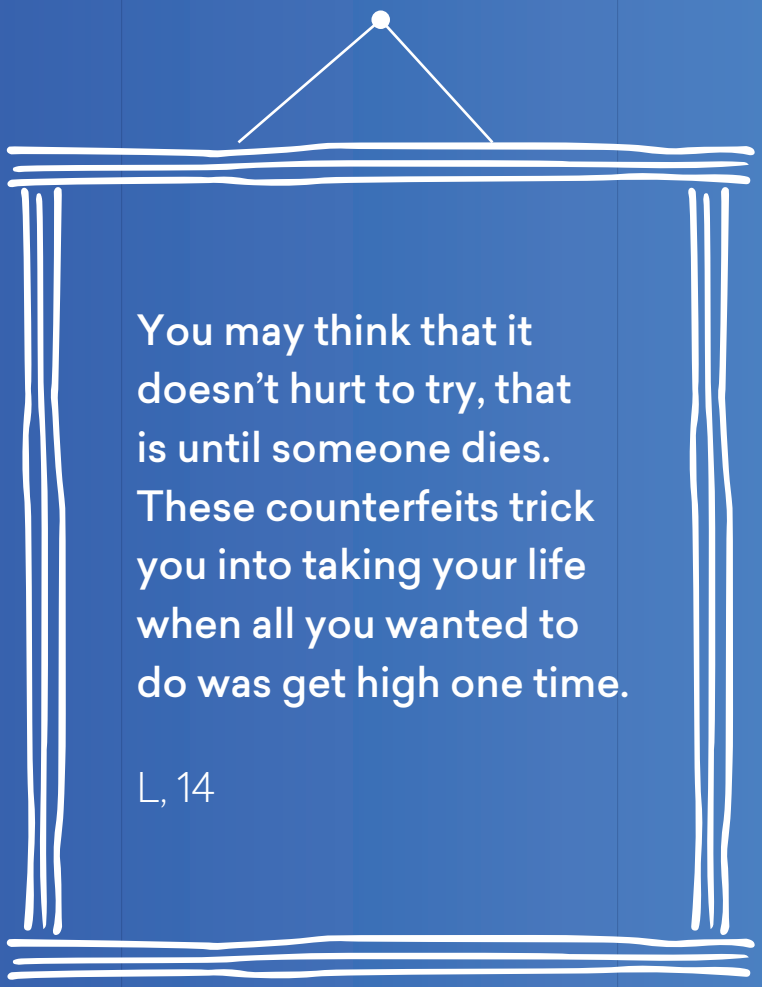
FEND

FULL ENERGY NO DRUGS

RHODE ISLAND PILOT REPORT

Preventum Initiative

JANUARY, 2020



You may think that it doesn't hurt to try, that is until someone dies. These counterfeits trick you into taking your life when all you wanted to do was get high one time.

L, 14

CONTENTS

Short poems from FEND participants are included throughout this report, along with their first initial and age.

ACKNOWLEDGMENTS

FEND is a campaign developed with collaboration from researchers, technologists and subject matter experts. The Preventum Initiative received funding for the Rhode Island pilot project from a State Opioid Response Grant (SOR) from SAMHSA, through the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities and Hospitals (BHDDH).

The Preventnum Initiative wishes to thank the following individuals and organizations that helped make the FEND Rhode Island campaign a success.

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- **Teresa Ensenat**
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Finally, we'd like to thank the high school students in Rhode Island who joined the FEND campaign. Thanks for taking the time to engage, learn, take part, share, and celebrate with us.

LETTER TO THE READER

Adolescence should be a carefree time of love and harmless fun, setting the stage for who we become, as we form new bonds, explore the world and find our place in society. Yet, substance abuse, anxiety and depression continue to take the lives of our young people, with prescription opioid misuse listed as the leading cause of unintentional injury and death among adolescents and young adults. It's clear that we must do more!

Traditional education programs have focused on curbing addiction and drug use in teens but they have failed to address the root causes of drug use: the pattern-forming problems of early trauma and the burden of mental health issues. Standard programs have focused on abstinence without question, telling our youth only that drugs are bad and not to be done under any circumstances, rather than empowering them with real information and the life-skills to rise and explore their potential.

Past campaigns resorted to preaching, ineffective scare tactics and shaming labels... engraining stigma and shutting doors, rather than encouraging the curiosity that drives education and the education that powers critical thought. If drug related deaths in youth are to be prevented, we need to equip our children with the know-how and tools to protect themselves, their friends, their families and their futures.

FEND is an innovative prevention campaign, incorporating evidence-based content and gamification techniques and, fittingly, rolled out on a smartphone app.

We recognize the correlation between mental health issues and drug use; we understand how Adverse Childhood Experiences (ACEs) and trauma have a direct impact on the mental health, potential substance use, suicide and other harmful behaviors and we therefore include information on all of these facets.

We empower youth with an understanding of how mental health is linked to drug use, so that they can use the information we provide on drugs, themselves, to cultivate resiliency skills that will last a lifetime. Beyond that, FEND includes information on where young people can find drug and mental health support in their local area, so that they are never alone.

In August of 2019, FEND launched a pilot in the state of Rhode Island, to engage the local, high school-aged youth. During the 4-month campaign more than 1800 people downloaded the FEND app, with just over 1000 of those users aged from 14-19 years. As in all FEND campaigns, the content, local resources and rewards were custom developed for Rhode Island teens. Informed by existing research, input from prevention coordinators in the state, as well as our youth advisory group, we were able to develop a campaign that was relevant and highly relatable to the local young people.

To our delight, the pilot campaign achieved encouragingly positive results, including a retention rate (percentage of people who return to the app) of 56%, where the industry average is only 25%. At a time when there are a multitude of apps, platforms and other media vying for the time and attention of our youth, the impressive retention rate we achieved on FEND is exciting, to say the least. These retention rates are significantly higher than traditional campaigns and speak to the fact that FEND is relevant and highly engaging to its target demographic.

This report provides an in-depth look at the stellar results of our FEND Rhode Island campaign. The significant advancement in knowledge, attitudes and beliefs expressed by the participants confirm the efficacy of delivering evidence-based, gamified primary prevention and education campaigns on a smartphone app.

The results and insights from this campaign will be used as a foundation to establish a sustainable FEND campaign in Rhode Island in the coming months and it's our aim that through quality insight and sound information we will furnish our young people with building blocks for a brighter future.

Sincerely,

Jacquii Burgess, PhD
Executive Director, Preventum Initiative

INTRODUCTION

At the start of 2020, we must acknowledge that the pandemic proportions of drug addiction, a complex disorder and chronic disease, are, quite simply, spiraling out of control... and we must take action.

With U.S. national opioid (illicit and prescription) overdose deaths rising from 8, 048 per year in 1999 to 47, 600 in 2017[1] and overall U.S. national overdoses rising from16, 849 in 1999 to a staggering 70, 237 per year in 2017, we can only imagine how disturbing those figures might look at the end of the coming year and worse yet, at the end of the coming decade. What's more, these figures relate only to overdoses and don't take into account other drug related fatalities: the inevitable consequences of drug use, such as mental or physical health issues, suicide, negligence and crime.

The fact is that, although 41% of users fall into the 19-22 year, young-adult demographic, 90% of all addicted adults began their drug use as adolescents, under the age of 18. Experimentation; peer-pressure; hormones; familial, social or school stresses and Adverse Childhood Experiences (ACEs) continue to combine into the cascading and often fatal disorder that is addiction and chronic drug abuse.

The toll of drug abuse on society is manifold, immeasurable and, frankly, catastrophic. Beyond the cost to the addicts, themselves, the health-effects, the mental disorders, depression, suicides and overdoses which often result... addiction breaks up family units and robs the nation's economy of hundreds of billions of dollars annually (last tally at $740 billion per year, in the U.S. alone[2] in healthcare costs, the toll of crime and the crippling loss for the nation's workforce.

Background & Motivation

Statistics indicate that 21% of teens aged 12 to 17 years have dabbled in prescription opioids, with 82% adhering to the prescription, 15% continuing into misuse and 3%[3] developing chronic abuse disorder, which often expands to include the use of illegal drugs.

The National Survey on Drug Use and Health[4] has revealed that an estimated 30,5 million U.S. citizens over the age of 12 had used illicit drugs in the 30 days preceding the 2017 survey alone. Together with the disconcerting estimate of 11,1 million synthetic opioid (pain reliever) users in 2017, it's safe to assume that, considering the correlation between black-market prescription opioid and illegal drug use, illicit drug use and its many crippling ramifications will only continue to rise...unless drastic measures are taken to nip this scourge in the bud.

Given the chronic, cascading and far-reaching effects of chronic abuse, it follows that, with this disease in particular, **prevention is better than cure.** Education *must* begin in childhood, and here's why:

Research literature has consistently shown that genetic, psychological, and social factors make some individuals more predisposed to substance abuse than others. Furthermore, adverse childhood experiences (ACEs), which correlate with substance abuse and several other mental health issues represent an important risk factor that needs to be considered in any prevention strategy. Studies confirm that individuals who experienced four or more categories of ACEs have a 4-to-12-fold increased risk for alcoholism, drug abuse, depression and suicide attempts and it goes without saying that, in family and social situations where ACEs occur, they are often prone to occur in numbers.[5]

Substance abuse is associated with a high risk of physical and mental health problems, not to mention poverty, criminal involvement and a severe diminishing in quality of life. Surveys conclude that half of the individuals who experience a mental illness during their lives will also experience a substance use disorder and vice versa, with disorders including anxiety, panic, and post-traumatic stress disorders (PTSD), depression, bipolar disorder, attention-deficit hyperactivity disorder (ADHD), borderline personality disorder, psychotic illness, and antisocial personality disorder.[6]

This association is easily observed in teenagers from community-based substance use disorder programs, 60% of whom meet the diagnostic criteria for another mental illness.

