

Cognitive testing of select questions from the 2017 New York City Youth Risk Behavior Survey (YRBS)

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Abstract

Cognitive interviewing is a method to test survey questions for cultural appropriateness and comprehensibility. Despite its longstanding history as a surveillance tool used to inform both national and local health and educational policies, questions included in the New York City (NYC) Youth Risk Behavior Survey (YRBS) have not undergone cognitive testing. To address this gap, one-on-one in-person cognitive interviews were conducted with a convenience sample of 17 adolescents ages 16-18 from a public high school in Queens. The objectives of the study were to: (1) identify possible comprehension issues; and (2) assess whether respondents are able to access and recall necessary information to answer select questions from the 2017 NYC YRBS. This report summarizes findings from the cognitive testing.

Background

Results derived from national and local surveillance systems are critical for assessing the burden of poor health outcomes, as well as for planning and evaluating public health programs. To address the need for data on health-risk behaviors that contribute to the leading causes of morbidity, mortality, and social problems among high school aged students in the United States, the Centers for Disease Control and Prevention (CDC) developed the national Youth Risk Behavior Surveillance System (YRBSS) (Brener, Kann, Shanklin et al. 2013). As part of CDC's YRBSS, the New York City Youth Risk Behavior Survey (NYC YRBS) is conducted by the New York City Department of Health and Mental Hygiene (DOHMH) in collaboration with the New York City Department of Education (DOE). Conducted in odd-numbered years since 1997 and consistent with CDC's protocol, the NYC YRBS is pencil and paper self-administered questionnaire designed to measure priority health-risk behaviors in six domains: (1) tobacco use; (2) alcohol and other drug use; (3) behaviors that contribute to unintentional injury and violence; (4) sexual behaviors that may lead to HIV infection, other STDs, and unintended pregnancy; (5) unhealthy dietary behaviors; and (6) physical inactivity. The results are representative of NYC public high school students in grades nine through twelve, excluding students in juvenile detention centers, alternative and special education schools, and schools with greater than 30% English language learners.

Despite its longstanding history as a surveillance tool widely used to inform both national and local health and educational policies, questions included in the NYC YRBS have not undergone cognitive testing by CDC or any other jurisdiction. Understanding the cognitive process – that is, how respondents interpret the questions, retrieve information, make judgements

based on their perceptions and experiences, and select responses – is important to ensure collection of valid and reliable data, as these data are used to calculate prevalence estimates and monitor trends over time (Ryan, Gannon-Slater and Culbertson 2012). This is particularly crucial given that most research on questionnaire development in general, intended to improve reliability and validity of measures, has been conducted on adults (Lippman, Moore, Guzman et al. 2014).

This report summarizes findings from cognitive testing of selected questions included in the 2017 NYC YRBS. The objectives of this study were to: (1) identify possible comprehension issues; and (2) assess whether respondents are able to access and recall necessary information to answer questions.

Methods

Sampling and Participant Characteristics

A convenience sample of adolescents aged 16-18 from a public high school in Queens were selected to participate in the study. The participating classroom was chosen based on the teacher's willingness to have her students take part in interviews. All students in the selected classroom were invited to participate. Written parental consent was obtained before the interviews and verbal assent was obtained from all participants on the day of interviews. Seventeen of the 20 students enrolled in the class were eligible for participation. Three students did not participate because they did not get their parental permission form signed.

