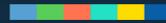


Comparison of Paper-and-Pencil Versus Tablet Administration of the 2021 National Youth Risk Behavior Survey (YRBS)



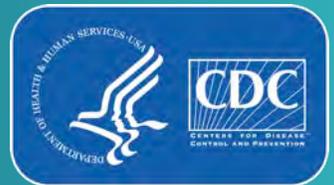
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Disclaimer: The findings and conclusions in the presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Table of Contents

- BACKGROUND
- METHODS
- RESULTS
- LIMITATIONS
- CONCLUSIONS



Background

- Overview of Youth Risk Surveillance System (YRBSS)
 - Largest public health behavior surveillance system in the U.S. for high school students.
 - Monitors health behaviors and experiences via the Youth Risk Behavior Survey (YRBS).
 - Items include:
 - Student demographics
 - Youth health behaviors (e.g., substance use, physical activity)
 - Student experiences (e.g., school connectedness, community violence exposure)



Background

- YRBSS Structure and Data Collection
 - Comprises: national, state, school district, territorial, and tribal surveys.
 - Traditionally administered using paper-and-pencil instrument (PAPI) since 1991.
 - CDC's Public Health Data Modernization Initiative:
 - Aim: Modernize surveillance infrastructure.
 - Goal: Achieve near-real-time data collection.
 - Faster and efficient data collection.
 - Timely data reporting for decision-making.
 - Reduced burden on student respondents.



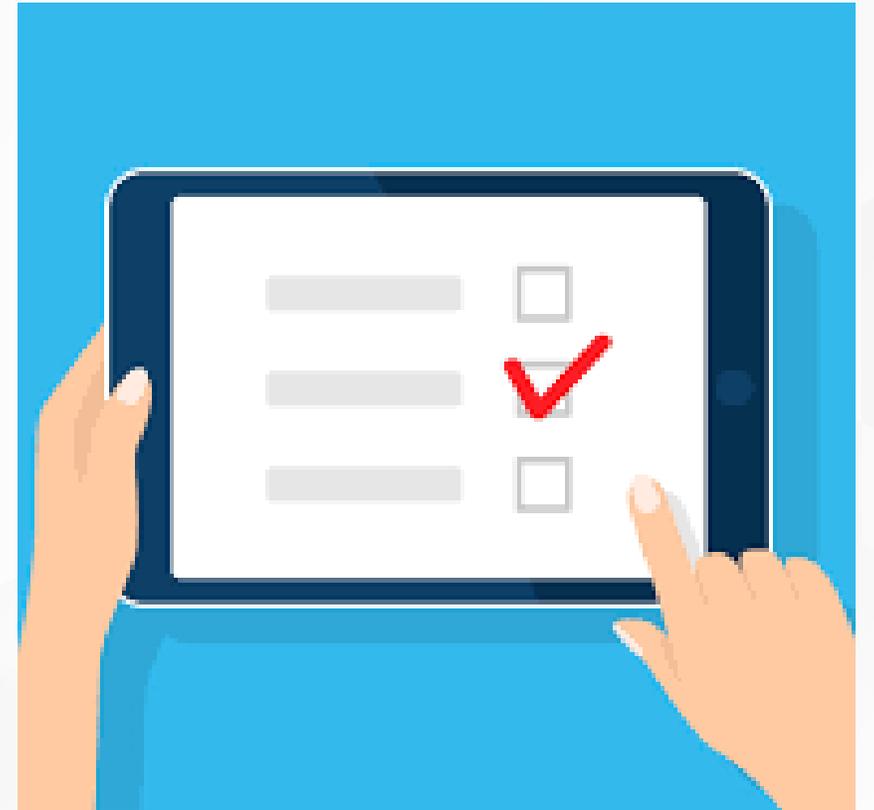
Background

- Transitioning to Electronic YRBS Surveys
 - Electronic survey administration found feasible and advantageous over PAPI.
 - Some state and local YRBSs started electronic data collection in 2019
- Study by Bryan et al (2019):
 - Compared: Electronic (7 sites) vs. PAPI (38 sites).
 - Findings:
 - Electronic data more complete.
 - Health behavior prevalence estimates consistent across modes.
 - Limitations:
 - Lacking random assignment to survey mode.
 - Demographic differences observed between electronic and PAPI survey respondents



Objectives for the 2021 YRBS tablet study

- Compare electronic tablet administration vs. PAPI in the same schools:
 - Prevalence estimates for youth behaviors and experiences.
 - Data missingness
- Understand the influence of tablet administration on students' survey responses.