The biggest cost of substance abuse is the senseless loss of human life. In the United States, the mortality rate due to drug overdose has increased significantly in the last two decades. For instance, just between 2015 and 2016 the rate of drug overdose deaths increased by 21,4%, with 63,632 individuals dying as a result of an overdose. Death due to overdose increased in all drug categories examined, with the largest increase occurring in synthetic opioids. Most deaths are caused by opioids, methadone, heroin, synthetic opioids other than methadone, cocaine, and psychostimulants with abuse potential.[7]

Given the significant stigma associated with substance abuse and addiction, knowing where to find help is not always enough, especially where children are concerned.

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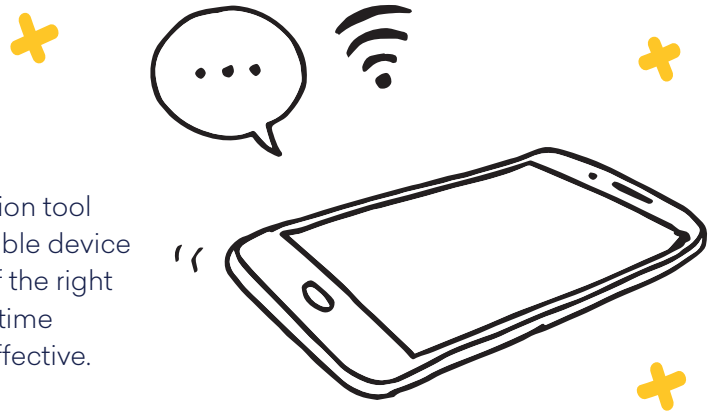
Undoubtedly, it is imperative that substance users, their families and their friends understand and recognize that addiction is a disorder and a disease, associated with notable biochemical changes in the brain, that simply cannot be controlled by 'strong will.'

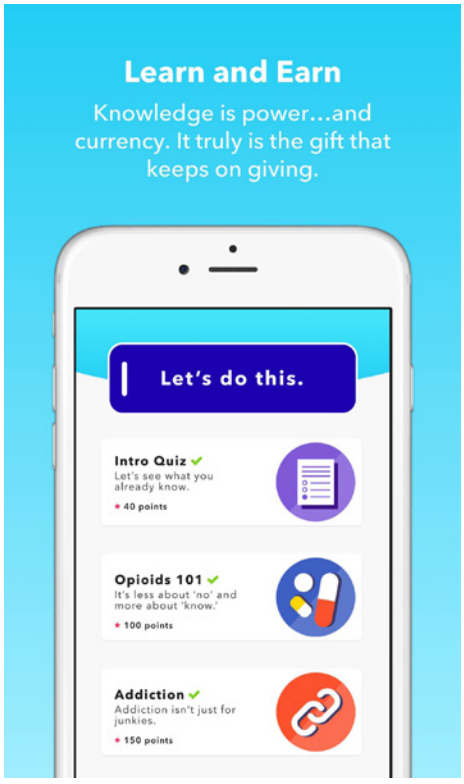
Considering all of this, it is clear that it's not only the adults that need to realize this but the children too, who desperately need to feel enabled to seek and even provide help where necessary, because lives and futures depend on it.

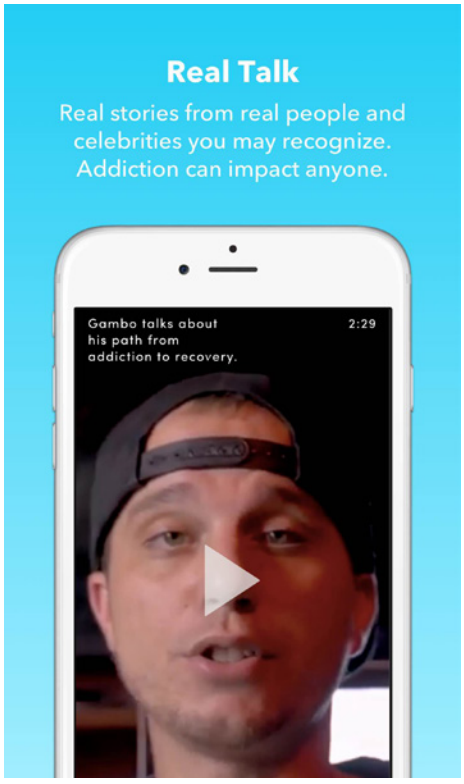
Resilience can be defined as the ability to cope, adapt, and recover from stressful events and effective coping strategies can help individuals maintain or improve their mental health despite the presence of stress. Optimism, social support, and training are just some of the variables that can influence resilience. While some individuals appear to be predisposed to be more resilient than others, evidence shows that resilience can be trained-in through cognitive-behavioral (CBT) and mindfulness techniques[8] and logic states that this training is best provided during childhood.

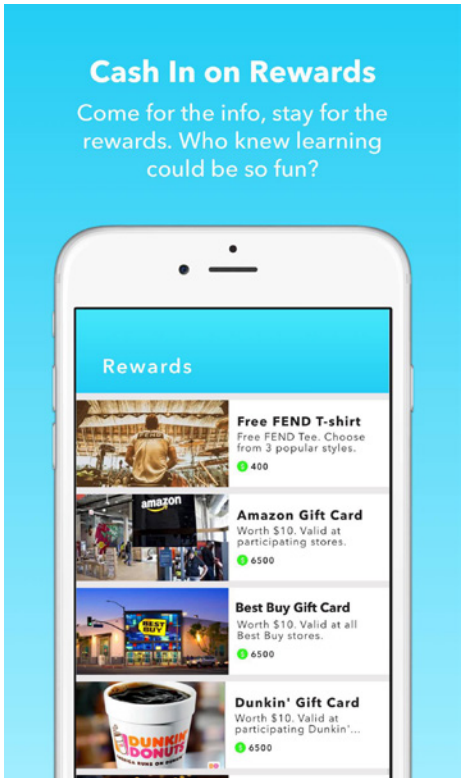
INTRODUCING FEND



FEND (Full Energy, No Drugs) is an innovative primary prevention tool delivered via an app on 2020s most popular and readily available device amongst young people...the smartphone. The combination of the right device, right content, and right rewards, delivered at the right time (when it suits the participant to view it) is what makes FEND effective.







The FEND campaign content is geared toward engaging our youth and seeks to empower them, as opposed to preaching or lecturing to them (which has so often proved to be counter-productive).

Furthermore, gamification techniques are used to engage and incentivize users to participate and learn by offering relevant and desired rewards such as Amazon, Starbucks, and Dunkin' Donut gift vouchers, movie tickets, concert tickets, and 'money can't buy' experiences.

The public-facing app operates on a platform that allows real-time reporting, which demonstrates the current success of the campaign. The reporting provides data such as who is engaged, who isn't, where there is low knowledge transfer and so-on, while the real-time reporting feature allows messages to be quickly modified, if needed, and/or rewards to be changed to ensure optimal effectiveness of the campaign and engagement by the target audience.

The primary substances FEND focuses on are high-lethality opioids (prescription painkillers, heroin, and fentanyl), benzodiazepines, and methamphetamines. There are good prevention programs that already exist for youth that focus on smoking, alcohol and other drugs but it is becoming increasingly apparent that the reach must extend beyond these to tackle a scourge of substances that is, worryingly, taking our adolescents by storm. Indeed, as previously mentioned, prevention is better than cure. FEND intentionally does not include these substances, so as not to dilute its core messaging.

Youth Advisory Group

As a part of every FEND campaign, local youth from the target audience are recruited to form a Youth Advisory Group (YAG). The compound roles of this group are to guide content and messaging, rewards and competitions to ensure they are relevant; and secondly, to help engage local youth to participate freely in the FEND campaign.

Being a teen is tough
and anxiety makes things rough
but if you're feeling down
never turn to drugs
instead find a family member
to help you up and use fend :)

F, 14

FEND RHODE ISLAND PILOT

In the small state of Rhode Island (RI), the opioid crisis has taken a shocking toll. In 2017, there were 277 overdose deaths involving opioids; an age-adjusted rate of 26.9 per 100, 000 person (higher than the national rate of 21 per 100, 000.[9]

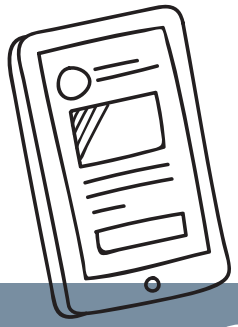
To combat this crisis, the state government, local prevention coalitions and NGOs established numerous prevention, rescue, treatment and recovery initiatives. RI has become known for its innovative responses to the crisis, so it's fitting that they chose to pilot a youth-targeting, app-based opioid prevention and education campaign to work alongside their other prevention programs.

The FEND Rhode Island pilot ran from August to November 2019 and was open to all high school-aged students in the state of Rhode Island. The pilot was funded by a State Opioid Response Grant (SOR) from SAMHSA, through the RI Department of Behavioral Healthcare, Developmental Disabilities and Hospitals (BHDDH). The initial definition of high school-aged students was 15-18 years but was modified to 14-19 years to allow older and younger high school students to participate. The outcome measures for the FEND RI pilot sought significant change in knowledge, attitudes and behavioral intent.