Data Collection

Questions were evaluated using cognitive interviewing methodology. This is a qualitative method of question evaluation that can be used to assess for possible response errors and construct validity (Miller, Chepp, Willson et al. 2014, Willis 2015). Respondent narrative and verbal probing techniques were the primary cognitive interviewing method used. Additionally, we used the think-aloud interviewing technique in which respondents verbalize their thoughts as they attempt to answer the survey questions

We developed a semi-structured interview guide with input from an expert survey methodologist. The guide focused on 13 questions from the upcoming fall 2017 New York City Youth Risk Behavior Survey. These items were newly developed and had never been asked on previous NYC YRBS questionnaires. Question topics included: nutrition, parental nativity, parental incarceration, gender identity, tobacco, drug use, sexual health, pregnancy prevention, and swimming ability. Interview questions were designed to gauge participants' comprehension and to elicit elaboration on their response choices. Specifically, the goal was to identify variations in question interpretation, information retrieval patterns, or item clarity. Scripted probes were used to generate consistency across interviews and interviewers. Interviewers also asked unscripted follow-up questions as needed to prompt further detail from participants. Probes included questions such as: Why did you answer the way that you did? How did you arrive at the answer? Can you clarify what you mean? How easy or hard was it to answer this question?

On June 1st, 2017, we (two researchers) conducted one-on-one interviews in English, which averaged 15 minutes per student. We compiled written notes of interview summaries. This study was approved by the NYC Department of Education institutional review board.

Data Analysis

Analysis was guided by the grounded theory approach based on compiled interviewer notes. Interviewer notes contained information on the way in which a respondent interpreted and processed each individual question, what experiences or mental clues helped respondents to formulate responses, and whether respondents experienced any difficulties. Researchers' notes were compared to identify common patterns of interpretation and response difficulties with each question across interviewees.

Results

Seventy one percent of the participants were male. Nearly half of the participants were Asian, and 12% identified as Hispanic or Latino. All participants were in the 11th and 12th grades and most were 17 years old (Table 1).

Tested Questions

Milk Consumption

What kind of milk do you usually drink? (Select only **one** response.)

- A. I do not drink milk
- B. Plain whole milk
- C. Plain 2% milk or reduced fat milk
- D. Plain 1% milk or low-fat milk
- E. Plain skim milk or non-fat milk
- F. Chocolate milk
- G. Other milk (such as soy, almond, or rice milk)
- H. Not sure

Possible sources of error

If participants primarily rely on caregivers to purchase milk, they may not know or remember the type of milk they usually drink. Moreover, participants could consume different types of milk at home and at school, and thus "usually" may be difficult to interpret.

Discussion

Through the think-aloud process, most participants indicated that they do not drink milk at all, making it easy to interpret the question, make a judgement, and select a response. Among those who said they drink milk, participants were able to indicate the kind of milk they usually drink, even if they do not purchase it themselves. Participants were more likely to refer to fat content than to type of milk (i.e., plain vs. chocolate). Those who could not immediately remember

reported that they envisioned the milk container label in their home refrigerator, indicating that their perception of “usual” reflects what they consume at home and not at school or elsewhere.

Water Consumption

During the past 7 days, how many times did you drink **a bottle or glass of plain water**? (Count tap, bottled, and unflavored sparkling water.)

- A. I did not drink water during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

Possible sources of error

The primary concern with this question is that participants might have difficulty recalling the frequency and quantity of their water consumption over the past week. Unless participants drink the same amount of water each day, it could be challenging to remember specifics. Furthermore, the wording of the answer choices is inconsistent, and perhaps not easy to understand. For instance, “1 time per day” could be confused with “1-3 times during the past 7 days.” Finally, no standard metric is provided for the size of “a bottle or glass,” meaning participants could be referring to very different volumes.

Discussion

Nearly all participants had difficulty answering this question. Participants had trouble recalling both frequency and quantity of water consumption over the past 7 days during think-alouds. Furthermore, participants were unable to match their response to the answer choices, even when demonstrating the cognitive process of think aloud.

Parental Nativity

Was either of your parents born outside of the United States? (Count Puerto Rico and the U.S. Virgin Islands as **outside** of the U.S.)

