Nonetheless, participants seemed to find the third point most helpful in promoting behavior change because it included the gist of the other statements (i.e., that hunters have a responsibility to play in keeping CWD out of NYS) and explicitly told them what behavior to avoid (i.e., using natural urine products).

The third one seems like an actionable statement... use it to explain and drive the point. (G1)

Three is the only actionable one. (G1)

Third one sums it up... probably the best. (G3)

Third is most impactful. (G3)

Statement Set 4

- CWD has been found in 25 states so far.
- You can't tell just by looking at it if a deer is infected with CWD.
- DEC prohibits bringing back whole carcasses or intact deer heads to NY.
- Limiting the parts you bring back to venison, antlers, and cleaned skulls reduces the risk that you will bring anything containing CWD.
- Hunters in other states have to follow similar rules.

Interpretation of statement

Overall, participants were able to identify the key message of statement 4 (i.e., that CWD could be in any deer taken outside NYS, but there are easy ways for you to reduce the risk of bringing home the prions that cause CWD). Rules and regulations regarding the transportation of carcasses over state lines and the impact this would have on CWD were particularly salient information among participants.

...what I can and cannot do, what parts I can bring back. (G1)

This just seemed like the justification for the whole bringing carcasses back to New York, rules that they have. (G2)

That New York does not want any whole carcasses brought over state lines. (G3)

I would agree, and these are things we have to do to keep it out of New York State. (G3)

However, some participants were unaware of current rules and regulations about the transportation of carcasses in NYS, and some thought guidance on this topic unclear.

Never heard about not bringing back a whole deer carcass. (G1)

...I believe, [it is] totally voluntary, not like you have to drive to checkpoints [where someone will inspect your vehicle]...so once again the onus is on the hunter actually do the right thing. It's just a request, basically... (G2)

If the state was to put out a fact sheet, with some of these commonly asked questions [that we are discussing in this meeting] people would definitely understand it more. And the state also needs to be clear and concise and fair with their rules and regulations regarding transporting carcasses—what they consider okay, what they don't consider okay—mainly to be fair, about it, I think. When they run into a lot of issues is when there's a lot of gray area. You're going to get people, they're going to be opposed, one way or the other. (G3)

Participants called for increased efforts to raise awareness about regulations on the transportation of deer carcasses across state lines. Some participants suggested that hunters often hunt in different states and may not be aware of the differences in carcass handling regulations in a different state.

Provide a list around the border area so people can look up the restrictions last minute ... (G1)

A lot of hunters that have never hunted out of the state aren't really aware of, or don't pay any attention. That's a problem ... (G3)

Message characteristics

For statement 4, participants expressed preference for the fourth bullet point (i.e., limiting the parts you bring back to venison, antlers, and cleaned skulls reduces the risk that you will bring anything containing CWD). Similar to the earlier statements, some participants selected these statements based on the assumption that only one statement would be included, which was not what was intended. Nonetheless, participants seemed to find the last point most salient because it explicitly stated desired behavior and the impact that behavior creates. In general, participants found unambiguous statements that provide a clear rationale most persuasive. For instance, another participant in group 3 mentioned that the third point was the weakest because it does not elaborate on the reasoning behind the desired behavior.

Fourth [bullet point was] most impactful. (G1)

I like the fourth point the best...limiting the things that you can bring back into the state is the clear message. (G3)

I would say DEC prohibits bringing back whole carcasses is the weakest because it doesn't really say why. It just says that it's prohibited. (G3)

Statement Set 5

- Prions that cause CWD can be found in deer urine, so use of natural scent lures could introduce CWD.
- Urine used in natural scent lures is collected from captive deer facilities, which may have deer infected with CWD.
- The risk from natural scent lures is hard to judge, so DEC asks hunters to avoid using natural scent lures to protect NY's hunting heritage.
- Most hunters do not think natural scent lures are important for their success.
- Artificial (synthetic) scent lures can be used by hunters without risk of introducing CWD

Interpretation of statement

This set of bullet points was designed to persuade hunters not to use natural scent lures, while acknowledging that uncertainty exists around risks associated with scent lures, but participants did not find it convincing. Participants in all three groups saw the statement as ambiguous; the hedging language in statement set 5 was confusing to participants and made it difficult for them to identify the take home message and behavior DEC was trying to encourage.

