

Cognitive Interview Evaluation of Survey Items to Measure Substance Use and Impaired Driving

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Introduction

The staff of the National Center for Health Statistics Collaborating Center for Questionnaire Design and Evaluation Research conducted a cognitive interviewing study to examine substance use and impaired driving questions developed by CDC's National Center for Injury Prevention and Control. These questions will be considered for possible inclusion on the Behavioral Risk Factor Surveillance System and include the use and driving under the influence of alcohol, marijuana, cocaine, methamphetamines, and prescription opioid pain medication. There were several objectives for this study. The first pertained to the use of these substances within a specific timeframe and frequency. Probing focused on recall issues to determine whether (and to what extent) respondents had accurate recollections about when and how often they used various substances.

A second study objective centered on perceptions of impairment. Respondents were asked to explain their understandings of impairment in general and with regard to specific questions. For example, questions used different phrases and words such as, "under the influence," "high," "experiencing side effects," or "perhaps had too much." Respondents discussed how they interpreted those phrases in the context of the survey questions.

A third and broader objective of this study was to determine the actual phenomena that respondents considered when answering the questions. The goal of probing was to reveal respondents' understandings of each question and the potential for response error. By documenting the specific construct captured by each question, survey designers are better positioned to make decisions about which questions to include in their questionnaire.

Finally, because of the sensitive nature of the topic, a certain amount of socially desirable answers was expected. That is, rather than providing fully accurate answers to certain survey questions, respondents may provide answers that they believe cast a better reflection on them. This phenomenon was explored with the constant comparative method of data analysis. Analysis of the congruence between answers provided to the survey question and the narratives of their personal experiences revealed whether respondents answered the questions in accordance with their experiences or according to notions of socially desirable behavior.

The next section of this report briefly describes the study methodology, including the procedure for sampling, the data collection method, and analysis plan. The last section presents both general findings and a question-by-question analysis.

Methodology

Sampling and respondent characteristics

Sample selection for the project was purposive. Recruitment was carried out through a combination of flyers, newspaper advertisements, and respondent word-of-mouth (i.e., snowball sampling). The primary aim was to choose respondents who met criteria relevant to substance use; therefore, respondents were chosen who had used alcohol, marijuana, cocaine, methamphetamines, or prescription opioid pain medicine before driving in the past 30 days. The secondary goal was demographic diversity, which was limited by the characteristics of those who met the first criteria and were willing to participate in the study. Most of the sample was Black/African American (77.5%), middle aged (65%) and had a high school diploma or less (82.5%). Slightly over half of those with a high school diploma or GED had some college, but no degree (54%). The demographic breakdown of respondents by round and in total appears in Table 1.

Table 1: Respondent Demographics by Round and in Total

	Round 1 (n=20)		Round 2 (n=20)		Total (n=40)	
	Number	%	Number	%	Number	%
Age						
Under 40	7	35%	1	5%	8	20%
41-60	11	55%	15	75%	26	65%
Over 60	2	10%	4	20%	6	15%
Race						
Black	12	60%	19	95%	31	77.5%
White	2	10%	0	0	2	5%
Hispanic	1	5%	0	0	1	2.5%
American Indian/Alaska Native	0	0	1	5%	1	2.5%
Asian	2	10%	0	0	2	5%
Multiracial	3	15%	0	0	3	7.5%
Gender						
Male	11	55%	9	45%	20	50%
Female	9	45%	11	55%	20	50%
Education						
High school diploma or less	15	75%	18	90%	33	82.5%
(Some college, no degree)	9	--	9	--	18	--
BA or AA degree	4	20%	2	10%	6	15%
Graduate degree	1	5%	0	0	1	2.5%

Data collection

Staff at the Collaborating Center for Questionnaire Design and Evaluation Research conducted 40 interviews in two rounds of testing. Each round consisted of 20 interviews. All interviews took place in the lab at the National Center for Health Statistics, were audio recorded, and then uploaded into Q-Notes, a software application for data storage and analysis of cognitive interviews. Summary notes were included and analyzed for each interview.

Data analysis

Data analysis was conducted according to the grounded theory approach, which inductively generates explanations of how respondents answered the questions. This approach utilizes the constant comparative method of analysis, in which analysts continually compare data findings to original data, resulting in data synthesis and reduction (Glaser and Strauss, 1967; Charmaz, 2006; Suter, 2012).

Several levels of analysis were performed, per Miller et al. (2014). First, analysts synthesized interview data into summaries, detailing how each respondent interpreted the question and formulated their answers. Next, analysts compared summaries across respondents and questions, identifying common themes. Once themes were identified, analysts compared themes across subgroups, revealing ways in which different groups of respondents processed the question differently depending on their differing experiences and socio-cultural backgrounds. Finally, analysts drew conclusions, determining and explaining how the question performed as it functioned within the context of respondents' various experiences and socio-cultural locations. In each analytic step, data were reduced into a theoretical summary detailing the question's performance. As such, these different analytic steps represent both data reduction and a movement toward larger conceptual themes. These themes are discussed next.

Findings: General Themes

Response Accuracy: Social Desirability, Awareness of and Estimating Substance Use

A certain amount of social desirability was expected in the way respondents answered the questions. In order to effectively test the questions, callers who indicated they had taken one or more of the above substances and driven in the past 30 days were screened into the study. This is, therefore, a sample of respondents perhaps more likely to discuss this behavior than the general population. Despite this sample characteristic, initial answers to the survey questions were often low and inaccurate. That is, the narratives provided by respondents during the probing portion of the interview did not match their answers to the survey questions in a pattern similar to that which might be associated with social desirability. However, evidence suggested that response error among the tested questions was due more to cognitive burden (and the resultant satisficing behavior) and less to the sensitive nature of the topic (and social desirability).