- A. Yes
- B. No
- C. Not sure

Possible sources of error

Participants may not know where their parents were born. Although we often classify Puerto Rico and the U.S. Virgin Islands as outside of the U.S for public health programming purposes, this distinction could confuse participants who identify these islands as American territories. Asking if “either” parent was born outside of the U.S. may create difficulty for participants who have only one parent born outside of the U.S. Participants who had been adopted and/or who were engaged in the foster care system might have trouble defining “parents.”

Discussion

This question worked in most cases. Participants were easily able to identify where their parents were born, often indicating that nativity was a frequent topic of conversation and an important part of their identity. One participant who had never met her father stated that she knew where he had been born. One participant whose father was born in Puerto Rico demonstrated the think aloud process when making a judgement about how to best respond. Ultimately, the participant was able to determine the answer. Another participant reported that this question might be confusing if only one parent had been born outside the U.S., but otherwise said the question was clear. It did not appear that participants struggled to define “parents,” though perhaps this is reflective of the sample composition.

Parental Incarceration

Has your father ever served time in jail or prison?

- A. Yes
- B. No
- C. Not sure

Potential sources of error

Terminology may present an issue; participants may be unfamiliar with the distinction between jail, prison, and other forms of detention. Even if participants’ fathers were incarcerated, this may have happened before their birth or when they were too young to understand. The term “father” is also not explicitly defined in the question, so participants could have difficulty interpreting to whom this refers (e.g. biological father, stepfather, adoptive father, etc.). Additionally, those without a father in their life might not know how to answer the question.

Discussion

Most participants did not have difficulty answering this question. Participants seemed to understand the distinction between jail and prison, especially from representation in the media. Some participants understood the question, but had to answer “not sure” because they did not have a relationship with their father and were unable to determine if he had ever spent time in jail or prison.

Sex Assigned at Birth

What sex is on your birth certificate?

- A. Female
- B. Male
- C. Not sure

Possible sources of error

Participants might have never seen their birth certificates or even if they had seen it might not have paid attention to the indicated sex. Transgender participants could have opted to have the sex on their birth certificate changed, which could create confusion, as the question does not differentiate between original and current birth certificate. Finally, participants may conflate the concepts of sex and gender, or might not realize there is a distinction altogether.

Discussion

All participants reported that this question was very easy to answer. Most participants indicated that they associate sex with one's reproductive anatomy. One participant suggested that the question would be clearer if worded, "What sex were you assigned at birth?" This would eliminate any confusion about original versus current birth certificate and, according to the participant, is how it was taught in health education class. Despite understanding the question, only about half of participants had actually seen their birth certificate and were able to confirm their documented sex.

Gender Identity

Some people describe themselves as transgender when their sex at birth does not match the way they think or feel about their gender. Are you transgender?

- A. No, I am not transgender
- B. Yes, I am transgender
- C. I am not sure if I am transgender
- D. I do not know what this question is asking

Possible sources of error

Because this question is sensitive, it could be triggering for some participants. Moreover, the answer categories do not include options for participants who may be gender non-conforming but not transgender. It is also possible that some participants might not be familiar with the concept of gender identity or the term transgender.

Discussion

All participants reported that this question was very easy to answer. However, many remarked that it might be easy for them to answer because they are in the “norm” (cis-gendered), but that they envisioned this question would be very hard to answer for someone who is gender non-conforming.

Tobacco Use

Which tobacco or nicotine product did you try **first**? (Select only **one** response.)

- A. I have never tried any tobacco or nicotine product
- B. Cigarettes
- C. Cigars, cigarillos, or little cigars
- D. Electronic cigarettes or e-cigarettes
- E. Chewing tobacco, snuff, dip, or snus
- F. Hookah or shisha tobacco
- G. Some other tobacco or nicotine product
- H. Not sure

Possible sources of error

As this question asks participants the type of tobacco product they first tried, this may involve recalling a behavior completed several years prior. Thus, it might be difficult to recall what type of tobacco product one tried first, particularly if the participant tried many products or is a frequent user of tobacco. Moreover, the answer choices refer to a variety of tobacco products and participants might not be familiar with or able to distinguish between multiple options.