Methods- 2021 National YRBS

Sampling Methodology

- Three-stage, cluster sample design for national representation
- U.S. students grades 9-12 across 50 states & D.C.
- Stage 1: Primary sampling units (PSUs) consisting of large-sized counties or groups of smaller, adjacent ones
- Stage 2: In PSU, 3 large (≥ 28 students/grade) and 1 small (< 28 students/grade) were selected with probability proportional to enrollment size
- Stage 3: Classes were selected randomly

Methods - 2021 YRBS Tablet Study

Participation & sampling: 57 high schools

- All 57 schools agreeing to participate both the PAPI survey and the tablet survey
- Staff generated 2 or 3 unique random numbers per grade, the first number(s) were assigned to classes for the PAPI survey, and the remaining number was assigned to the class for the tablet component
- 4684 students (PAPI) & 3645 (tablets)

Methods

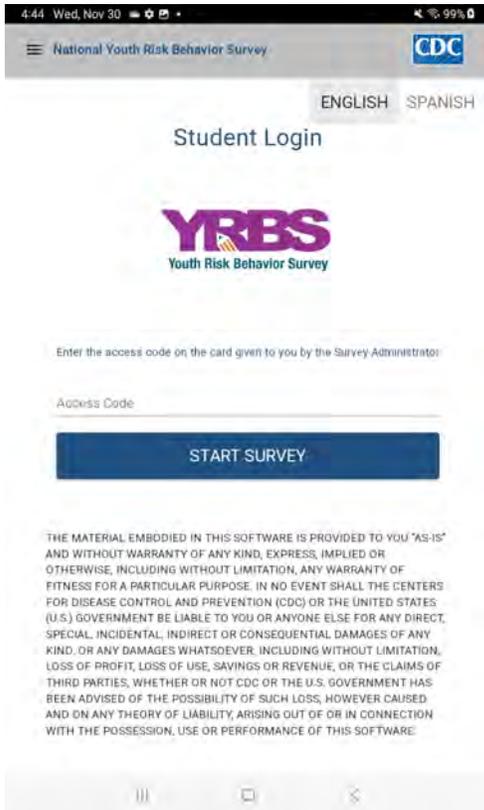
Data Collection Procedures

- Data Protection:
 - Voluntary, anonymous participation
 - Local parental permission sought before survey
 - CDC's Institutional Review Board-approved protocol
- PAPI Survey:
 - Computer-scannable booklets
 - Response checks by data collectors
 - Scanning through iNSIGHT 70-5400140 optical scanner
- Tablet Survey:
 - Pre-programmed tablets with random access codes
 - Survey saved locally and synced to a central MS SQL Server database post-collection