The satisficing model first proposed by Krosnick and Alwin (1987) posits that in answering difficult questions respondents may not try to recall every piece of relevant information, only enough information on which to base a reasonable answer. Many of these questions were difficult for respondents to answer accurately. Those who used substances every day or never at all generally had no trouble arriving at an answer. But response burden was much higher for those who used substances more than never, but less than every day. While there were multiple reasons for response difficulties (see the question-by-question analysis), there was little evidence of social desirability as the main problem. In other words, even though many respondents provided underestimates of use or even excluded certain substances from their answers, they showed little reluctance in discussing their substance use with interviewers during probing. Instead, underestimates seemed due to respondent lack of awareness of their degree of substance use, caused by never previously reflecting on their patterns of use (in both frequency and amount). This occurred in multiple questions on different substances, such as alcohol, marijuana, cocaine, and opioid pain medicine. For example, the first question was, "During the past 30 days, on how many days did you have at least one drink of any alcoholic beverage...?" One respondent initially answered 15 days. In retrospective probing he changed his answer to 12 days, telling the interviewer he drinks three times a week. However, in discussing it even further, he realizes that the only day he does NOT drink during the week is Monday, which brings the answer to 26 days a month. It took him a fairly lengthy discussion to arrive at an accurate answer because he had never gone through the mental calculation prior to answering this survey question.¹

¹ A full discussion can be found in the question-by-question analysis.

As the previous example illustrates, evidence in this study showed that questions asking respondents to report the number of times they used a substance in the past 30 days were cognitively difficult and yielded low-accuracy responses. This finding is corroborated by similar research on alcohol questions for other federal surveys (Massey, 2017). On the other hand, questions asking for yes/no responses lowered cognitive burden and improved reporting accuracy. Respondents are better at reporting *that* they took a particular substance than they are at providing details on how often. As a result, respondents often eased their cognitive burden by providing estimates (that were usually rough and low) rather than summations of specifically recalled incidents. For example, the most common strategy used by respondents in answering how many days in the past 30 days they drank alcohol was to provide an estimate based on a typical month – not the past 30 days in particular (see the question-by-question analysis).

A final note on social desirability. While no evidence was found in this study that the sensitive nature of the topic would lead to response error, this may not hold true among a randomly selected sample. At the same time, the finding that the cognitive challenge associated with many of these question resulted in satisficing behavior still holds true, irrespective of item sensitivity.

Perceptions of Impairment: “Under the influence” vs. “Perhaps had too much”

Different ways of asking whether a respondent had a particular substance in their system while driving prompted different interpretations. Particular phrases were explored in order to assess how respondents understood the intent of the questions.

Under the influence: This phrase yielded broad and inconsistent interpretations of question intent. One question read, “In the past 30 days, what substances, if any, were you under the influence of while driving?” The phrase “under the influence” was understood as either impaired driving (to the exclusion of buzzed driving), driving with *any* amount of substance in your system (even if no effects are felt), or driving with an illegal substance in your system, to the exclusion of prescription medications (such as opioid pain medication).

Perhaps had too much: This phrase was interpreted more narrowly and, as a result, yielded more consistent interpretations. For example, the question was, “During the past 30 days, how many times have you driven when you’ve had perhaps too much to drink?” This was seen as asking about being impaired or “drunk driving”. While respondents had different notions about what constitutes “drunk driving”, from extreme to mild, they at least understood the concept consistently.

Respondents who interpreted “under the influence” as impaired driving, did not see a difference between that and “perhaps had too much”. The question, “In the past 30 days, what substances, if any, were you under the influence of while driving?” and the question, “During the past 30 days, how many times have you driven when you’ve had perhaps too much to drink?” were understood as having the same intent. But other respondents – those who understood “under the influence” as driving with any amount or driving with an illegal substance – saw these as different questions. A more detailed examination of findings can be found in the question-by-question analysis, presented next.

Findings: Question-by-Question Analysis

ALCDAY5: During the past 30 days, how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?

_____ Number of days per week
or
_____ Number of days per month

None (GO TO 1B)

Round 2 Version: During the past 30 days, on how many days did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?

_____ Number of days (IF NONE, GO TO 1B)

Findings: Respondents consistently understood the intent of this question as asking whether they had any alcohol to drink in the past 30 days. However, having two timeframes (weeks or months) in the first round confused both the respondent (“Can you read the beginning of the question again?”) and the interviewer. Respondents often provided a number without saying whether it was per week or per month. Interviewers, therefore, had to spend time during question administration establishing which timeframe the respondent was using. Because the question began with “during the past 30 days,” many respondents used a month timeframe when answering. In round 2 the question was simplified to contain only one reference period of 30 days.

Variations in Timeframe Interpretations

While a single timeframe helped simplify the question, the “past 30 days” was understood in one of three ways. First, some respondents thought about the 30 days prior to the date of the interview. For example, one respondent answered 25 days. When asked how he arrived at this answer, he said, “I can think back that there were at least five days out of the month that I didn’t have money. So that’s how I remember.” In other words, this respondent arrived at his answer by using specific recall of the past 30 days. However, this was an uncommon strategy.

A second, and more common pattern, was for respondents to answer based on the previous or current month, regardless of whether it was the middle or end of that month. For example, one respondent’s interview was on the 18th of July. He was thinking of the times he drank in July, not of the times he drank since June 18th. Another respondent whose interview was in the beginning of July was thinking about the month of June.

The third pattern was most common. Many respondents did not think of the past 30 days or a specific month at all. Instead, they thought of their general pattern in a typical month because this was easier than trying to recall drinking behavior for specific dates. For example, one respondent gave an answer of eight. When asked to explain she said, “I’m a social drinker, so I can say probably two times a week.” Another person answered four and explained her general pattern, “I usually drink on the weekends. I’ll drink wine. So I know at least one day, because I work one day on the weekend. And the other day’s my day, so.” Finally, another respondent said he was thinking of a “four-week span and not particular dates” when he gave an answer of 15.

Specific recall vs. general estimates

Different strategies were used by respondents in answering how many times they drank alcohol. Some respondents arrived at their answer by first recalling and then adding up the specific times they drank.

For example, one respondent gave an answer of “maybe one or two.” During probing he explained he was thinking of specific times. He said, “One time chilling with the fellows and another time was when we were out at a tournament.” This pattern of specific-incident recall occurred only several times and among infrequent drinkers.