Some [of the bullet points] are too wishy washy (G1)

Seems like they [DEC] are not sure... use of words 'can be found', 'may have'... not direct or clear enough. (G1)

This topic seems subjective; there doesn't seem to be a fact you can state compared to the earlier messages. (G1)

these statements are all over the road... (G2)

...appears that you're strongly encouraged to use the artificial stuff, but you can still use the natural stuff. (G3)

...you're trying to tell people to do something, or not to do something and, in this situation you're not really going one way or the other you're saying it may be, there may not be there, you can use it, or you know you shouldn't use it, but it's not giving you a direction... (G3)

Notably, some participants in group 3 argued that the uncertainty in the bullet points seemed to detract from the seriousness of the issue while participants in group 1 suggested focusing on the facts.

I think an unsaid message here is that because you are still allowed to use the natural stuff the risk must not be that great. Wouldn't it be illegal, if it was that big of a risk? (G3)

Yes, it's like a decision just needs to be made. Either it's okay to use or it's not okay... if the DEC truly believes that it's that much of a potential for harm...just make it so that it's synthetic only. (G3)

Focus on the facts. (G1)

Statements have to be factual, not speculative (G1)

They suggested that including more evidence to support the statements could help to reduce uncertainty and make the message more persuasive.

But it's just if you ask me to do it and you give me good reason behind it I'm more likely to do that... (G2)

A link, if you will, to some studies that have proven... (G2)

...some type of a scientific proof that the artificial worked as well as the natural. That would be important too. You can use it, but how effective, is it.... (G3)

what's the actual [likelihood that natural scent lures will contain the prions that cause CWD], you know, some data based on the science ... that ...there's an ...8% of you know, natural lures contain the prions?... Is this a less than 1% likelihood ...we are talking about? I'm just thinking that, you know, we're kind of in that age where the science and the data teach it... (G3)

Additionally, participants in different groups suggested different approaches to tackle the uncertainty in the statement. Participants in group 2 expressed a preference for a softer approach of education to get people to change their behavior.

...[it should be] done through education and cajoling and not by antler point restrictions and stuff like that... (G2)

...So, the best thing to do is education, rather than rules and regulations which are just arbitrary and capricious... (G2)

...typically if you asked me to do something I'm generally more willing to comply, when you tell me I can't do something you're more likely to get me to do it anyway just to spite you. (G2)

There were also mixed opinions about the perceived effectiveness and current adoption of natural scent lures. Participants expressed disagreement with the statement "Most hunters do not think natural scent lures are important for their success." Instead, they claim that it is dependent on individual hunters' preference. Several participants felt strongly about the efficacy of natural scent and refuted the claim that hunters don't find scent lures important for success.

... [this bullet point is] absolutely ludicrous because I know people that live by it [natural scent lures] and others that it's absolutely absent in the repertoire... (G2)

I've been doing it [using natural scent lures] for three years, especially (with) the older ones who swear by it, most of the younger hunters I know, my age ... or younger, around 50-50 [tendency of using scent lures]. (G3)

I would disagree most hunters actually believe that [believe the claim that most hunters do not think natural scent lures are important for their success]. (G1)

Artificial scent lures are really a non-issue. They're not the subject at hand here and I don't think that they're in anybody's book considered a viable alternative to natural urine... A buck knows what is real urine and what heat smells like. There's no substitute for that. (G2)

I disagree with the statement that most hunters do not think it's very important. I think they're very important, I think they're very effective I've used them for years, I also do a fair amount of fur trapping, so I understand the importance of scents and they're very effective if they're used properly. (G3)

...most of the core whitetail guys, they're not using artificial scents. Their belief is in natural scents. (G3)

Message characteristics

In general, participants were critical of all the bullet points in this statement set, primarily due to the choice of words that made it seem speculative and subjective rather than factual and objective. Participants thought this message would cause more harm than good for the issue of CWD. In general, participants expressed a preference for statements that are clear and unambiguous as well as objective and supported by empirical evidence regardless of whether they are factual or statements or desired behaviors.