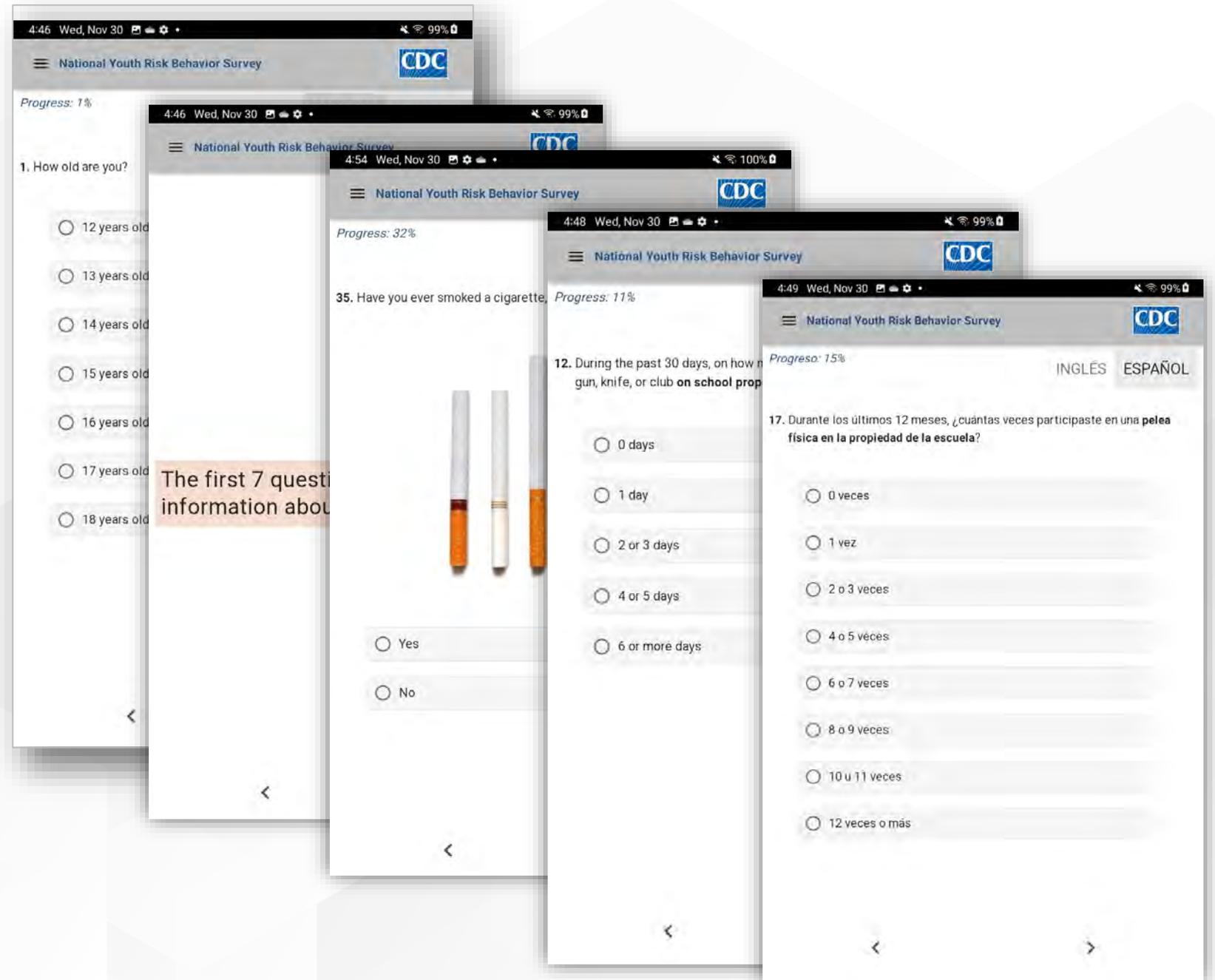


2021 YRBS TABLET STUDY



Sample Questions

- Student uses their finger to select their response and then the “>” button to advance
- User experience enhanced by including images of specific products
- Progress bar shows completion level



Methods

2021 YRBS Questionnaire:

- Total Items: 99
 - Demographic characteristics: 9 items.
 - Health topics: 89 items (injuries, mental health, tobacco, alcohol, sexual behaviors, diet, physical activity, COVID-19, etc.).
 - One item assessed level of English fluency.
- Survey Mode:
 - PAPI: Standard text-only.
 - Tablet: Text with color images for 13 items.
 - No skip patterns; every student saw every question in the same order.



Methods

Demographic comparison:

- PAPI vs. Tablet using chi-square tests.

Effect of mode on the prevalence of 89 health behavior & experience items.

- Logistic regression
- Controlled for sex, race/ethnicity, and grade.

Missingness comparison:

- Compared item-level missingness between modes using Z-tests.

Tool & significance:

- All analyses were conducted using SAS 9.4.
- Due to numerous comparisons, p value $<.01$ was used for statistically significant.



RESULTS

Demographic characteristics of students in the study sample, overall and by mode, 2021 YRBS tablet study

Characteristics	Study Sample (%) Unwt N=8329	PAPI (%) Unwt n=4684	Tablet (%) Unwt n=3645	Chi-square Test P value
Sex				
Female	49.4	50.0	48.6	0.214
Male	50.6	50.0	51.4	
Race/ethnicity				
White #	49.8	49.5	50.3	0.073
Black #	18.4	18.6	18.2	
Hispanic/Latino	18.0	18.8	17.0	
Asian #	6.0	5.9	6.2	
Other #	7.7	7.1	8.4	
Grade				
9	24.6	24.3	25.0	0.551
10	25.7	26.3	24.9	
11	25.3	25.0	25.5	
12	24.5	24.4	24.5	
Sexual identity				
Heterosexual	75.4	75.1	75.7	0.798
Lesbian, gay, or bisexual	15.4	15.6	15.2	
Other/questioning	9.2	9.4	9.1	