The more common strategy used by respondents was to give an estimate based on their general drinking patterns. One respondent gave an answer of 20 and explained, “I’m just giving an estimate. I know I usually drink every weekend. On weekdays I drink 2 or 3 times on the weekdays as well.” Another respondent who gave an answer of eight explained, “Every weekend...Friday and Saturday, every weekend. There are four weeks in a month, so I’d say eight days.”

Finally, several respondents simply answered “everyday” or “none”. These respondents had much less cognitive burden than others, whose drinking fell somewhere between never and every day. One person said, “I would say every day – of those 30 days. Even if it’s just a glass of wine or maybe a beer. Not too much, but a drink pretty much every day.”

Shifting estimates

In talking about their answers to this question, many respondents’ reports shifted. This occurred for several reasons. The number shifted either because it was initially difficult to do the math, or because respondents were not aware of (or never thought about) how much they drank. There was not solid evidence that social desirability motivated respondent underestimates. Even though respondents may have underestimated their drinking when initially answering the survey question, during the probing portion of the interview they expressed no reservations in discussing how much they drank. If anything, underestimates were due more to satisficing behavior as respondents did not take the time necessary to calculate an accurate answer until the probing portion of the interview. Even then, some respondents had trouble arriving at an accurate number. One respondent answered 15, but during probing said, “I usually – because I work construction – have me a drink every evening.” Asked why he did not answer 30, the respondent could not provide a direct answer, and instead opted to explain his general pattern in some detail. “It’s mostly 3 times out of a week. Weekends, I’m getting down. Now Monday, I’m not going to drink – I know that for a fact. Tuesday, boom -- Wednesday, Thursday, Friday, Saturday, Sunday.” The final explanation suggests that 26 seems to be the closer estimate – the respondent’s drinking excludes only four Mondays of the month. Because the respondent had no reservation in talking about how often he drank, the underestimate of his original answer is unlikely due to social desirability and more likely due to the cognitive burden associated with either the math or with the respondent simply never having thought about how much he drinks. This was a common phenomenon. Another respondent answered three, but during probing said, “I made a mistake.” Initially she thought about the times she went out with friends to drink socially. But during probing she realized she has a glass of wine almost every day at home and that should be included in her answer. Generally, initial estimates were low and cursory but as respondents discussed their patterns during probing, the precision of their estimates would improve.

DRNKDRI2: During the past 30 days, how many times have you driven when you’ve had perhaps too much to drink?

_____ Number of times (IF NONE, GO TO 1B)

Findings: Note that in a survey context, it should first be established whether the respondent has driven at all in the past 30 days (or the question should include a “not driven in past 30 days” response option), otherwise the question is double-barreled (i.e., it asks two questions at the same time but requires only one answer). Several respondents answered “zero” because they had not driven at all (“I haven’t driven in the last 30 days.”) – which is different from not drinking prior to driving.

This question did not change between rounds in order to fully explore interpretations of “perhaps had too much”. This question was interpreted fairly consistently by all respondents, who understood it to be asking about drunk or impaired driving. One respondent said of the question, “I was assuming you were thinking, was I more or less impaired.” Many respondents did not include times that they drove after drinking but did not judge themselves to be impaired. One respondent answered zero and said,

I wouldn't say too much...I have had some to drink. I'd say there's been about three times where I had two drinks...possibly three. Yeah, two drinks and then drove later on. If you said 'anything to drink' I would say yes. If you said 'too much' I would say no.

Similarly, another respondent answered zero and explained, “Well, I drove yesterday after one beer, but I don’t do too much drinking. I’ve never drove drunk or anything.” Only a few respondents included times they had anything at all to drink before driving.

Despite the fact that most respondents understood this question to be asking about drunk driving, they had varied ideas about what drunk driving was. In other words, they had different ideas about what counted as “too much” to drink. Some respondents based their assessment on the way they feel. Others based it on being more than the number of drinks they typically consume. And some based their assessment on their perceived tolerance level.

Assessments tied to feeling states: Some respondents said they knew they had “too much” by the way they felt. Essentially, in their answer they included only those times they drove while feeling drunk or impaired and explained how that feels. Most provided fairly extreme descriptions. Examples of these descriptions include:

Where you're slurring your words, you're stumbling. You feel nauseous, you're sick. You're describing the room as spinning.

When I get sick. When I've had a bit too much of everything.

Woozy, off-balance, light-headed.

When the room starts spinning around.

In my opinion it's when you're overly intoxicated...stumbling...slurred speaking.

It all depends on whether or not I can see straight, or if I'm slurring my words. Then that's too much.

If things don't focus, then you're not supposed to be driving.

When I probably can't walk straight. My eyes are blurry – vision I mean.

Assessments tied to number of drinks: Others based their assessment of “too much” on whether they drank more than what they normally consume. For example, one respondent said three drinks are too much for her to drive, but two are okay because that is what she normally drinks. Another said, “I can usually handle two or three glasses of wine. Maybe I had that fourth glass and I had a friend over and had to take them home.” Another respondent explained what “too much” was for him. He said, “At a bar or club, at around cup five. Five or six lets me know, okay, you are teeter-tottering that line of ‘you need to throw your keys to somebody else or drink water for the rest of the night’.” One person explained that “too much” was “more than what I’d usually have”, which was a half pint of straight liquor and a 24 oz. can of beer.

Relatedly, some respondents considered a certain number of drinks in general (for anyone) to be “too much” for driving. For example, one respondent described anything over two drinks to be “too much” for driving. However, others had higher estimates. One respondent said that six beers was too much – but less than that was fine. Another said a 24-pack was too much to have before driving – but a six- or 12-pack was okay.

Assessments tied to level of tolerance: Many respondents think they can “handle” what they drink and are able to drive. As a result, those instances would not be included in their answers. One respondent said, “In my system I feel as though...I just think I can really handle the wheel, even under the influence.” Another person said, “I really didn’t have enough to affect my driving. I might have had a beer, but I don’t really do anything excessive that’d affect my driving.” Some people described this as being able to suppress the feelings of intoxication when necessary. For example, one respondent talked about his ability to “shut off” the effects of alcohol in order to focus on driving. He believed he had this ability because “I’m a connoisseur. I’ve been drinking for a while.” Another respondent said, “I could be toasted, but if I can focus, I’ll drive.”

1B: During the past 30 days, on how many days did you use marijuana?