Prior to launching the pilot, FEND recruited seven YAG members from across the state, with the help of the regional prevention coordinators. The Youth Advisory Group met three times during the campaign, in addition to meetings with individual group members. Their guidance, enthusiasm and willingness to support FEND and promote it to their communities was invaluable.

Participant recruitment via social media

Social media as a recruitment tool has gained popularity in the past five years. The ability to target specific demographics (geo-location, age-group, gender), along with its popularity among adolescents and young adults make it an ideal method for reaching potential FEND participants. The social media strategy used for the Rhode Island campaign is outlined below.



1 IDENTIFY AUDIENCE

FEND aimed at 14 to 19 year-olds, as a representative sample of Rhode Islanders based on geographic location, race, ethnicity and gender

2 RESEARCH AUDIENCE DEMOGRAPHICS, PSYCHOGRAPHICS AND ATTENTION SPENDING

Using tools provided by social platforms, an overview was built of the audience: what they are interested in, where they spend their time, who they follow, what influences them.

3 IDENTIFY PLATFORMS TO REACH TARGET AUDIENCE

Snapchat, Facebook, Instagram and Tiktok were chosen due to their popularity with target audience.

4 CREATE APPROPRIATE MESSAGES TO SUIT THE PLATFORM/AUDIENCE

Two key themes were used: altruistic and reward. Multiple messages were created using these themes, along with various media types such as influencer video, animations and memes.

5 MONITOR AND EVALUATE EFFECTIVENESS

Multiple combinations of message, video and channel were tested to establish the most effective campaign strategy, then budget was aimed at the highest performing option, in terms of its overall reach and effectiveness. Snapchat and Instagram proved the most effective channels for participant recruitment and reach.

Using social media channels to recruit participants for this campaign resulted in an effective representative sample of participants being recruited to the FEND app. In total 1841 people participated in the FEND RI campaign. The demographic characteristics of these participants is provide in Appendix 1.

TIKTOK

152,411
IMPRESSIONS

875
LINK CLICKS

FACEBOOK/INSTAGRAM

153,896
IMPRESSIONS

7,816
VIDEO VIEWS

1,459
LINK CLICKS

SNAPCHAT

2,364,349
IMPRESSIONS

21,729
SWIPE-UPS

**Impressions – number of times FEND advertisements were shown. *Link clicks/swipe-ups – number of people who saw a FEND advertisement and clicked through to find out more and/or download the app.*

THE FEND CAMPAIGN

DOWNLOAD **FEND** APP

SIGN-UP, DEMOGRAPHIC DETAILS
(DOB, gender, ethnicity, school, zip code)

BASELINE SURVEY
(pre-test) points awarded

ACCESS TO RESOURCES TAB
(local support services, helplines, life-saving tips)

CORE CONTENT
- video
- pop quiz
- reinforcement
- points awarded

POINTS REDEEMED FOR REWARDS

CORE CONTENT
- video
- pop quiz
- reinforcement
- points awarded

CORE CONTENT
- video
- pop quiz
- reinforcement
- points awarded

POINTS REDEEMED FOR REWARDS

EXIT SURVEY
(post-test) points awarded

ONGOING MISSIONS
- topical content i.e. vaping, suicide...
- community engagement and activities
- user-generated questions/content
- video, pop quiz, reinforcement, points awarded

POINTS REDEEMED FOR REWARDS

The FEND campaign

After downloading the FEND app (freely available on the App Store or Google Play), participants sign-up, provide demographic details and then complete the baseline survey (pre-test), which offers multiple choice options and check-box questions, designed to gauge awareness of drug facts and how to respond correctly in various threatening, drug related scenarios.

From there, participants go through the nine core content sections. The core content topics for the Rhode Island pilot are shown below.

Core content topics for FEND Rhode Island campaign	
SUBSTANCES	• Opioids • Benzodiazepines • Fentanyl and counterfeit pills
OVERDOSE	How to recognize/respond, Good Samaritan Laws
ADDICTION	Addiction is a disease (no-one is immune). Prescription to addiction
MENTAL HEALTH	Things I wish my teenage-self had known about depression and anxiety
RESILIENCY	• Taking care of yourself (physically, mentally, emotionally) • Tips for dealing with the hard times (coping skills)
LET'S TALK ABOUT IT	Asking for help, when/where to get help, how to start a conversation with friends who may need help

Each content piece includes information on one of the core topics in the form of a short video (personal story, or animation/motion graphic) geared at informing through engagement. This is followed by a pop-quiz to reinforce the content objective and, finally a key takeaway message is given. Points are awarded to the participant for viewing the video and completing the pop quiz.

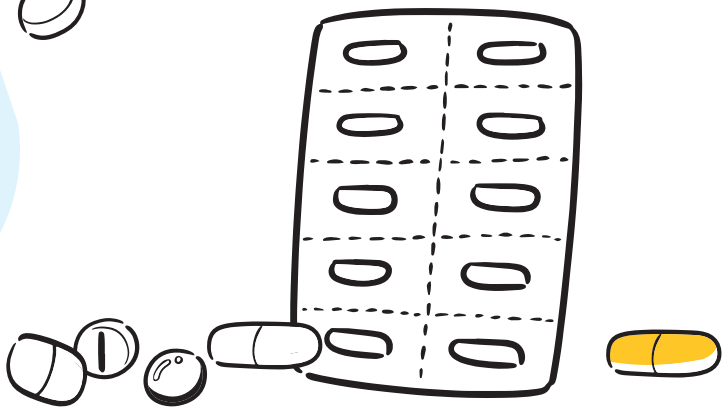
The participant continues on through the core content, with the incentive of accumulating points as they go. After completing the core content, participants can then complete the exit survey (post-test), after which more points will be awarded.

From there, the participant can begin to actively engage and complete optional FEND themed missions – such as creating a meme, writing a short poem, designing a t-shirt graphic and more. Points earned through engagement can be redeemed for rewards, such as Amazon, Starbucks or Dunkin' Donut vouchers, movie tickets, concert tickets or FEND swag. Participants are also encouraged to give feedback, ask questions and suggest future content topics.

In addition to the core content, the app has a resources section which provides participants with additional information. For example, where to get help, with a list of local support services and helplines available for teens; infographics about recognizing and responding to an opioid overdose, and how to administer Narcan.

Fitting in
It's how we cope
With our peers
But sometimes
We tend to drift
Away
From people who really care

H, 15



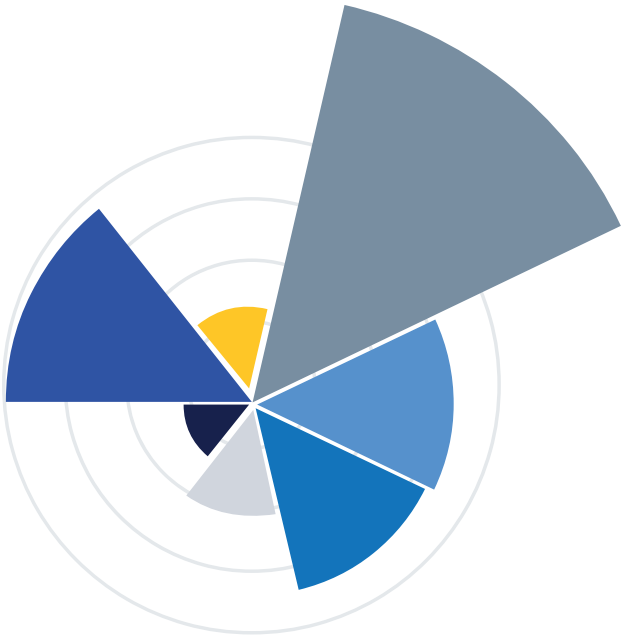
RESULTS

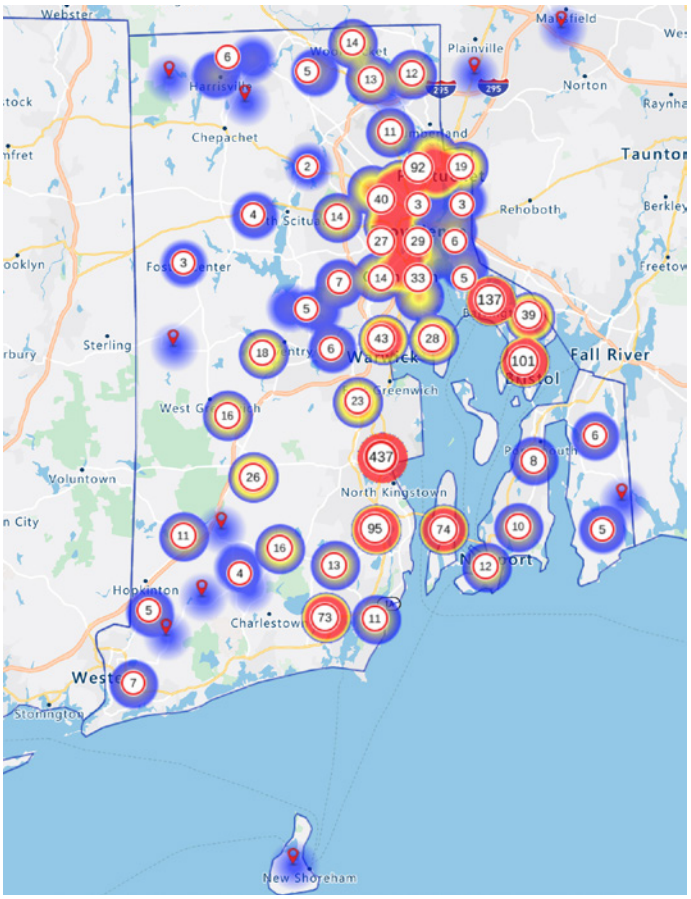
Demographic Characteristics

In total, 1841 people participated in the FEND RI campaign. Demographic data was not recorded for 204 participants and demographic characteristics for the all remaining participants are shown in Appendix 1.