- Demographics
 - No differences between PAPI and tablet modes

- Missingness:
 - Less missingness in tablet mode for sex and race/ethnicity

Demographic missingness in the study sample, overall and by mode, 2021 YRBS tablet study

Characteristics	Overall Missingness (n, col %)	PAPI Missingness (n,%)	Tablet Missingness (n,%)	Z score Test P value
Sex	100 (1.2)	76 (1.6)	24 (0.7)	<0.001
Race/ethnicity	169 (2.0)	118 (2.5)	51 (1.4)	<0.001
Grade	74 (0.9)	49 (1.1)	25 (0.7)	0.082
Sexual identity	435 (5.2)	250 (5.3)	185 (5.1)	0.596

p level at 0.01, two-tailed. *P* value is based on *Z* test of two proportions.

Results

Prevalence (proportions) of outcome variables

- Overall:
 - 6 out of 89 variables (6.7%) showed significant prevalence (proportion) differences between modes.
- Lower Proportions in Tablet vs. PAPI Mode:
 1. Tried to quit using all tobacco products
 2. Did not eat breakfast
 3. Spent 3+ hours/day on screen time
- Higher Proportions in Tablet vs. PAPI Mode:
 1. Experienced sexual violence in the past year
 2. Used synthetic marijuana
 3. Offered/sold/given illegal drugs at school



SUMMARY OF DIFFERENCES IN PREVALENCE (PROPORTIONS), BY ADMINISTRATION MODE AND TOPIC, 2021 YRBS TABLET STUDY

Topic	Total number of items	Number of significantly different proportions between modes	PAPI > tablet	Tablet > PAPI
Unintentional injuries and violence	17	1	0	1
Mental health and suicide-related behaviors	5	0	–	–
Tobacco use	10	1	1	0
Alcohol and other drug use	19	2	0	2
Sexual behaviors	7	0	–	–
Dietary behaviors	11	1	1	0
Physical activity	6	1	1	0
COVID-19 and other health-related topics	14	0	–	–
Total	89	6	3	3



Results

Missingness differences by mode

- Overall Results:
 - 33.7% (30 of 89 items) showed different missingness between modes.
- Higher Missingness in PAPI Mode:
 - 10 items:
 - 5 items: unintentional injuries and violence.
 - 3 items: mental health and suicide behaviors.
 - 2 items: dietary behaviors.
- Higher Missingness in Tablet Mode:
 - 20 items:
 - 2 items: unintentional injuries and violence.
 - 5 items: tobacco product use.
 - 5 items: alcohol and drug use.
 - 7 items: sexual behaviors.
 - 1 item: other health topics.



Topic	Total number of variables	No. of variables with significant differences in missingness: PAPI vs. tablet	No. of variables with greater missingness in PAPI	No. of variables with greater missingness in tablet
Unintentional injuries and violence	17	7	5	2
Mental health and suicide-related behaviors	5	3	3	0
Tobacco use	10	5	0	5
Alcohol and other drug use	19	5	0	5
Sexual behaviors	7	7	0	7
Dietary behaviors	11	2	2	0
Physical activity	6	0	–	–
COVID-19 and other health-related topics	14	1	0	1
Total	89	30	10	20

SUMMARY OF DIFFERENCES IN MISSINGNESS, BY ADMINISTRATION MODE AND TOPIC, 2021 YRBS TABLET STUDY



Missingness pattern by demographics

- For these 30 variables that were significantly different in missingness:
 - Further Chi-square tests were conducted to analyze differences in missingness by demographic characteristics.
 - Supplement results revealed that only two variables showed differences.