_____ Number of Days (IF NONE, GO TO PNPYN.A)

Findings: Respondents had no difficulty understanding this question to be about marijuana use. Moreover, like alcohol use, it was easy to answer for respondents who either never used marijuana or who used it every day. In these cases, their answers were accurate and reliable. Common responses were, “I don’t smoke marijuana” or “every day, 30 days”.

The cognitive burden was higher for respondents who rarely used marijuana. Two different strategies were employed by infrequent users. Sometimes they remembered specific times and reported that number. For example, one respondent answered three and recounted three specific days in a row that she smoked in July. She said, “The first time I wanted to smoke a joint of weed. The second time, because the first joint of weed wasn’t that good, it escalated. And the third time I finally found some good weed.” However, like the alcohol question, this was a less common strategy.

As with alcohol, most respondents who used marijuana more infrequently than every day often provided estimates rather than counting specific instances that they remembered. These estimates were not always accurate nor were they reliable – estimates would often shift as respondents discussed their patterns and habits. For example, one respondent had difficulty settling on an answer. She first said, “Four times in the past week.” So the interviewer recorded 16 days. When probed further she said it

was difficult to estimate and demonstrated satisficing behavior – providing a reasonable, if incorrect, answer because it was too difficult to arrive at an accurate one. She concluded, “I’m a smoker...just put all the time. All the time I smoke.” But then she said she smokes about “every other day” and described herself as an “occasional smoker”. She said, “It’s not every day because we don’t have money every day...it’ll be occasionally.” In the end, coming up with a specific number was difficult for the respondent, so her answer shifted depending on how much detail she was asked to provide and how much effort she put into her answer. Similarly, another respondent initially answered eight days thinking that it was roughly double the amount she gave for alcohol. But then during probing, she said, “You know, we might want to put that number up a little bit. I’ll say about 12 times.” This shift was based on her recalling the information a different way. Rather than thinking about it in relation to alcohol use, she thought about how often she buys marijuana. She said, “Because usually what I’ll do is, I’ll get a small bag of marijuana and it usually lasts me about three days [per week, totaling to 12 days per month].” For the most part, respondents who were not regular users of marijuana had no ready-made answer for how much they used the substance. Many simply never thought about it, and doing so was not a trivial cognitive task. As a result, they were inclined to satisfice and provide a rough estimate.

2B: During the past 30 days, in what way did you use marijuana the most? Please select ONE. Did you...

- Smoke it, for example, in a joint, bong, pipe, or blunt
- Eat it, for example, in brownies, cakes, cookies, or candy
- Drink it, for example, in tea, cola, or alcohol
- Vaporize it, for example, in an e-cigarette-like vaporizer or another vaporizing device
- Dab it, for example, using waxes or concentrates
- Use it some other way

Round 2 version: During the past 30 days, in what way did you use marijuana the most? Please select only one. Did you mostly...

- Smoke it [READ IF NECESSARY: for example, in a joint, bong, pipe, or blunt]
- Eat it [READ IF NECESSARY: for example, in brownies, cakes, cookies, or candy]
- Drink it [READ IF NECESSARY: for example, in tea, cola, or alcohol]
- Vaporize it [READ IF NECESSARY: for example, in an e-cigarette-like vaporizer or another vaporizing device]
- Dab it [READ IF NECESSARY: for example, using waxes or concentrates]
- use it some other way

Findings: In the first round, some respondents did not hear the question as asking about the most common way they used marijuana. As a result, some respondents began by providing all ways they used it. For example, one respondent said, “I have done the dab, the bong, and I roll blunt but I don’t use the blunt, I use sheets.” Another respondent answered, “A blend of smoking it and edibles.” When respondents answered in this manner, the interviewer had to repeat the question to obtain a single answer. In round 2, the wording in the stem was modified to emphasize that respondents should choose the most common method of use. Every respondent in round 2 answered only the most common way.

In addition, because the list of response options was so long in round 1, some respondents interrupted the interviewer before hearing all the choices. For example, one respondent said, “Joint. I’m going to answer that one right there.” Another respondent interrupted and said, “I’ll just tell you, I smoked it. Smoking is definitely my main vessel.” In round 2, the response options were shortened. Rather than reading the examples for every method, the examples were included as a ‘read if necessary’ instruction.

No respondents needed the examples read, and fewer respondents interrupted the interviewer in round 2. Overall, the question in round 2 was much easier to administer.

3C: Do you have a recommendation or prescription from a healthcare provider to use marijuana?

- Yes (GO TO MARDRV1.B)
- No (GO TO 3C.1)

Findings: This question did not change between rounds. Respondents had very consistent ideas about what this question was asking. Generally, it was interpreted as having a formal prescription and documentation of a medical condition from a physician. The conditions they mentioned being associated with prescription marijuana use were generally of a serious nature. The examples included arthritis, Crohn’s Disease, glaucoma, bladder cancer, and pain from chemotherapy for breast cancer. As one person said, “It’s really hard to get a prescription for that. You have to have some kind of debilitating disease.”

3C.1: When you used marijuana during the past 30 days, was it for medical reasons such as to treat or decrease symptoms of a health condition, or was it for non-medical reasons such as to get pleasure or satisfaction?

[READ IF NECESSARY: such as, excitement, to fit in with a group, increased awareness, to forget worries, for fun at a social gathering.]

- Only for medical reasons to treat or decrease symptoms of a health condition
- Only for non-medical purposes to get pleasure or satisfaction
- Both medical and non-medical reasons

Findings: This question did not change between rounds. Respondents consistently understood the question to be asking whether they used marijuana for medical reasons or for recreational reasons. However, most respondents thought ‘medical reasons’ included primarily *physical* (not emotional or mental) health conditions. Even though many respondents reported that marijuana helped them with emotional or mental conditions, they often categorized these as non-medical reasons for the purposes of this question. Respondents discussed using marijuana for mood, anger management, depression, stress, anxiety, or even appetite augmentation, but often would not answer ‘medical reasons’. One respondent answered ‘only non-medical’ but talked about how it helped him manage stress. He said, “Marijuana is more like, it relaxes you if you’re stressed out, or arguing with your kids or got into it with your girl.” Another person also said he uses it “to keep me calm...to calm me down.” And another respondent who answered ‘only non-medical reasons’ also said it helps “suppress the pain for a moment” when thinking about the frustrations and psychological pain in her life.