The target audience for FEND RI pilot was 14 to 19 year-olds; therefore the results discussed in this report focus on these participants only.

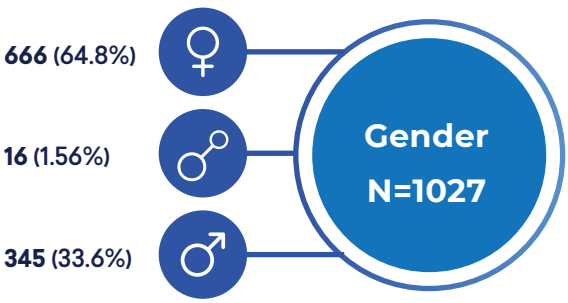
A total of 1027 participants ages 14 to 19 years completed the baseline (pre-test) survey and 599 of them completed the exit (post-test) survey, with a completion rate of 58.3%. Demographic characteristics are shown below.

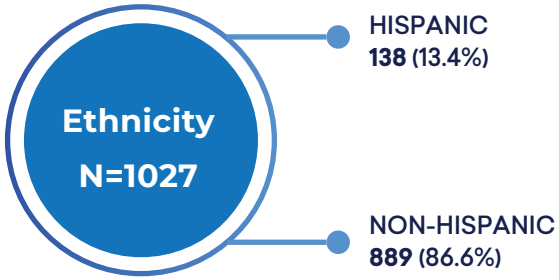




Map showing the location of FEND participants based on their zip code.

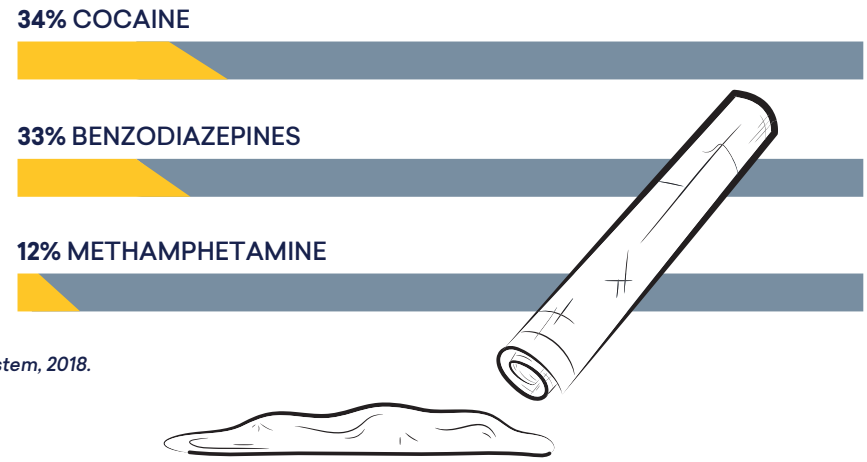
RACE	N=1027
HAWAIIAN/PACIFIC ISLANDER	**03** (0.29%)
ASIAN	**34** (3.31%)
OTHER	**53** (5.16%)
BLACK	**58** (5.65%)
WHITE	**802** (78.1%)
NATIVE ALASKAN/NATIVE AMERICAN	**10** (0.97%)
MULTI-RACIAL	**67** (6.52%)





63%

of all opioid deaths also involved other drugs



Source: CDC's State Unintentional Drug Overdose Reporting system, 2018.

Opioid overdose

Four of FEND's baseline, pop-quiz and exit questions related to opioid overdose; participants were asked what the signs of an overdose were; how to respond to an overdose; their confidence in recognizing and responding to an opioid overdose; and how likely they were to seek medical help if they witnessed an overdose.

As shown in Table 1 (and Figures 1 & 2), a notable increase in knowledge around how to recognize and respond to an opioid overdose was observed.

Knowledge around signs and symptoms demonstrated by the statistically significant increase ($P < 0.001$), including all of the correct signs and symptoms apart from 'sleepy or unresponsive'; as well as the statistically significant decrease ($P < 0.001$) in those that chose the incorrect signs (shaking/fitting and fever), were duly noted.

Furthermore, statistically significant increase in knowledge around how to respond to an overdose was also observed in the percentage of participants that chose "Lay them on their side" and "Administer Narcan nasal spray". Participant confidence in recognizing and responding to an opioid overdose also increased, reaching statistical significance ($P < 0.001$).

Finally, likelihood of seeking medical help showed an increase, however, it didn't reach statistical significance (P 0.012). This may be related to the fact that less than half (46.2%) of participants had heard about the Good Samaritan Laws before seeing the video about it on the app.

I am strong

My friends are strong

And if I see someone struggling I will not be afraid to talk to them

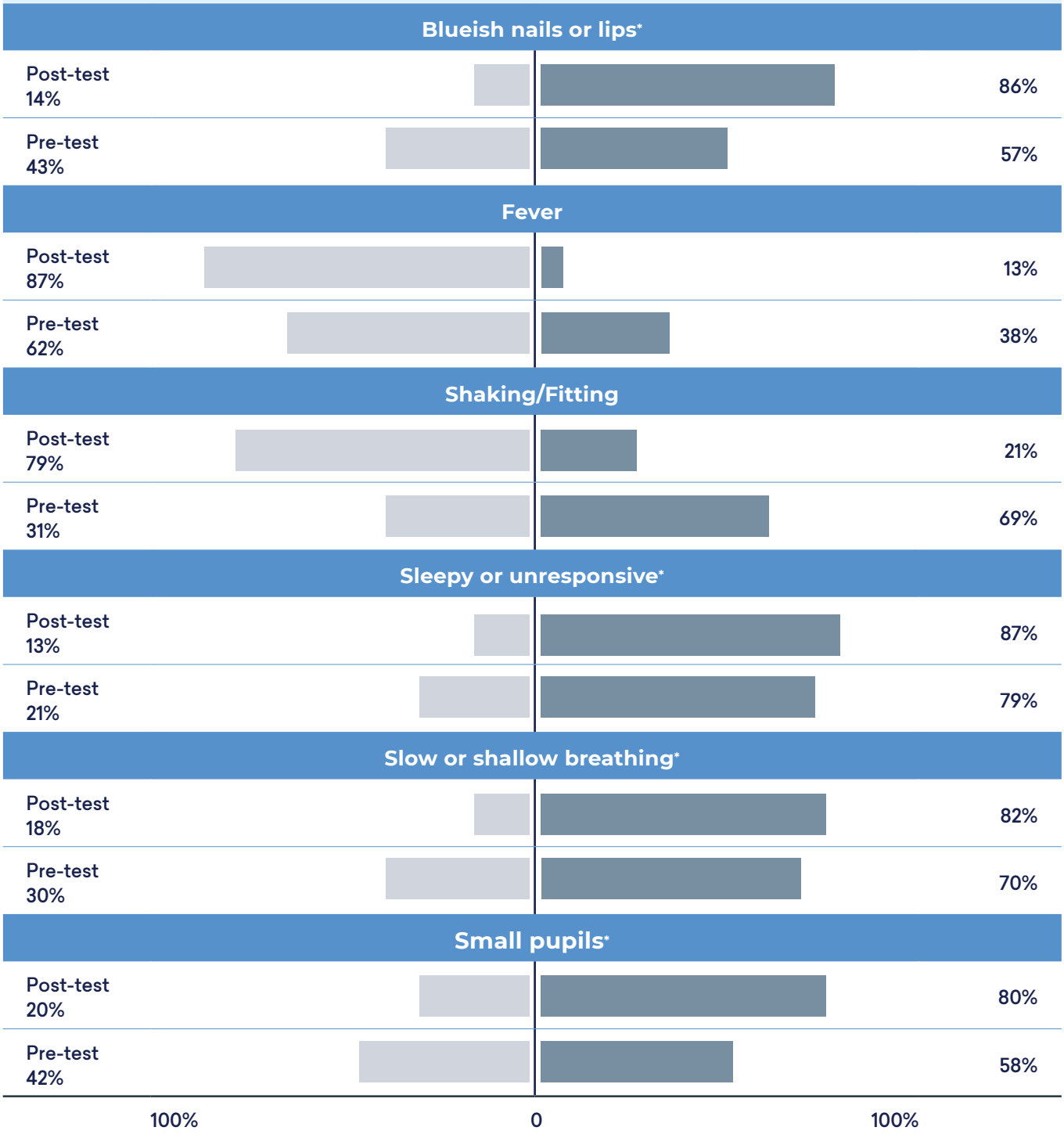
A, 15

Table 1 Participant knowledge, confidence and attitudes regarding opioid overdose