Supplement results

Chi-square Test	Number of missing observations in PAPI vs. Tablet			
	By Sex	By Grade	By Race/ethnicity	By Sexual Identity
	P value [†]			
Did not always wear a seat belt	0.8031	0.3100	0.4626	0.3598
Drove after drinking alcohol	0.8256	0.0106	0.6574	0.5574
Texted or e-mailed while driving	0.5550	0.1108	0.5851	0.6821
Ever saw someone get attacked, beaten, or shot in neighborhood	0.6344	0.3674	0.5805	0.1527
Ever forced to have sexual intercourse	0.5704	0.2157	0.0928	0.2551
Were bullied on school property	0.1534	0.8546	0.6955	0.6282
Were electronically bullied	0.2766	0.8885	0.4905	0.3084
Felt sad or hopeless	0.3145	0.5058	0.9228	0.8868
Seriously considered attempting suicide	0.0778	0.8342	0.3713	0.8799
Made a suicide plan	0.0097	0.6067	0.8846	0.8272
Ever tried cigarette smoking [§]	0.4419	0.2581	0.3751	0.6251
First tried cigarette smoking before age 13 years [§]	0.1313	0.1560	0.1807	0.5304
Currently smoked cigarettes [§]	0.5450	0.9267	0.8001	0.5041
Smoked more than 10 cigarettes per day [§]	0.1623	0.4134	0.0422	0.9733
All tobacco product cessation	0.2037	0.5186	0.0918	0.2947
Had their first drink of alcohol before age 13 years	0.8034	0.8752	0.3108	0.5267
Currently drank alcohol	0.1334	0.3946	0.1414	0.6255
Largest number of drinks	0.1888	0.9960	0.1863	0.3850
Source of alcohol	0.3584	0.3077	0.0877	0.0941
Ever used marijuana	0.9317	0.0669	0.1043	0.7484
Ever had sexual intercourse	0.9882	0.9984	0.0498	0.6272
Had first sexual intercourse before age 13 years	0.7081	0.9504	0.0613	0.8485
Had more than 4 sex partners during lifetime	0.4721	0.8333	0.0596	0.9972
Currently sexually active	0.9634	0.8652	0.0598	0.7915
Alcohol/drugs and sex [¶]	0.9412	0.8116	0.1174	0.8807
Condom use [¶]	0.5941	0.6843	0.0625	0.7931
Birth control pill use [¶]	0.3492	0.0827	0.5495	0.2194
Did not drink milk	0.9135	0.0032	0.8749	0.9533
Did not drink plain water	0.5491	0.0657	0.8662	0.0375
Had a sunburn	0.4550	0.0846	0.3589	0.2542

Limitations

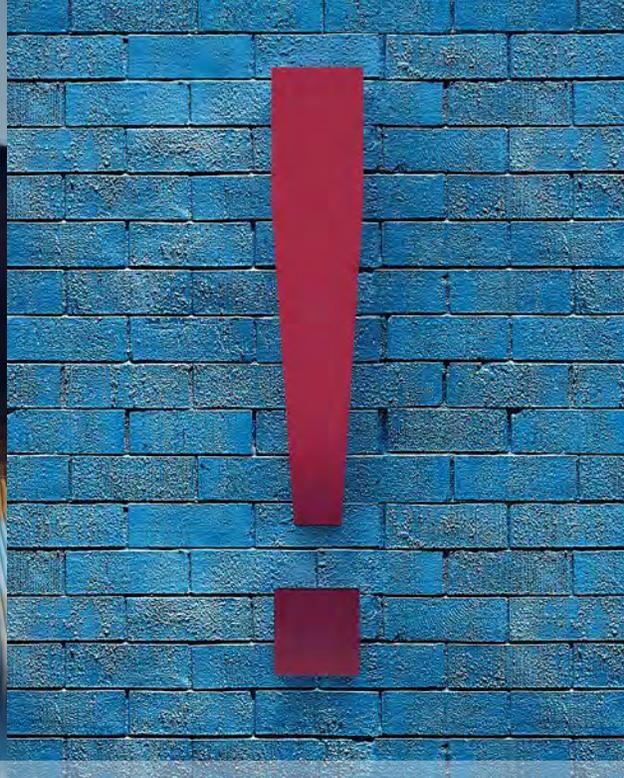
- Classrooms, not individual students, randomly assigned to survey modes.
- Differences may exist in unobserved demographics (e.g., socioeconomic status).
- Results are not nationally representative.



Conclusions



- Transition from PAPI to electronic surveys aligns with CDC's Data Modernization Initiative.
- Electronic administration (via tablets) maintains data quality across student behaviors.
- Findings support electronic surveys in U.S. schools
- Continued investment and improvements in public health monitoring are needed.



THANK YOU

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QUESTIONS