Other respondents personally recognized the medical aspects of emotional conditions but still wondered whether the intent of the question was to count them as ‘medical reasons’. Sometimes during probing they would decide to include both in their answer. One person said, “Okay, I use it for pleasure and satisfaction...but sometimes it makes my pain levels feel more comfortable, so it’s kind of like both reasons.”

A couple respondents personally thought of their emotional reason as medical, but were not sure whether to include it as such if they did not have an official prescription for marijuana. One person asked, “I don’t have the card, but can I still put medical reasons? Because it’s to calm me down...I get

depressed sometimes and let life predict my day. So it kind of helps me for that...” Another respondent was very thin and used it to help with her poor appetite. She answered ‘only non-medical reasons’ and said, “Because I don’t have a prescription for medical. That’s the only reason I said non-medical.” However, she personally felt that both reasons applied.

MARDRV1.B: During the past 30 days, how many times have you driven within 2 hours of smoking or 4 hours of eating marijuana?

Number of times: _____

None

Findings: For several reasons this was a difficult question for respondents to answer. There were many elements to the question, challenging both recall and judgment. Respondents who did understand the question often could not pull together each aspect [past 30 days] + [how many times driven] + [smoking/eating within 2/4 hours] into an accurate answer. Some respondents had a difficult time even understanding the intent of the question or the unit of analysis. Many respondents needed the question repeated and expressed confusion. The following are examples of respondents’ first reaction upon hearing the question:

What do you mean by that question? Did I, like, two hours before, then drove?

Did it say how many days? Or how many times?

You said how many hours?

How many hours have I driven two hours...?

One respondent was so confused he thought the question was asking about alcohol when he first heard it. He answered, “Probably like 30 times. I’m not at the level where I can’t – should be – driving. Probably have a beer on the way home.” Another respondent expressed a difficult time with the timeframe. She said, “Two hours, huh? That’s hard to say. Umm...probably three.” She explained it was difficult because she loses track of time when she smokes, as a side effect of the marijuana.

Another reason this was such a hard question to answer is because most respondents never thought about how often they drive under these conditions and timeframe and, therefore, did not know. As a result, some respondents engaged in satisficing behavior. One respondent answered one time. Upon probing, it was discovered that there was never a time in the past 30 days he could remember driving after smoking, but could not rule the behavior out. When asked why he answered one, he said, “I just threw it out there...I just wanted to say [one] to play it safe.”

Finally, in the second round of testing respondents were asked how long they experienced the effects of smoking marijuana (no respondents reported eating marijuana on any regular basis). Most respondents reported that it depended on the quality of the product and how much they used in a sitting. However, general estimates ranged from 30 minutes to five hours.

MARDRVy.B: During the past 30 days, how many times have you driven while perhaps under the influence of alcohol AND marijuana?

Number of times: _____

None

Findings: As with the previous question, this question was difficult for respondents. For example, one respondent answered two and said, “Alcohol and marijuana? Well, I drove with the alcohol, but when I smoked the joint I didn’t drive that day...and you said how many times? Within 30 days?” The interviewer repeated the question. The respondent was still confused and said, “If you put marijuana with that question, I couldn’t answer it intelligently because I did it with just the alcohol. Not the marijuana. And that would be twice with the alcohol.” Because multiple substance use and driving is captured in the last question, this question was dropped for round 2.

PNPYN.A: During the past 30 days, have you taken any prescription opioid pain medicine, either with or without a doctor’s prescription? Count drugs such as codeine, Vicoden, OxyContin, hydrocodone, and Percocet. Please do not include over-the-counter pain medicine such as aspirin, Tylenol, or Advil.

- Yes
- No (GO TO **ILDUSE**)

Round 2 version: During the past 30 days, have many times have you taken any opioid pain medicine such as codeine, Vicoden, OxyContin, hydrocodone, or Percocet? Please do NOT include over-the-counter pain medicine such as aspirin, Tylenol, or Advil, but DO include taking opioid pain medicine either with or without a prescription.

Findings: In round one, many respondents did not allow the interviewer to read the entire item because a question is asked, followed immediately by two statements of what to include or not include. Additionally, the length of the question made it difficult for some respondents to understand what it was asking. It contained a lot of information to cognitively process and different respondents focused on different elements of the question. Notably, there was no evidence that the word “opioid” framed the intent of the question for most respondents. They simply did not attend to that word. Instead, some respondents interpreted the question as asking about prescription medication. For example, one respondent asked, “In the past 30 days have I taken any prescriptions?” Others thought it was asking about pain medication (“Pain medication? No.”), and still others thought it was asking about the examples (“I did take OxyContin”). Some were confused enough to answer in error. One person answered “No, never.” But then he said during probing, “But I had the Percocet from my surgery [20 days ago].” He said the bottle was empty, so he is no longer taking them and currently has no refill. “The type of pain medication I have it...uh...no, I don’t have any more pain medicine.” This respondent lost track of the 30 day timeframe.

Because the original question was long and confusing, the question was modified in round 2. The goal was to make the question conceptually more concrete by anchoring it to the prescription opioid pain medicine examples. However, some of the original problems remained. For example, several respondents still interrupted the interviewer before hearing the entire question. Others listened to the entire question, but still could not retain all elements of what it was asking. As a result, some focused on the last part and heard it as asking about *either* with *or* without a prescription, but not both. For example, one respondent included Seroquel 400 in her answer because she thought the question was about *any prescription*. Her answer was 30 days. She said, “I have not taken those you just listed, but I do take Seroquel 400. That’s a sleeping medicine that helps you sleep. I don’t know. It’s connected to insomnia but it’s a drug and it does drug you.” The multiple sentences served to confuse her on the intent of the question.

Another respondent did not report a prescription of Tylenol 3 even though she thought it was an opioid because it had codeine. She explained that she omitted it from her answer because she thought the question was asking about recreational use of drugs and *not* prescription drugs. This may possibly be attributed to a context effect, since the other questions included alcohol, marijuana, cocaine, and methamphetamines – substances not typically associated with medical use. Or it may simply have been that she heard only the last phrase, ‘without a prescription’. In any case, there were too many conditions in the question for her to keep track of, resulting in error.