	PRE-TEST N=1027	POST-TEST N=599	% CHANGE	P-VALUE
Opioid overdose signs and symptoms				
SLOW OR SHALLOW BREATHING*	721 (70.2%)	491 (82.0%)	+11.8%	<0.001
SHAKING/FITTING	706 (68.7%)	128 (21.4%)	- 47.3%	<0.001
SLEEPY OR UNRESPONSIVE*	810 (78.9%)	523 (87.3%)	+8.4%	0.001
SMALL PUPILS*	595 (57.9%)	480 (80.1%)	+22.2%	<0.001
BLUEISH NAILS OR LIPS*	585 (57.0%)	516 (86.1%)	+29.1%	<0.001
FEVER	391 (38.1%)	80 (13.4%)	- 24.7%	<0.001
Opioid overdose response				
LAY THEM ON THEIR SIDE*	715 (69.6%)	489 (81.6%)	+12%	<0.001
LET THEM SLEEP IT OFF	28 (2.73%)	22 (3.67%)	<1%	0.359
SHOCK THEM BY POURING COLD WATER ON THEM	174 (16.9%)	69 (11.5%)	- 5.4%	0.613
MAKE THEM DRINK A COFFEE	48 (4.67%)	24 (4.01%)	<1%	0.613
ADMINISTER NARCAN NASAL SPRAY*	433 (42.2%)	469 (78.3%)	+36.1%	<0.001
STAY WITH THEM UNTIL HELP ARRIVES*	862 (83.9%)	514 (85.8%)	+1.9%	0.347
Confidence in recognizing and responding to an opioid overdose				**<0.001**
NOT CONFIDENT	362 (35.2%)	33 (5.51%)		
SOMEWHAT CONFIDENT	379 (36.9%)	242 (40.4%)		
VERY CONFIDENT	128 (12.5%)	307 (51.3%)	+38.8%	
UNSURE	158 (15.4%)	17 (2.84%)		
Likelihood of seeking medical help for O/D				**0.012**
NOT LIKELY	39 (3.81%)	16 (2.67%)		
SOMEWHAT LIKELY	133 (13.0%)	55 (9.18%)		
VERY LIKELY	837 (81.7%)	520 (86.8%)		
UNSURE	15 (1.46%)	8 (1.34%)		

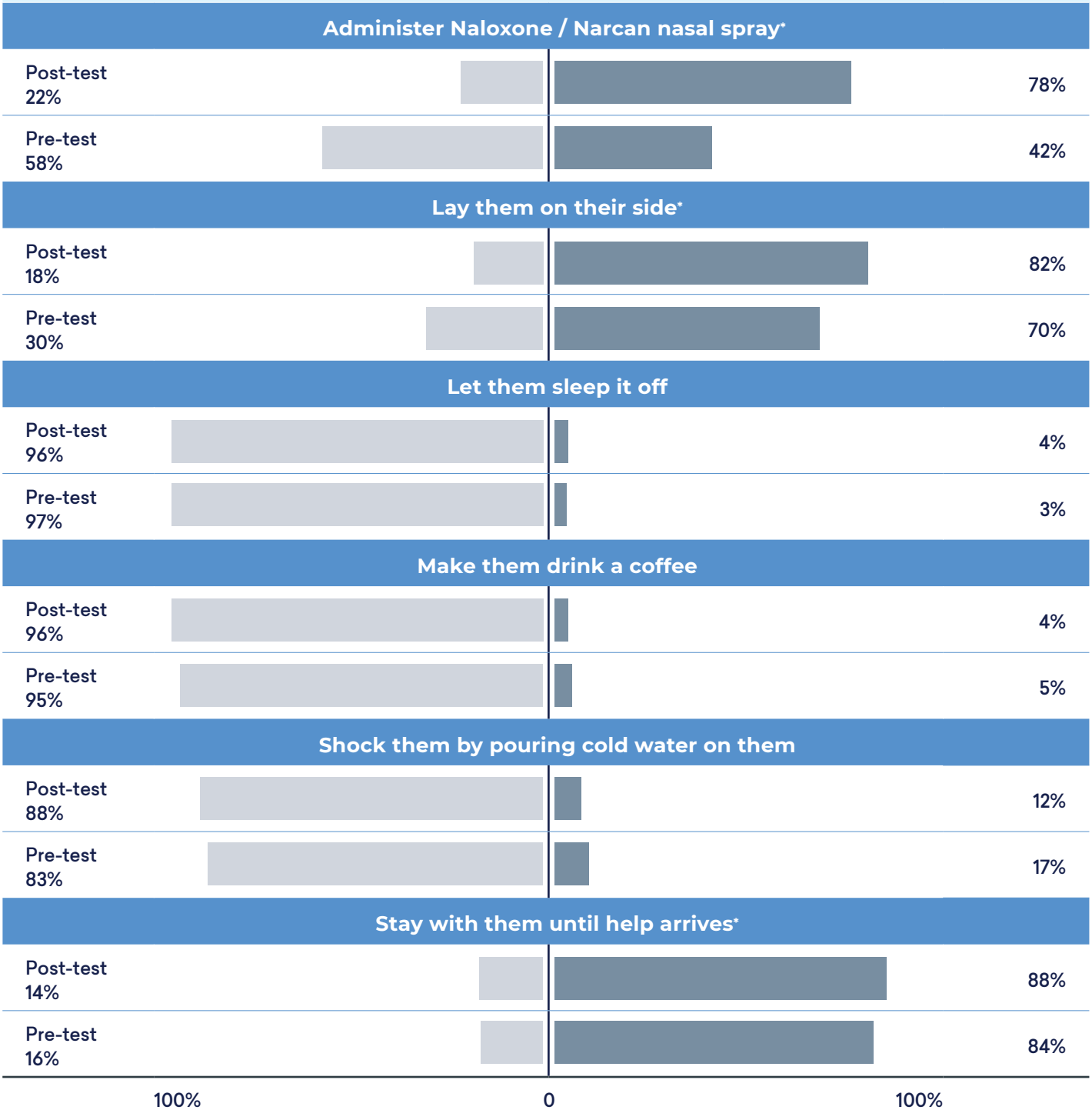
*Statistical analysis was performed using Chi-square test of independence. * Correct answer.*

Figure 1 Participant pre and post-test knowledge of opioid overdose signs and symptoms



*Correct answers.

Figure 2 Participant pre and post-test knowledge on responding to and opioid overdose



*Correct answers.

Opioids and addiction

Participants were asked four baseline, pop-quiz and exit questions related to prescription painkillers, mixing substances and addiction, as shown in Table 2.

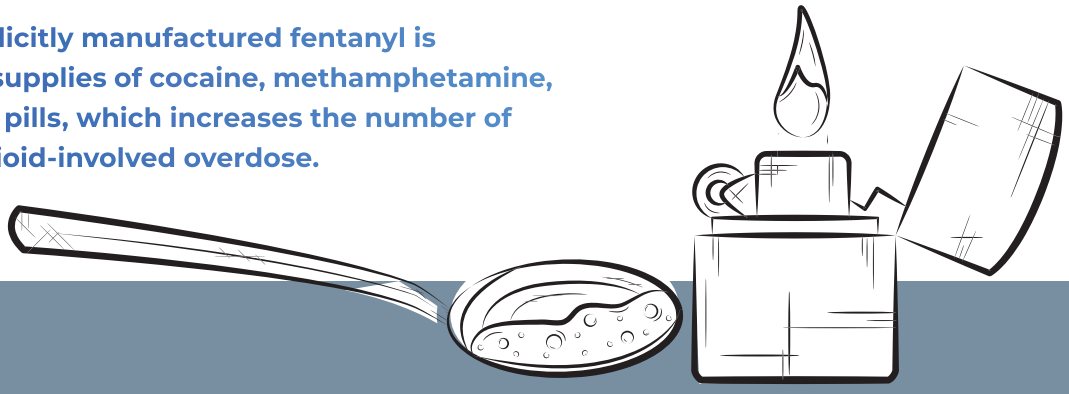
Table 2 Knowledge and attitudes regarding opioids and addiction

	PRE-TEST N=1027	POST-TEST N=599	% CHANGE	P-VALUE
Avoiding addiction is a matter of self-control				**<0.001**
FALSE*	442 (43.0%)	344 (57.4%)	**+14.4%**	
TRUE	585 (57.0%)	255 (42.6%)		
Dependence on prescription painkillers can occur in 4-5 days				**0.003**
FALSE	65 (6.33%)	17 (2.84%)		
TRUE*	962 (93.7%)	582 (97.2%)	+3.5%	
Most dangerous substance to mix with Benzodiazepines				**<0.001**
HALLUCINOGENS (I.E. ECSTASY, ACID)	265 (25.8%)	88 (14.7%)		
SEDATIVES (I.E. ALCOHOL)*	459 (44.7%)	421 (70.3%)	**+25.6%**	
STIMULANTS (I.E. COCAINE, METH)	303 (29.5%)	90 (15.0%)		
Young people are more likely to die from an overdose of:				**<0.001**
ALCOHOL	241 (23.5%)	47 (7.85%)		
COCAINE	82 (7.98%)	26 (4.34%)		
METH	50 (4.87%)	17 (2.84%)		
OPIOIDS*	654 (63.7%)	509 (85.0%).	**+21.3%**	

*Statistical analysis was performed using Chi-square test of independence. * Correct answer.*

Initially mixed with heroin, illicitly manufactured fentanyl is increasingly being found in supplies of cocaine, methamphetamine, and counterfeit prescription pills, which increases the number of populations at risk for an opioid-involved overdose.

Source: CDC, MMWR 68(43). Nov 2019.



Participant knowledge on the highly addictive nature of prescription painkillers increased markedly between pre and post-tests as shown in Table 2.

Knowing that dependence on prescription painkillers can occur with as few as 4-5 days of use increased from 93.7% to 97.2%, which was statistically significant at the 0.05 level (P = 0.003). This message was important to get across to this audience, since an estimated 50% of teens who currently inject heroin started out misusing prescription pain killers.

When asked about the substance involved in the most overdose deaths in young people, a quarter (23.5%) of participants wrongly selected alcohol. This decreased by 16% in the post-test and the correct answer 'opioids' increased by 21%, reaching statistical significance (P < 0.001).