this whole slide is almost all speculative, is how it reads, and so none of it is really seemed factual... (G1)

...[you] really got to lay out the facts and get rid of any of the wishy washy 'can be' 'might be' 'maybes' and just be careful with your wording. (G1)

these statements are all over the road... (G2)

... you are allowing possibly risky behavior without stating straight out that it's high risk.(G3)

... introducing a lot of gray areas in here because it's hard to judge...you're trying to tell people to do something, or not to do something and, in this situation you're not really going one way or the other you're saying it may be, there may not be there, you can use it, or you know you shouldn't use it, but it's not giving you a direction. (G3)

There were also mixed opinions about which sub-points were the most impactful and effective. Similar to the earlier statements, some participants selected these statements based on the assumption that only one statement would be included, which was not what was intended.

The first one is the strongest. (G1)

One definitely drives the point home. (G3)

I think one is the most direct message, and I think most people are going to shake their head at [bullet] number four. (G3)

One and three is probably the strongest message and five is an important point to make, how much people listen to that I don't know. (G3)

Although statement 4 had been discounted by a number of participants, some participants suggested combining sub-points 1 and 4 to make the point best.

Last statement with first statement coupled together [would be] more effective. (G1)

I think one and four combined sums it up the best. (G3)

I would combine one and four... (G3)

Summary slide

1. CWD is an immediate threat to NYS.
2. Arrival of CWD will lead to fewer deer and more restrictions on hunters.
3. Hunters can and should take responsibility for keeping CWD outside NYS.
4. CWD could be in any deer you kill outside NYS, but there are easy ways for you to reduce the risk of bringing home the prions that cause CWD.
5. Deer urine-based lures could contain the prions that cause CWD, so DEC wants hunters to avoid using deer urine-based lures.

When participants were presented with the summary statements designed to capture the key points in each of the 5 sets of statements, some noted that they would have found it helpful to have these summary bullets as the final point accompanying each of the five sets of statements. They thought that the summary bullet points were more direct and thus, impactful in comparison to the earlier statements.

Use sub-points from the earlier slides to support these statements (G1)

Individual messages in each slide did not have the same punch/a bit soft as these statements (definitive – what it is, what we can do etcetera) (G1)

The only question is on [summary slide bullet] one [i.e., CWD is an immediate threat to New York]. I believe message one to be correct, but I don't know that the four original bullet points [that were shown to participants earlier in the meeting in statement 1] had the immediacy that this [summary] message was looking for. (G3)

However, it is important to interpret these findings with caution as the earlier statements were important in setting the context and background to understand and interpret the summary statements. As such, these statements may not have produced the same outcomes if participants had not viewed and discussed the earlier statements.

Preferred Information Sources

Sources of information

Participants identified several trusted sources of information that they relied on including academia, DEC, and hunting organizations.

...through your [focus group moderator/Cornell faculty member] publications...or hunting syllabus(G1)

... if it came in an email from the DEC.... (G2)

I think hunters trust those people [The President of a sportsman's organization or rod and gun club], and I think we should be getting our information from the people that are dealing with the problems ...the CWD hotspots, find out if they've done some studies communicate those studies ... I know a lot of us get emails from the DEC... do an article in the outdoor news ... (G2)

I might pay a little bit more attention DEC than RMEF/WTF. (G3)

Yet there were others who argued that the information itself is more important than the source.

I'm going to make my decisions based on what is actually getting out not what organization [sends the messages]. (G3)

Preferred channels

Participants identified several channels through which they would prefer to receive CWD-related information. These included both online and offline modes of communication, although we were primarily interested in the former for the purposes of this study. Participants mentioned that they would like to receive CWD-related information through emails, social media (i.e., Facebook, Instagram), websites, word-of-mouth, the DEC hunting regulation guide, and hunting-related magazines. They highlighted that "...it doesn't hurt to get it out to multiple sources".

Notably, participants thought that involving the hunting community is crucial due to the reliance on word-of-mouth, even electronically, which would be helpful for spreading the message and could even potentially convince critics to consider the behavioral recommendations from DEC.