Additionally, rather than maintaining the yes/no format of the original, the question in round 2 asked about number of times used in the past 30 days. It was more of a burden for respondents to estimate number of times and answers were not exact. In some part this was due to prescriptions being written on an “as needed” basis for post-surgery pain. For example, one respondent said, “I take hydrocodone. In the past 30 days? I’d say about five to ten times.” She had no recollection of specific days, nor did she take the medicine on a regular schedule. She took it as the pain in her knee flared up. This was similar for several other respondents as well who gave a rough estimate of the times their pain increased. One respondent said, “Probably five times. I got shot in my shoulder, so when it rains it tends to irritate me.” On those occasions he takes OxyContin before going to sleep in the evening. In general, the yes/no format of the original question provided less detail but was also more accurate.

In sum, this question is long with many words and many elements to focus on: [past 30 days] + [number of times] + [opioid medicine] + [not over-the-counter medicine] + [with or without a prescription]. This places an inordinately high cognitive burden on respondents in terms of comprehension, recall, judgment, and response. In other words, there are many places for the response process to go awry, making answers less-than-accurate.

PNPDRV1.A: During the past 30 days, how many times have you driven on the same day after taking prescription opioid pain medicine, either with or without a doctor’s prescription?

Number of times: _____

None

Round 2 version: During the past 30 days, how many times have you driven on the same day after taking prescription opioid pain medicine?

Findings: The question in round 1 was long, causing problems similar to other questions. Respondents had difficulty processing what was being asked. For example, after hearing the question one respondents said, “Yesterday. How many times? You said the past 30 days how many times?” Someone else gave an answer of “At least three times a day.” Another respondent first answered ‘zero’ and then changed it to ‘everyday’ when he heard the question again.

Respondents tended to focus on different aspects of the question without necessarily attending to all aspects. Some respondents focused on the last clause and thought this was a question about driving while taking *any* prescription medication. For example, one respondent included his blood pressure and cholesterol medicine in his answer.

Finally, for those who take opioids every day but do not drive every day, this was perceived as a question about how often they drive. If they drive everyday but do not take opioids every day, it was perceived as a question about how often they take opioids. In both cases respondents’ answers were usually estimates – often rough estimates, especially when occurrences of pain (or driving) were

unpredictable. For example, one person answered, “Like 10 times.” When asked to explain he said, “Sometimes I go to work...because I work at night security. I have to walk around and the pain acts up so I have to take the medicine then.” Another respondent also answered 10 times, trying to estimate how often her pain occurs at work, because that is when she takes a pill and drives.

Respondents’ estimates sometimes shifted because they never thought about how much they used their medication, especially if they took it on an “as needed” basis. For example, one respondent answered four. However, in thinking more about it during probing she said, “At first I’m thinking I don’t take them that often. But then the reality, if I think about it...Sunday to Sunday is a full seven day period. And it’s more often than I’m realizing.” It was not uncommon for respondents to underestimate what they took simply because they never thought about it prior to answering this question.

The prescription clause was dropped in round 2 in order to simplify the question. This did help respondents focus on answering for opioids opposed to any possible prescription medicine they may take. No respondents in round 2 thought about substances other than opioids.

However, similar to round 1, most respondents still provided estimates that were often very rough, shifted, and were sometimes underestimates. For example, one respondent said, “About 12 times. You said the past 30 days, right? About 12 to 14 days.” He was initially thinking about how often he drove for work. However, upon probing he remembered that he also drove for personal reasons (for example to pick his wife up from work) but did not include that in his initial estimate.

PNPDRV3.D: During the past 30 days, how many days have you driven while “high” or experiencing side effects (such as drowsiness, dizziness, or confusion) from a prescription opioid pain medicine?

Number of times: _____

None

Round 2 version: During the past 30 days, how many days have you driven while experiencing any effects of opioid pain medicine such as drowsiness, dizziness, confusion, floating or feeling carefree? [READ IF NECESSARY: Please include taking opioid pain medicine either with or without a prescription.]

Findings: The version of this question in round 1 sometimes confused people because the words “high” and “side effect” held different meanings. Generally, being high was seen as more extreme than simply experiencing side effects. Respondents had different reactions to two concepts being in the same question. Some respondents focused on the word “high” and did not include what they considered to be mild side effects. For example, one person answered “zero” but during probing discussed that he did drive after taking OxyContin. He said, “I feel a little sedated and calm and the pain goes away...so I may be a little slower processing my thoughts. But I’m still in charge.” He explained that he answered “zero” because he was “not really high, high – I did take pain killers but I was able to drive at the same time.” When asked what he thought the question was asking, he said, “I thought it was asking while you were driving, were you really, really high.”

Another pattern was for respondents to include driving with any and all side effects. One respondent decided to answer 30, because he experienced some degree of Percocet side effects of every day, where “I might be feeling fatigued.” But for feelings of being “high”, it was less often. Feeling more intense side effects he said occurred, “twice, three, four times a week.”

Another aspect of the question that had the potential to confuse respondents was the word “prescription”. Some respondents did not limit their answers to opioids, but included any prescription medication they were taking. One respondent answered 30, but was thinking of his high blood pressure and cholesterol medicine that he takes every day.

The modification for round 2 included deleting the words “high” and “prescription”. Dropping “prescription” did seem to improve comprehension, as all respondents in round 2 were thinking of opioids and no other medication for this question.

Deleting the word “high” allowed most respondents to focus on the list of possible side effects. However, respondents still made different judgments on what to include as “any effect”. Some included minor side effects, but others included only driving while experiencing major side effects (“everything looks like it’s moving in front of you”, “like coming off a roller coaster ride”, “I’m not as sharp as I should be and do foolish things that put myself at risk, and others”).