Discussion

All participants reported that this question was very easy to answer. Recall did not appear to be an issue. However, this could reflect the fact that most participants had never tried tobacco or tobacco products. We might not have been able to test this question adequately because tobacco users were not represented in our sample. Nonetheless, even participants who had never tried tobacco products were familiar with the answer choices.

Prescription Drug Use

During the past 12 months, how many times have you taken a **prescription stimulant** without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as Adderall, Ritalin, Concerta, or Vyvanse.)

During the past 12 months, how many times have you taken a **prescription benzodiazepine** without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as Xanax, Valium, Klonopin, or Ativan.)

- A. 0 times
- B. 1 or 2 times
- C. 3 to 9 times
- D. 10 to 19 times
- E. 20 to 39 times
- F. 40 or more times

Possible sources of error

Participants might not be familiar with the terms used in the question stem, including both the drug classes (i.e., stimulants and benzodiazepine) and the corresponding examples. For participants who have used drugs within the past 12 months, recall related to frequency might be difficult, particularly if participants are either regular users or very infrequent users. For instance, participants who use drugs regularly might be unable to estimate the precise number of times that they have used a drug over the past 12 months. Conversely, participants who may have tried a drug 11 months ago could struggle to place the timing of the event, forget the type of drug they tried, or forget having done so altogether.

Discussion

Nearly all participants reported difficulty answering these questions, often stating that they were unable to identify the drug classes. Including examples was helpful for some participants, but overwhelmingly, participants did not find the examples clarifying. As a result of this confusion, some participants chose to select “0 times” even if they had tried a drug. Most participants shared that they were only able to select an answer because they knew with certainty that they had never tried any drugs, making it easy to select “0 times.” It is likely that this question would underestimate drug use among infrequent users who are unable to decipher the terminology or recall the behavior.

Sexual Health Education

In what grade were you **first** taught about sexual health in school?

- A. I have never been taught about sexual health in school
- B. 6th grade or earlier
- C. 7th grade
- D. 8th grade
- E. 9th grade
- F. 10th grade
- G. 11th or 12th grade
- H. Not sure

In what class were you **first** taught about sexual health in school?

- A. I have never been taught about sexual health in school

- B. Health Education
- C. Science
- D. Living Environment
- E. Physical Education
- F. Advisory
- G. Some other class
- H. Not sure

Possible sources of error

Participants might not be able to easily recall the grade and class where they had first received sexual health education. They could also have difficulty defining the term “sexual health” without a clear definition or point of reference. For example, participants who had received basic biology instruction might consider this as sexual health education. Additionally, from anecdotal experience, sexual health education in NYC varies significantly across schools, both in content and in format. For instance, a class that covers reproductive anatomy is sometimes considered sexual health at some schools, while other schools have a specific semester-long course, including lessons on reproductive anatomy, contraception, STD prevention, etc.

Discussion

Most participants found these questions easy to answer. Participants noted that learning about sexual health was a memorable experience that stood out as a distinct landmark in their education. More specifically, participants knew exactly when, where, and from whom, they first learned about sexual health. Participants also seemed to have clear definitions of sexual health – they mostly used key terms, such as puberty, sex, STDs, condoms, and pregnancy. However, one participant noted that Living Environment -- a required high school course which includes topics such as cell structure, reproduction and development, genetics, evolution, and ecology -- is part of the larger science curriculum, yet separate from Health Education class. Therefore, the participant was unsure of which answer category to choose.

Contraception

The **first time** you had sexual intercourse, what **one** method did you or your partner use to **prevent pregnancy**? (Select only **one** response.)