I go to the local rod and gun club, so I get regular communication from my local rod and gun club...I think hunters trust those people (G2)

Give a dozen or so people some sort of visual statement, they may post it (on Facebook/Instagram), I mean it'll be all over the state...a general template that anyone can kind of post their logo on, per se... it shows...this is official DEC, but we [hunting organizations/hunting community] also care about [it]. (G3)

If I was a naysayer... when all these other [hunting] groups are saying what's in the sciences there, ...you know, it would help drive home [the point]. (G3)

DISCUSSION, CONCLUSIONS, RECOMMENDATIONS

We were interested in determining whether hunters understood the intended take home message in each statement. We confirmed that participants were able to accurately identify the intended message in statement sets 1 through 4 (i.e., the messages that CWD is an immediate threat, that the arrival of CWD will lead to restrictions on hunters, that hunters can and should take responsibility for preventing spread of CWD, and that there are easy ways for hunters to avoid bringing home the prions that cause CWD in deer taken outside NYS). Certain bullet points were more salient and impactful than others, however. For example, the ideas that it is easier to keep CWD out of NY than to get rid of it after it arrives, and DEC will change hunting practices if CWD arrives, were perceived as impactful statements in all groups.

Meeting discussions indicated that participants struggled to identify the intended message of statement set 5, which was designed to communicate that urine-based scent lures should be avoided because they could contain the prions that cause CWD. Language conveying uncertainty about the risks associated with use of natural scent lures elicited doubts about recommended behaviors and confusion about the underlying rationale for behavioral recommendations. Although uncertainty is inherent in CWD management, meeting discussions make it clear that reflecting uncertainty in messaging may cause confusion, raise doubts, and inhibit behavior change. For example, the statement that “the risk from natural scent lures is hard to judge” led hunters to question the associated DEC recommendation to avoid use of natural scent lures. Similarly, group participants thought that wording acknowledging uncertainty about the risks associated with use of natural scent lures would undermine DEC recommendations related to use of natural lures.

Whether participants were reading declarative statements about CWD or statements about behavioral recommendations from DEC, they preferred clear and unambiguous presentation of information. Participants also preferred that behavioral recommendations be described in a direct and actionable manner. They stressed the importance of elaborating on the rationale for

and impact of recommended behaviors in order to provide a more persuasive argument and convince them of the significance of their behavior change. Their comments suggested that even hunters who possess basic understanding of CWD may not be motivated to engage in behavior change unless messaging includes a clear rationale behind it emphasizing the importance of adopting the behavioral recommendations. These comments echo best practice recommendations for effective risk communication (e.g., clarity, simplicity, credibility) and should be considered across the CWD communication campaign (Tumpey et al., 2018).

Some participants called for more empirical evidence to support the statements. They claimed that they would be more convinced by the statements and more likely to engage in the recommended behavior if there was empirical evidence to support recommended behaviors. Some participants also mentioned that having empirical support would make it easier for hunters to convince other hunters to adopt the recommended behaviors through word-of-mouth. This suggestion might be incorporated as part of the messages disseminated to the public by citing existing research or having experts (e.g., scientists, DEC, hunting instructors) talk about the issue (if using a video format).

Participants questioned some of the claims presented in meetings, most notably the claims that: (a) most hunters don't think natural scent lures are important for their success, (b) hunters could reintroduce CWD to NYS by using natural scent lures, and (c) spread of CWD into NYS would lead to decline in the deer population. These findings provide additional incentive to support any claims made in the CWD communication campaign with empirical evidence.

In order to be relevant to hunters, CWD messages must help hunters understand how they and others they care about would be affected by CWD, that the negative effects could be significant, and that they can reduce those risks by taking recommended actions. We asked focus group participants questions to determine how statement sets 1-5 shaped CWD threat perceptions. Reactions to the messages were mixed. Exposure to the statements seemed to produce negligible effects on threat perceptions among those who already possessed awareness and knowledge of CWD. However, the statements did make some participants more aware that CWD could be a threat to their current hunting practices. This indicates that statements about the potential loss of hunting practices, or being forced to change hunting practices, might gain the attention of hunters. It could be useful to emphasize what hunting practices hunters stand to lose if CWD enters NYS.