This message was reinforced in FEND's core content messages, which highlighted that 80% of drug overdose deaths in 15-19-year-olds are accidental. In the pop-quiz that followed, 67.6% of participants expressed awareness of this fact.

Attitudes and general understanding around addiction were tested in the question related to addiction being a matter of self-control, and changed significantly between the two time points, by 14% (P < 0.001).

The heightened risk of mixing substances with alcohol were evaluated in two baseline, pop-quiz and exit questions, one asking what the most dangerous substance to mix with Benzodiazepines was, and the other (in a pop quiz) around mixing drugs/ substances in general.

This marked a significant increase in knowledge between the two time points of ~25% (P < 0.001) around the risks of mixing drugs and alcohol.

Every day I came home from school and showered my brother with hugs. I will never see him again because of opioid drugs.

N, 17

Likelihood of discussing the risk of opioids with family and friends

Participants were asked the likelihood of their talking with family or friends about the risks of prescription opioids.

Figure 3 shows that there was a 40% increase (22.5% to 62.8%, P < 0.001) in those who were 'very likely' to do so, as well as a significant decrease (24.2% to 3.0%, P < 0.001) in those who were 'unlikely' to have the discussion.

The reason for this may be that, as participants became more informed about the risks and confident about the issue, they were more likely to share this new knowledge with others.

Fentanyl, benzodiazepines and counterfeit drugs

Core content messages also focused on Fentanyl, benzodiazepines and counterfeit drugs. Information to teens around the risks associated with these substances is particularly important, given the steep increase in drug overdose deaths involving these drugs in the past few years.

After watching these content messages, 90% of participants know they are in the age-group (15-24 years) that has experienced one of the sharpest increases in deaths due to Fentanyl in recent years. The majority recognized the high occurrence and dangers of fentanyl-laced counterfeit pills, 96% knew that taking just one counterfeit painkiller laced with Fentanyl could result in death and 88% acknowledged there was no easy way to tell the difference between a counterfeit pill and a legitimate pill.

Understandably but no less worryingly, participants were less likely to know the highly addictive nature of benzodiazepines, whether taken recreationally or as prescribed. Although three quarters of participants acknowledged they were highly addictive if used occasionally, it was concerning to see that 13% thought they were only addictive if taken in high quantities and 8% thought they were only addictive if the pills were bought on the streets or black market.

On a positive note, 95% recognized the heightened risk of overdosing if alcohol and benzodiazepines are taken together.

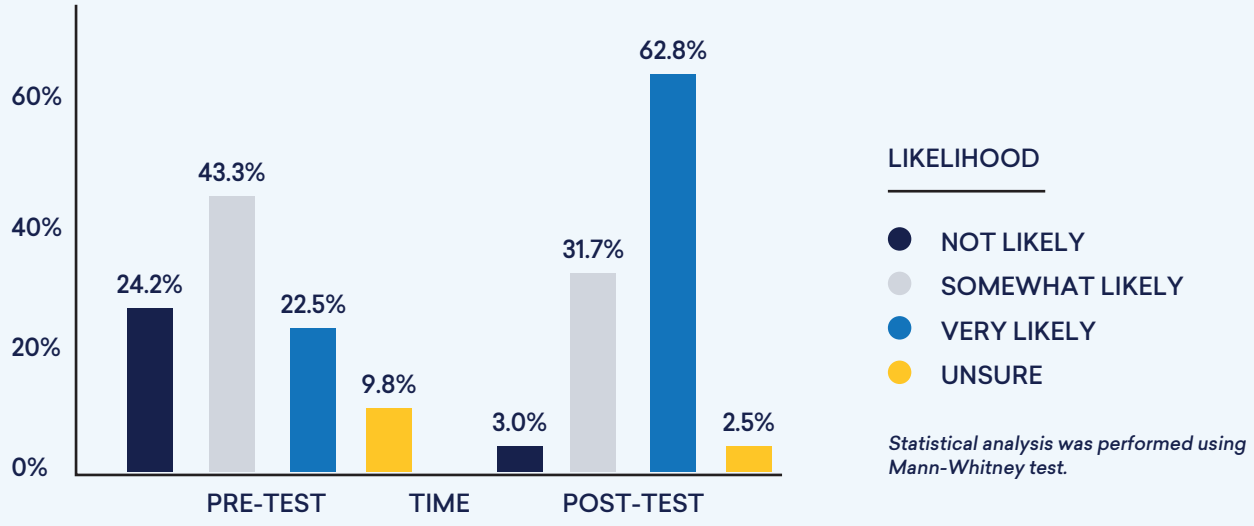
Perceived risk of substance use

Seven questions on perceived risk were included in the pre- and post-test surveys based around research that has found that attitudes and beliefs, such as perceived risk and disapproval, significantly influence drug-using behavior.

In fact, perceived risk has been shown to be a leading indicator of changes in use; and in the aggregate, disapproval is indicative of peer norms. Participants were asked how much they think people risk harming themselves (physically or in other ways), if they do the following (see Figure 4):

- Take prescription painkillers (to get high), once or twice?
- Take prescription painkillers (to get high) regularly?
- Take Benzodiazepines (i.e. Xanax or Valium) to get high, once or twice?
- Take Benzodiazepines (i.e. Xanax or Valium) to get high, regularly
- Try Heroin once or twice?
- Take unknown prescription pills at a party?
- Mix prescription medications (e.g. Percocet or Xanax) with alcohol?

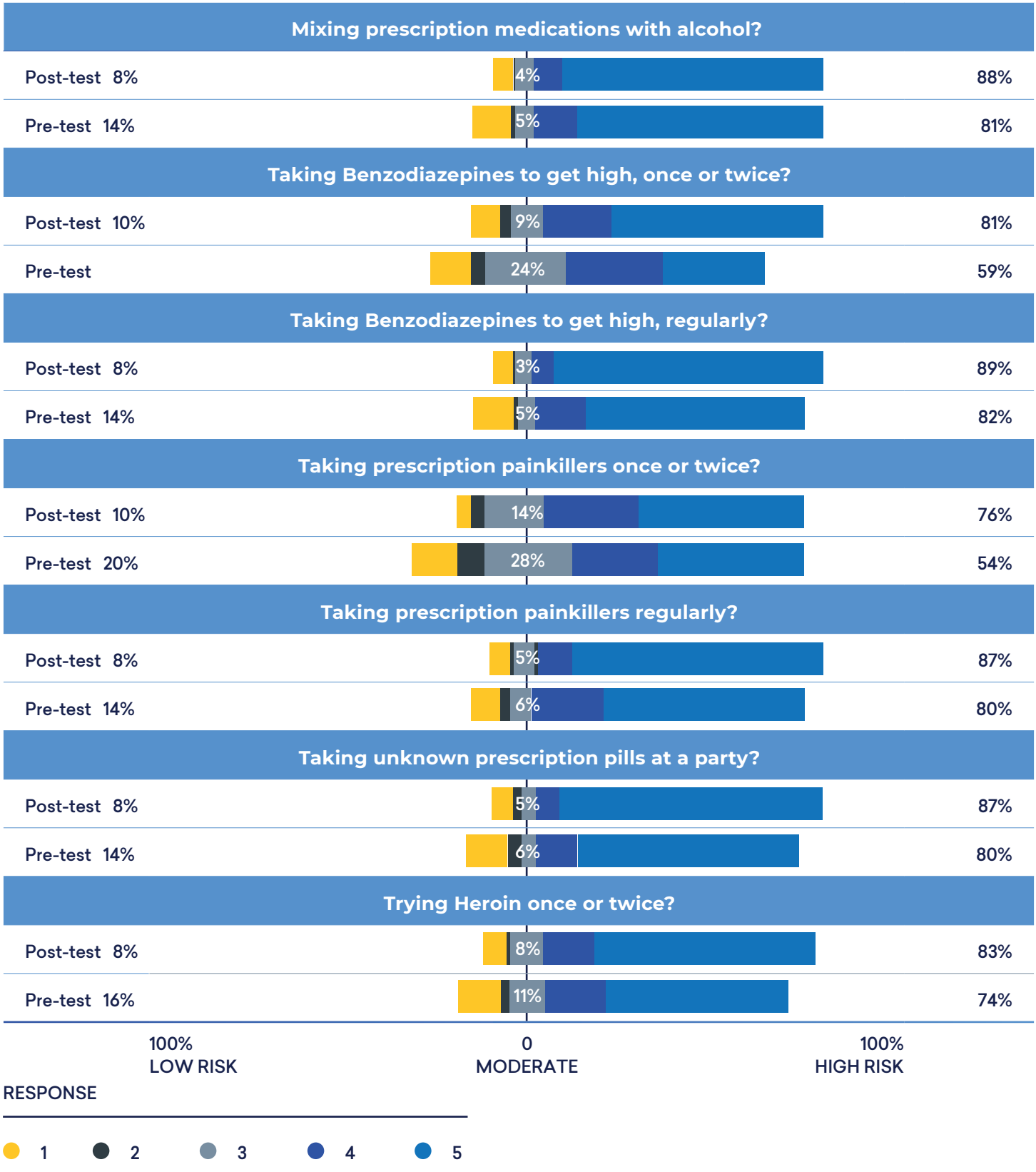
Figure 6 Likelihood of discussing the risk of opioids with family and friends



Statistical analysis was performed using Mann-Whitney test.

Figure 4 Perceived risk of substance use in pre- and post-test

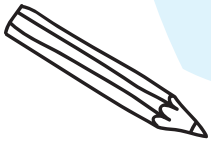
Numbers on the right and left represent the percentage of participants that chose more than moderate risk (4 or 5) and less than moderate risk (1 or 2), respectively



Encouragingly, results showed an increase in the perceived risk of substance use between pre- and post-text surveys (Table 3).