Another judgment respondents had to make was to decide whether “any effects” included the intended purpose of the medication. Respondents with high levels of pain often described experiencing none of the side effects listed in the question, but instead provided an answer based on experiencing the intended effects of the medicine, usually in a positive way. For example, one respondent answered 10 days and said, “It takes the pain away, but I’ll still be normal...I just won’t be in pain.” Another respondent answered 14 days. However, she was not thinking about experiencing side effects, she was thinking about any time she was on opioids while driving – because without them, she would be unable to drive. She explained after taking her medication, “Now I can function. Now I can walk and do stuff I need to do and not be in pain.”

On the other hand, some respondents who experienced cessation of pain without other side effects did answer “zero”. One respondent said, “Believe it or not, no. I don’t get any of that.” She went on to explain how she feels on opioids, “All I know is that within 15 minutes to an hour, I can get up and I can move. So the pain is kind of subsided.” She did not judge this positive experience to be a negative effect as intended by the question.

Finally, respondents were probed on the extent to which the side effects listed in the question reflected the side effects they experienced with opioid pain medication. For the most part the words in the question were accurate, but respondents did add some of their own descriptions of what they feel. These additional descriptions included: off balance, claustrophobic, paranoid, irrational, blurred vision, and rubbery legs. Despite the additional descriptions, there were no false negative response errors as a result of respondents not seeing their specific side effect listed.

ILDUSE: During the past 30 days, have you used cocaine or methamphetamines?

- Yes
- No (GO TO **CODE**)

Findings: This was a straightforward question for most respondents. They understood the substances and knew whether they had used them in the past 30 days. However, respondents who used one or the other sometimes specified as much to the interviewer. For example, one person noted it was crack specifically and not methamphetamines.

Additionally, putting both substances together made one person wonder if the question was asking about a particular class of drugs, not simply the two mentioned. He asked whether MDMA would be included. He answered ‘no’ to this question, but he had taken MDMA and suspected it might be included because the effects feel the same. To simplify the question, it was split into two questions for round 2.

Round 2 versions:

ILDUSE: During the past 30 days, how many times have you used cocaine?

ILDUSE2: During the past 30 days, how many times have you used methamphetamines?

Findings: Again, the questions were modified from the original yes/no response options in round 1 to number of times in round 2. As with other questions asking about number of times, respondents often arrived at their answers by providing rough estimates. One person answered 15 and said, “If someone has it, I’ll take it every once in a while.” Another person also estimated 15 because he used it about half the days of the month. Only one person recalled specific incidents and reported that number. His answer was two, so it was easier to recall those specific times.

None of the round 2 respondents had used methamphetamines, so that question could not be tested.

ILDDR2.B: During the past 30 days, how many times have you driven while perhaps under the influence of cocaine or methamphetamines?

Number of times: _____

None

Findings: Respondents who had done so infrequently could recall specific times and add them up for an accurate answer. One respondent reported one time and remembered it specifically because it was not a pleasant experience. “I felt paranoid. Didn’t want to do it again...I felt it was too risky.” Another person answered three and could also remember each incident. However, respondents who did so more often – but less than everyday – could not remember all specific times. To answer the question they provided an estimate.

‘Under the influence’ captured any use. One person answered 15 times and said, “With me, anything you take in, you’re under the influence of.” Another person also reported 15 times and said, “It doesn’t impair my ability to drive.” But ‘under the influence’ to her meant any amount at all.

CODE: In the past 30 days what substances, if any, did you use with other substances? [READ OPTIONS; MARK ALL THAT APPLY]

- Alcohol alone, no other substances
- Marijuana alone, no other substances
- Prescription opioid pain medicine alone, no other substances
- Cocaine or methamphetamines alone, no other substances
- Other substance alone
- Alcohol and marijuana at the same time
- Alcohol and prescription opioid pain medicine at the same time
- Alcohol and cocaine or methamphetamines at the same time
- Alcohol, marijuana, and prescription opioid pain medicine at the same time

- Alcohol, marijuana, and cocaine or methamphetamines at the same time
- Alcohol, prescription opioid pain medicine and cocaine or methamphetamines at the same time
- Other combination
- None of the above, I didn't use any substances (END INTERVIEW)

Round 2 version: [READ AS OPEN ENDED; INTERVIEWER CODE ALL THAT APPLY]

Findings: This question was very confusing for most respondents. For example, before answering, one respondent said, "I don't quite understand that." Confusion manifested different ways. Some respondents lost track of the 30 day timeframe. One respondent, for example, answered for her entire life. She said, "I was thinking in general, throughout my entire life... 'have you ever, through your entire life had these combinations' was what I was thinking." Another person missed the timeframe altogether and asked, "Is that just on that day?"

A second manifestation of the confusion was in respondents thinking the question was asking about number of times they used a substance. One respondent said, "Alcohol...it was...how many times?" Another respondent said, "In the past 30 days? I'm gonna say eight. Because it's normally on the weekends for me." She answered for the number of times she uses substances in combination.

A third source of confusion was the response options. The list of options was far too long when read aloud and thoroughly confused respondents who simply could not stay focused to hear them all. As a result many respondents interrupted the reading of the categories to provide the answer in their own words. One respondent interrupted and said, "It would be just alcohol and crack. I don't use anything else." Others may have listened to all the choices, but were confused by them. One respondent who heard the question and categories said, "Okay, I don't know how to answer this. But to you: I have drunk and smoked marijuana, and I have drunk and smoked some coke." While he could answer the question, he could not work with the categories as presented to him.

Fourth, some were uncertain exactly what "use *with* other substances" meant. Respondents were not sure if the intent was to ask about ingesting multiple substances *at the same time*, or if it was about having multiple substances in your system at the same time, even if they were ingested at *different* times. One respondent said, "It depends on what you mean by 'with it'...because it's not taken at the same time, but it might be fairly close in time...within 30 minutes." Another person was confused about timing as well. He takes Percocet every day and then may drink some time after that. He said, "Well, I already had the medication [Percocet] and I drank alcohol." He wanted guidance from the interviewer on how to answer.