Additionally, threat perceptions may be limited depending on hunters' perceptions of who is responsible for introducing CWD to NYS. For instance, participants in group 2 raised the issue of deer farms posing the greatest risk of re-introducing CWD to NYS, and claimed that the

independent effort of the hunting community to curb CWD may be meaningless. Hence, providing more clarity through raising public awareness of the spread of CWD and the role that hunters play in it may prove to be helpful to encourage more hunters to follow behavioral recommendations.

Focus group participants considered themselves to be more knowledgeable about CWD than the average deer hunter. Most participants were avid deer hunters and some were representatives of hunter organizations, so they may seek and process more hunting-related information than the average hunting license holder. Messages aimed at a general hunter audience, which includes casual and novice hunters, might benefit by being paired with background information about CWD (e.g., what CWD is, how it is transmitted, its prevalence) and how it threatens deer and deer hunting in New York. Some messaging addressing these points was included in the messages tested in the focus groups, but it might be expanded to address the lower knowledge levels of general hunting audiences.

A common guideline for effective communication is to send messages through sources trusted by the target audience. Focus group discussions suggested that academia, DEC, and hunting organizations would be trusted sources of information for many hunters, and thus could hold persuasive power among a segment of the hunting community. Discussion comments reinforce the importance of involving the hunting community in outreach efforts, to enhance communication about CWD through trusted social networks.

Based on the findings from the three focus groups, we recommend that statements similar to the following statements be considered for use as part of DEC's communication outreach efforts:

Statement 1: CWD is an immediate threat in NYS. It is easier to keep CWD out of NYS than to get rid of it after it arrives.

Statement 2: The arrival of CWD will lead to more restrictions on hunters. Hunting practices will have to change to contain CWD. The DEC would identify areas where it would prohibit (a) taking a deer carcass out of the area, and (b) disposing carcass on the land.

Statement 3: Hunters can and should take responsibility for keeping CWD outside NYS. Hunters pose a risk of introducing CWD when they use natural urine products or bring home carcasses or parts that may contain prions.

Statement 4: CWD could be in any deer you kill outside NYS, but there are easy ways for you to reduce the risk of bringing home the prions that cause CWD. DEC prohibits

bringing back whole carcasses or intact deer heads to NYS. Limiting the parts you bring back to venison, antlers, and cleaned skulls reduces the risk that you will bring anything containing CWD.

Statement 5: Hunters should not use deer urine-based lures as they could contain prions that cause CWD. Artificial (synthetic) scent lures can be used instead as it does not risk introducing CWD to NYS.

Next Steps

Based on findings from the 2021 hunter focus groups, the Cornell Center for Conservation Social Sciences (CCSS) collaborated with DEC to design and develop test messages that will inform the development of digital media interventions aimed at encouraging compliance and behavior change among hunters to prevent the emergence of CWD in NYS. Stage three of the project (i.e., message testing experiments) was implemented in fall, 2021. The final stage of the project (i.e., pilot testing messages in four communities) will be implemented in summer, 2022.

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APPENDIX A: STATEMENTS ABOUT CWD

Statement 1:

- CWD is in Pennsylvania and other states near New York.
- It could appear anywhere in NY at any time, but no one knows when it will appear.
- If CWD appears in NY, it may not be possible to get rid of it.
- It is easier to keep CWD out of NY than to get rid of it after it arrives.

Statement 2:

- If CWD appears in NY, it would threaten deer populations and hunting heritage.
- The disease itself would lead to a decrease in the deer population.
- DEC would reduce local deer populations to control the spread of the disease.
- Hunting practices would have to change. To contain CWD, DEC would identify areas where it would prohibit: taking a deer carcass out of the area, and disposing a carcass on the land.

Statement 3:

- Hunters play a vital role in keeping CWD out of NY by not introducing the prions that cause CWD through deer carcasses and hunting products.
- While captive deer facilities can introduce CWD, too, the primary risks from these facilities are being addressed by DEC and the Department of Ag & Markets.
- Hunters pose a risk of introducing CWD when they use natural urine products or moving carcasses or parts that may contain prions.
- You can help other hunters keep CWD out of New York.