The percentage that chose more than moderate risk increased for all questions. The percentage change was highest for "taking prescription painkillers (to get high) once or twice " and "taking benzodiazepines (to get high) once or twice". An approximate increase of 20% was observed in the participants that chose more than moderate risk.

Statistical analysis using Mann-Whitney test showed that the increase in perceived risk was statistically significant on all questions (P < 0.001).



20%

of high school students

have been offered, sold or given illegal drugs on school property

Source: CDC, MMWR 67(8). June 2018.

I once got high
And didn't come down
Thought I was real cool
Turned out I was a clown

N, 15

Table 3 Perceived risk of substance use

	PRE-TEST N=1027	POST-TEST N=599	P-VALUE
TAKING PRESCRIPTION PAINKILLERS (TO GET HIGH), ONCE OR TWICE?	3.46 (1.30)	4.10 (1.16)	<0.001
TAKING PRESCRIPTION PAINKILLERS (TO GET HIGH), REGULARLY?	4.13 (1.35)	4.48 (1.11)	<0.001
TAKING BENZODIAZEPINES (TO GET HIGH), ONCE OR TWICE?	3.61 (1.28)	4.25 (1.16)	<0.001
TAKING BENZODIAZEPINES (TO GET HIGH), REGULARLY?	4.21 (1.34)	4.56 (1.09)	<0.001
TRYING HEROIN ONCE OR TWICE?	4.01 (1.38)	4.35 (1.15)	<0.001
TAKING UNKNOWN PRESCRIPTION PILLS AT A PARTY?	4.20 (1.35)	4.50 (1.12)	<0.001
MIXING PRESCRIPTION MEDICATIONS WITH ALCOHOL?	4.24 (1.35)	4.54 (1.10)	<0.001

Data is presented as median [IQR]. Statistical analysis was performed using Mann-Whitney test.

Friend group behavior was also assessed in a set of pop-quiz questions that asked participants to think about their own close circle of friends and estimate how many of them would do the following (see Table 4 below):

Table 4 Responses to friend group behavior questions	N (%)
Occasionally take prescription meds to get high?	
NONE OF THEM	446 (64.7%)
LESS THAN HALF	157 (22.8%)
ABOUT HALF OF THEM	49 (7.11%)
MORE THAN HALF	31 (4.50%)
ALL OF THEM	6 (0.87%)
Regularly take prescription meds to get high?	
NONE OF THEM	534 (77.5%)
LESS THAN HALF	67 (9.72%)
ABOUT HALF OF THEM	51 (7.40%)
MORE THAN HALF	30 (4.35%)
ALL OF THEM	7 (1.02%)
Occasionally mix prescription meds with alcohol?	
NONE OF THEM	522 (75.8%)
LESS THAN HALF	85 (12.3%)
ABOUT HALF OF THEM	46 (6.68%)
MORE THAN HALF	26 (3.77%)
ALL OF THEM	10 (1.45%)
Regularly mix prescription meds with alcohol?	
NONE OF THEM	554 (80.4%)
LESS THAN HALF	57 (8.27%)
ABOUT HALF OF THEM	39 (5.66%)
MORE THAN HALF	31 (4.50%)
ALL OF THEM	8 (1.16%)
Have experienced a bad reaction from popping pills at a party?	
NONE OF THEM	529 (76.8%)
LESS THAN HALF	83 (12.0%)
ABOUT HALF OF THEM	37 (5.37%)
MORE THAN HALF	33 (4.79%)
ALL OF THEM	7 (1.02%)

Association between perceived risk and friend group behavior

Responses to the perceived risk questions and friend group behavior questions were then analyzed for association. The average was calculated for each set of questions and Spearman's correlation was used to assess whether a negative correlation exists between the perceived risk and friend group behaviors.

Results showed that there was a statistically significant, negative correlation between the perceived risk and friend group behavior ($r = -0.12$, $P < 0.001$) i.e. higher perceived risk is associated with more safe behavior.

The association was stronger with post-test data compared to pre-test data. This data supports the relevance of providing drug risk related education, in order to reduce harmful friend group behaviors.

Association between demographic characteristics and perceived risk

Linear regression was used to assess the association between perceived risk and demographic characteristics, while perceived risk was calculated as previously mentioned; the analysis was restricted to pre-test data.

Race and ethnicity showed a statistically significant association with the perceived risk. The perceived risk was higher in Non-Hispanics compared to Hispanics (ß = 0.28, $P < 0.05$), and lower among Non-whites compared to Whites (ß = -0.29, $P < 0.001$).

Gender did not show a statistically significant association with perceived risk. This finding indicates that some demographic groups tend to perceive opioid use as less risky than others, which may make these groups more predisposed towards opioid/substance use.

Overall change in knowledge, attitudes and beliefs

As shown in the results so far, the FEND RI campaign achieved its goal of significant changes in the knowledge, attitudes and beliefs associated with opioid and other drug risks, recognizing and responding to an opioid overdose, dependence and addiction.

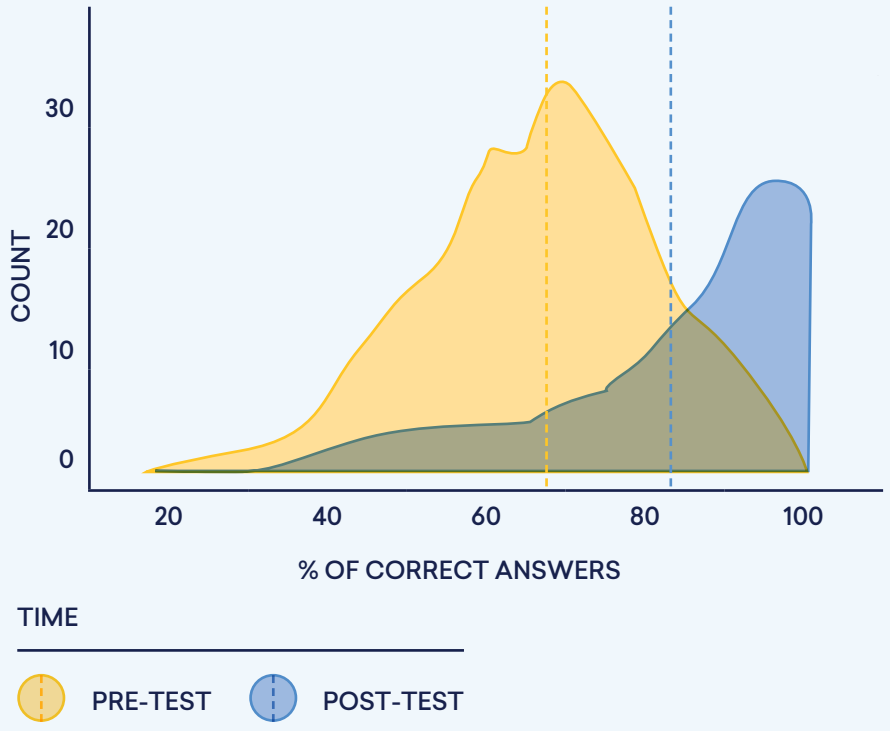
Overall knowledge score

An overall knowledge score was developed to easily calculate a change in knowledge percentage between pre-test and post-test surveys (this score is explained in detail in the Methodology section of this report). Participants were awarded one point for each correct answer, then the number of incorrect answers was subtracted from that.

Figure 5 highlights the significant increase in overall knowledge score between baseline and exit figures. The average percentage of correct answers increased by 16.6%, from 67.1% to 83.7%.

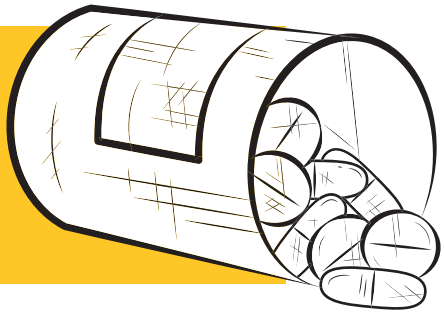
Statistical analysis, using an unpaired t-test, showed that the increase in knowledge percentage was statistically significant ($P < 0.001$). Figure 5 shows a shift towards right in the knowledge score percentage after use of the app.

Figure 5 Percentage of correct answers before and after app use (lines represent mean)



Prescription opioid misuse is the leading cause of unintentional injury and death among adolescents and young adults.

Source: Prescription opioid use and misuse among adolescents and young adults in the United States: A national survey study.



Impressively, the percentage of participants that answered all questions correctly increased from 0.78% to 23% after use of the app (Table 5).

Statistical analysis, using Chi-square test of independence, showed that the percentage of participants that completed all questions correctly was significantly different between both tests (P < 0.001).

Table 5 Change in knowledge after app use

	PRE-TEST N=1027	POST-TEST N=599	P-VALUE
CORRECT ANSWERS	10.7 (2.33)	13.4 (2.74)	<0.001
KNOWLEDGE %	67.1 (14.6)	83.7 (17.2)	<0.001
All 16 answers correct:			**<0.001**
<16	1019 (99.2%)	461 (77%)	
16	8 (0.78%)	138 (23%)	

Factors associated with change in knowledge

The change in knowledge (%) between both time periods was calculated for each participant (Change = post-test score – pre-test score). The association of age, race, ethnicity and gender was assessed using linear regression, while pre-test score was used as a covariate in the model.

Analysis showed that gender and pre-test scores were associated with the change in knowledge score. The average knowledge in females was higher by 5.18% compared to males in the same age group (ß = 5.03, P < 0.001).