- A. I have never had sexual intercourse
- B. No method was used to prevent pregnancy
- C. Birth control pills
- D. Condoms
- E. An IUD (such as Mirena or ParaGard) or implant (such as Implanon or Nexplanon)
- F. A shot (such as Depo-Provera), patch (such as Ortho Evra), or birth control ring (such as NuvaRing)
- G. Withdrawal or some other method
- H. Not sure

Possible sources of error

The question does not explicitly define “sexual intercourse” and thus does not establish a consistent frame of reference, thereby reducing the accuracy of the measurement. Some participants might interpret sexual intercourse as only vaginal, while others may also include oral or anal intercourse. Additionally, those who are put off by the term “sexual intercourse” might skip the question, potentially increasing item nonresponse. Although the question refers to the “first time,” lack of long-term recall may lead participants to respond to the most recently recalled event. Lack of familiarity with the listed forms of contraception may also make it difficult for participants to select an answer choice. Further, participants may not be aware of the method of contraception used by their partner(s).

Discussion

Most participants reported that they never had sex, making it easy to select an answer. Participants almost unanimously defined sexual intercourse as penile-vaginal intercourse. Some participants noted that having the words “prevent pregnancy” helped to focus on penile-vaginal intercourse. Although the topic of sexual intercourse could be sensitive, most participants were quite forthcoming about their sexual history. Even more sexually experienced participants were willing to disclose their behaviors to interviewers. Moreover, sexually active participants knew exactly the method of contraception they used, and one participant knew the brand of birth control his partner was taking. Among those using barrier methods, shared knowledge among partners of the method used might be more likely.

Swimming Ability

How would you describe your swimming ability?

- A. I do not know how to swim
- B. I can swim a little and can float in shallow water
- C. I can swim somewhat well but cannot swim the entire length of a pool
- D. I can swim the entire length of a pool

Possible sources of error

It may prove difficult for participants to self-assess swimming ability, especially on an absolute scale. Participants’ definitions of swimming ability may also not align with the given answer choices. For example, terms such as “shallow”, “length of a pool”, and “well” are all subjective and ambiguous. Answer choices are not ordinal nor are answer choices B and C mutually exclusive. Lastly, participants may be subject to social desirability bias and may report being more skilled than they actually are.

Discussion

All participants reported that this question was very easy to answer. Participants appeared to have difficulty answering the question using their own words, but were quickly and easily able to select a response when presented with these answer choices.

Conclusion

We found that conducting cognitive interviews with youth is not only feasible, but also valuable, even with a small sample size. One of the most important lessons learned was that young people are eager to share their thoughts and are forthcoming, supporting the notion that youth's responses are both valid and reliable. Using the technique of think aloud, we were able to identify important comprehension and recall issues, particularly pertaining to nutrition and drug related questions. While this study was specific to the NYC YRBS, other researchers attempting to measure risk behaviors among adolescents should consider the reliability of such measures in developing their questionnaires.

In addition to a small sample size, another limitation was that we only conducted interviews in one classroom in one school, so findings might not be representative of or generalizable to other parts of NYC or other jurisdictions. Furthermore, we were unable to adequately test questions related to behaviors that few young people had engaged in, such as drug and tobacco use.

Information obtained from these cognitive interviews can be used to improve question stems and answer choices by adjusting reading level, changing reference periods, and providing recognizable examples where appropriate. Because the 2017 NYC YRBS questionnaire had already been designed and approved by CDC before pretesting, modifications to the questionnaire were not made. However, these findings will be used to inform development of the 2019 NYC YRBS. We suggest that future systematic pre-testing of both national and local YRBS instruments is needed. Through such testing, we can improve data quality in order to better shape programs and policies that promote youth's health and well-being.

Table 1. Demographic summary of participants

	% (N)
Sex	
Male	71 (12)
Female	29 (5)
Age (years)	
16	18 (3)
17	59 (10)
18+	23 (4)
Grade	
11	47 (8)
12	53 (9)
Hispanic	
Yes	12 (2)
No	88 (15)
Race	
Asian	47 (8)
Black or African American	18 (3)
White	35 (6)

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