Statement 4:

- CWD has been found in 25 states so far.
- You can't tell just by looking at it if a deer is infected with CWD.
- DEC prohibits bringing back whole carcasses or intact deer heads to NY.

- Limiting the parts you bring back to venison, antlers, and cleaned skulls reduces the risk that you will bring anything containing CWD.
- Hunters in other states have to follow similar rules.

Statement 5:

- Prions that cause CWD can be found in deer urine, so use of natural scent lures could introduce CWD.
- Urine used in natural scent lures is collected from captive deer facilities, which may have deer infected with CWD.
- The risk from natural scent lures is hard to judge, so DEC asks hunters to avoid using natural scent lures to protect NY's hunting heritage.
- Most hunters do not think natural scent lures are important for their success.
- Artificial (synthetic) scent lures can be used by hunters without risk of introducing CWD.

Summary statements:

1. CWD is an immediate threat to NYS.
2. Arrival of CWD will lead to fewer deer and more restrictions on hunters.
3. Hunters can and should take responsibility for keeping CWD outside NYS.
4. CWD could be in any deer you kill outside NYS, but there are easy ways for you to reduce the risk of bringing home the prions that cause CWD.
5. Deer urine-based lures could contain the prions that cause CWD, so DEC wants hunters to avoid using deer urine-based lures.

APPENDIX B: DISCUSSION GUIDE

Statement 1:

- If you were going to explain the main message in these statements to a friend or family member, what would you tell them?
- What questions do you have about the information on the screen?
- Does this information change how you think about the threat of chronic wasting disease getting into the deer herd in New York?
- Which of these statements would have the most influence on how you think about the threat of CWD?
- Which of these statements seem most important to you as reasons to keep CWD outside of New York?

Statement 2:

- If you were going to explain the main message on the information to a friend or family member, what would you tell them?
- What questions do you have about the information on the sheet?
- How does this information change how you think about the threat that CWD poses in New York?
- What is it about the information here that would change how you think about consequences of CWD in New York?
- Which of these statements seem most important to you as reasons to keep CWD outside of New York?

Statement 3:

- If you were going to explain the main message on the information sheet to a friend or family member, what would you tell them?
- What questions do you have about the information on the sheet?
- Which, if any, of these statements would influence how you think about the responsibility that hunters have for keeping CWD outside New York State? Which, if any of these

statements would influence how you think about your own personal responsibility for keeping CWD outside of New York?

- Do you think it would make you change how you think about the way you hunt the next time you go hunting? What is it about the information that would make you change the way you think?

Statement 4:

- If you were going to explain the main message on the information sheet to a friend or family member, what would you tell them?
- What do you think the organization that wrote these statements wants hunters to do?
- What questions do you have about the information on the sheet?
- How does this information affect how you think about the importance of hunters coming back home from out of state with only venison and a clean skull cap and antlers?
- Which statements do you think provide the best rationale or the best incentive for coming back to New York with only venison, antlers, and clean skull caps?
- Which statements do you think provide the least incentive or the weakest rationale for coming back to New York with only venison, antlers, and clean skull caps?
- What other kinds of information would encourage you to have your deer processed where you hunt, before coming back to New York?

Statement 5:

- If you were going to explain the main message on the information sheet to a friend or family member, what would you tell them?
- What do you think the organization that wrote these statements wants hunters to do?
- What questions do you have about the information on the sheet?
- Does this information change how you think about using natural scent lures for deer hunting? What is it about the information here that would change how you think about using natural scent lures?

- Which statements do you think provide the best rationale or the best incentive for avoiding use of natural scent lures?
- Which statements do you think provide the least incentive or the weakest rationale for avoiding use of natural scent lures?
- What other kinds of information would encourage you to avoid using natural scent lures for deer hunting?

Summary Slide:

- Now that I've shown you what was intended, does anyone want to add anything on whether the statements we just read are communicating the main ideas above?
 - (Follow-up questions as needed, based on additional comments)
- We've been sharing messages with you that DEC might use to communicate about CWD, but we know that hunters also get information about CWD from other sources. Who do you trust for information about CWD?
- Does anyone have anything else they want to add before we close?