Fifth, there was a significant problem with the concept of using substances alone verses together. The question is essentially posed as asking about substances used together, but contradictorily includes response options for solo-use. One respondent asked, "You mean in combination with?" This question was understood by many respondents as asking about the use of substances in combination. As a result, they would not choose using a substance alone without the prompting of the interviewer – particularly when they had already discussed using individual substances in prior questions. For example, one respondent chose only the option 'alcohol and marijuana at the same time' when it was clear from early discussion that she also used them alone. When the interviewer asked whether to also mark 'marijuana alone' the respondent said, "I thought you said in conjunction with each other?" Another respondent commented, "That was a difficult question. Because, again, I use weed and alcohol, but it also asks for both. So if you're asking what substances I use together, okay, weed and alcohol. But it also asks for alcohol and marijuana [alone], so it's kind of weird."

Finally, some respondents had never given thought to the substances they use together, so it was difficult to answer. One respondent thought about it for a moment and said, “I had to think about that one. Because there’s no way I would’ve smoked if I hadn’t started drinking. Drinking influenced me to do that.” But other times it was easy because they automatically used two together. It was difficult to parse out if and when they used a substance solo. One respondent simply said, “It varies. Most of the time, yes. They all end up together. I might start out with alcohol and then everything else [marijuana, PCP, cocaine] falls into place.” It was clear that some respondents never thought about their use of substances in this manner.

Because the response options were long and confusing, the question in round 2 was administered as an open-ended question – the question stem remained the same, but the response options were not read to the respondent. Rather than remedy the problem, it created additional confusion. Respondents did not know what substances to include. One respondent asked, “What do you mean by other substances? I do take occasionally a male supplement...it’s over-the-counter. It’s a milder form of Viagra....I take Tylenol in the morning.” Another respondent thought that his blood pressure and cholesterol medicine might count as substances to report, and someone else wondered if caffeine counted. One respondent did *not* include alcohol. When the interviewer enquired into her reasoning, the respondent asked, “Is that a substance? Drinking is a substance?”

MARDRVy.C: In the past 30 days what substances, if any, were you under the influence of, while driving? [READ OPTIONS; MARK ALL THAT APPLY]

- Alcohol alone, no other substances
- Marijuana alone, no other substances
- Prescription opioid pain medicine alone, no other substances
- Cocaine or methamphetamines alone, no other substances
- Other substance alone
- Alcohol and marijuana at the same time
- Alcohol and prescription opioid pain medicine at the same time
- Alcohol and cocaine or methamphetamines at the same time
- Alcohol, marijuana, and prescription opioid pain medicine at the same time
- Alcohol, marijuana, and cocaine or methamphetamines at the same time
- Alcohol, prescription opioid pain medicine and cocaine or methamphetamines at the same time
- Other combination
- None of the above, I didn’t drive under the influence of any substances

Round 2 version: [READ AS OPEN ENDED; INTERVIEWER CODE ALL THAT APPLY]

Findings: This question was confusing to respondents in much the same way as the previous question: respondents sometimes missed the 30-day timeframe or thought the question was asking “how many times”. Additionally, there were too many categories to effectively read aloud. In round 2, the question was administered as an open-ended question, but as with the previous question, this only led to confusion over what to include as a substance. Moreover, in this question confusion over what to include as a substance was tied to the phrase “under the influence”.

The primary finding for this question is that there were three fundamental interpretations of “under the influence”. This created inconsistent answers and response error. The phrase “under the influence” was understood as either impaired driving, driving with *any* amount of substance in your system (even if no effects are felt), or driving with an illegal substance in your system.

Impaired Driving: Some respondents understood the question to be asking about impaired driving. One respondent interpreted it as “your judgment is off...you’re not really paying attention to what’s going on.” She included marijuana in her answer but not alcohol because she did not deem herself to be impaired by the alcohol, only the marijuana. Another respondent answered alcohol alone and prescription pain medicine alone and explained, “Being under the influence of substances that can alter or affect your perception or your reasoning...can make you less alert or less functional than you hope to be.”

Driving With Any Amount: Other respondents understood the question to be asking about driving with any amount of substance in their system. For example, one respondent who answered “zero” to driving after having “perhaps too much” alcohol, did include alcohol in this question. When asked to explain the different answers, she said, “I’m seeing those as two different questions.” She explained that “under the influence” means she’s had the substance, but “not too much”. In contrast, “perhaps had too much” means she’s “ready to go to bed and won’t be remembering things” the next day. Some respondents gauged “any amount” by the ability to pass a breathalyzer test. One respondent included alcohol and cocaine in his answer and said, “Under the influence means...that breathalyzer thing comes back up to me. Over the limit is a certain point or more.” Another person included marijuana in his answer even though he does not feel too impaired to drive when he smokes it. He said, “There’s never really getting too high with marijuana. I feel like you can kind of keep smoking and smoking...with weed, I’m like fine. I can still kind of kick back and drive.” The interviewer asked about the difference between that and “perhaps had too much.” The respondent said, “That’s probably asking have you ever been blasted trying to drive.”

Driving With an Illegal Substance: Some respondents interpreted the question as driving under the influence of substances deemed to be illegal to use at all when driving. One respondent included only alcohol in his answer and provided justification by saying, “I haven’t used any illegal drugs in quite a long time.” Another respondent struggled with her answer. She included opioid prescription medicine (the only substance she used), but did not see it fitting in well with the intent of the question. She said, “To me, the term ‘under the influence’ and ‘driving high’ indicates illegal use of drugs. So my first response is, ‘I don’t drive high.’ I don’t drive under the influence. To me, that refers to liquor and illegal drugs. But when you ask specifically pain medication, well yes. That applies to me.” In this case being able to hear the categories (this respondent was in round 1) helped her include opioid pain medicine that she might have otherwise excluded, had the question been posed as open-ended. In fact, respondents who received the open-ended version did not include prescription opioid medicine in their answers. For example, one respondent did not include opioid pain medicine, explaining that she did not experience any “high” when taking it. Another respondent only included alcohol and marijuana but omitted his opioid pain medicine for the same reason. Also, one respondent did not include opioids because she did not see pills (perhaps prescription pills) as a substance intended for this question. When asked, she had a hard time articulating why. First she said she did not include it because she did not inhale it. When asked to explain she said, “Maybe as far as smoking it...I consider a substance like when you’re smoking.” But then she also said alcohol should be included in this question. Despite her inability to fully explain why, it was clear she did not think this question was asking about her opioid prescription medicine.

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