Higher pre-test scores were associated with a lower increase in the percentage of correct answers i.e. participants with lower pre-test knowledge score (%) were more likely to benefit from the app use.

Ethnicity and race didn't show a statistically significant association with the change in knowledge.

Factors associated with baseline knowledge score

The association of age, race, ethnicity and gender with baseline (pre-test) knowledge (%) was tested and performed at a 5% level of significance.

Results showed that higher age was associated with higher knowledge score (ß = 3.45, P < 0.01). The average knowledge score was higher by 4% in Non-Hispanics compared to Hispanics (ß = 4.01, P < 0.01) and was higher by 5% in females compared to males (ß = 4.98, P < 0.01).

Race also showed a statistically significant association with baseline knowledge score (ß = -4.98, P < 0.001), indicating that the average knowledge score is lower by 4.98% in Non-Whites compared to Whites.

Mental Health and Wellness

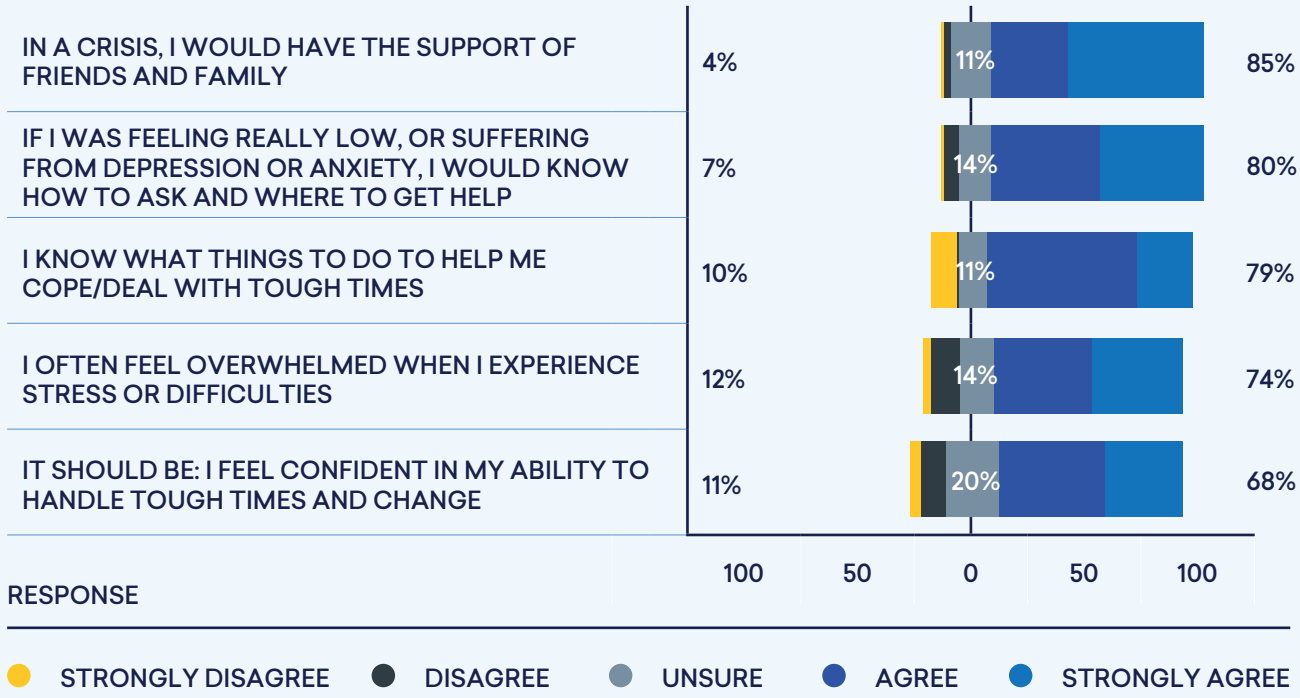
In addition to the content, pre and post-test questions around opioids and other substances, the FEND RI pilot also included information on mental health and wellness, as well as building resilience.

In pop-quizzes, participants were asked a range of questions about their own mental health and wellness, including their confidence and ability to cope with challenging times and situations.

When going through tough times, almost half (46.3%) of the participants preferred to keep it to themselves and deal with it, while 42.9% preferred to talk someone about it and 10.8% were unsure.

Eighteen percent (18%) reported using alcohol or drugs to relax, feel better about themselves, or fit in under such circumstances. The majority (75%) of participants knew where they could get help and support in their local area.

Figure 6 Responses to dealing with stress, crisis and difficulties



As shown in Figure 6, the majority (85%) of participants either agreed or strongly agreed that they would have the support of friends and family in a crisis. Similarly, 80% agreed or strongly agreed that they would know who to talk to when feeling really depressed and 79% knew the things they could do to help themselves cope with troubled times.

The most commonly employed methods described by participants to reduce stress were listening to music (76%) and hanging out with friends (6%). Not surprisingly, music and social activities appear to help young people cope with stress.

Sixty-three percent (63%) of respondents said they were very likely to talk to a friend or family member struggling with a mental health issue or substance misuse, while 30% were somewhat likely.

When asked about seeking out support services if they themselves were struggling with a mental health issue or substance misuse, 37% were very likely to seek help and 36% were somewhat likely to do so.

While these findings are relatively positive, highlighting the willingness of many of these young people to help and support others struggling with mental health and substance abuse issues, they are less likely to ask for help if they themselves are struggling with the same issues.

SUMMARY

With the ongoing increase in drug addiction and abuse amongst both teens and adults, it's clear that traditional education techniques, shallow or non-specific information campaigns and classic treatment programs simply aren't effective enough.

As mentioned in our introduction, the patterns of addiction and drug abuse (often resulting in mental disorder, disarray and death) are engrained in youth, which is why FEND has been tailored to nip these patterns in the bud by addressing root cause, base knowledge and mechanisms for response.

We offer tools to regain faltering potential, overcome and flourish, when and where it matters, through an in-depth training program of active, entertained engagement and welcome reward.

To our knowledge, FEND is the first app-based prevention campaign aimed at giving young people the skills and knowledge necessary to make informed, responsible decisions regarding drug use.

The aforementioned results demonstrate that, as expected, many young people who download the FEND app have only a limited knowledge of the risks associated with prescribed opioid use and abuse and a misperception of how opioid risk correlates with opioid use behavior.

At FEND, we intentionally refrain from teaching our youth that all drugs are bad, all the time, as this type of strategy has been shown to offer only limited results in the past. Instead, the FEND app seeks to provide adolescents with the know-how to think critically and make informed decisions about their health and the empowerment, impetus and life-skills to better work through difficult times.

Importantly, we've also sought to provide young people with easy access to mental healthcare providers and other relevant resources that they can look to when in need of support.

FEND serves not only to instruct and inform, but also to encourage and empower young people to speak up about addiction and enable them to provide help when others need it.

Our findings indicate that the FEND app has produced positive changes in all of these areas, a result that motivates us to expand and improve our work by reaching more people and making use of their feedback.

METHODOLOGY

Data cleaning

Data cleaning was performed using R v 3.6.1. The change in knowledge and attitudes toward opioids and other substances assessed using two surveys: onboarding survey (pre-test) and exit survey (post-test).

Knowledge scoring

Six questions were used to assess the knowledge of participants regarding opioid risk, addiction and overdosing: Four multiple choice questions (MCQ) and two check-box questions (participants were allowed to choose more than one answer).

For MCQ questions, participants were awarded 1 point for each correct answer.

For check-box questions, participants were awarded one point for each correct choice (selecting the right answer or not selecting the wrong answer).

For each participant, the total number of points was calculated and divided by the total number of valid responses. The maximum possible score was 16 and the lowest possible score was 0. The same approach was used when scoring the exit survey.

The perceived risk or harm of substance use was assessed using seven likert scale questions (ranked on a scale from 1 to 5, with 1 representing no risk and 5 representing high risk).

Two likert scale questions were also used to assess confidence in recognizing signs of overdosing, as well as the likelihood of seeking medical help in the case of opioid overdose, respectively.

One question was also used to assess the likelihood of discussing the risk of prescription opioids with family or friends.

Change in knowledge between pre-test and post-test

A chi-square test of independence was used to compare the distribution of responses for individual questions between the pre-test and post-test cohorts.

Mann-Whitney (non-parametric test) was used to compare pre-test and post-test responses for likert scale questions.

Pre-test and post-test knowledge scores were initially compared using unpaired samples t-test. Unpaired t-test, rather than paired t-test, was used to avoid the loss of data from participants who completed the onboarding survey but did not complete the exit survey.

Using a paired t-test for the analysis, although more appropriate statistically, would result in the loss of power as only participants who completed boarding and exit surveys would be used for the analysis.

Thus, the two cohorts were treated as different ones and unpaired samples t-test was done to test the equality of mean knowledge scores between both cohorts (null hypothesis) i.e. the mean pre-test knowledge score is not significantly different from the mean post-test knowledge score.

We hypothesized that the mean post-test knowledge score would be higher compare to the pre-test score.

Factors associated with the change in the % of correct answers (knowledge score %)

Linear regression analysis was used to assess the association between demographic characteristics and knowledge score %.

Analysis was restricted to participants who completed the pre-test and post-test quizzes (n = 599).

The change in knowledge (%) between both time periods was calculated for each participant (Change = post-test score – pre-test score).

The association of age, race, ethnicity and gender was then assessed using linear regression. Pre-test score was used as a covariate in the model.

Hypothesis testing was performed at 5% level of significance.

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APPENDIX 1

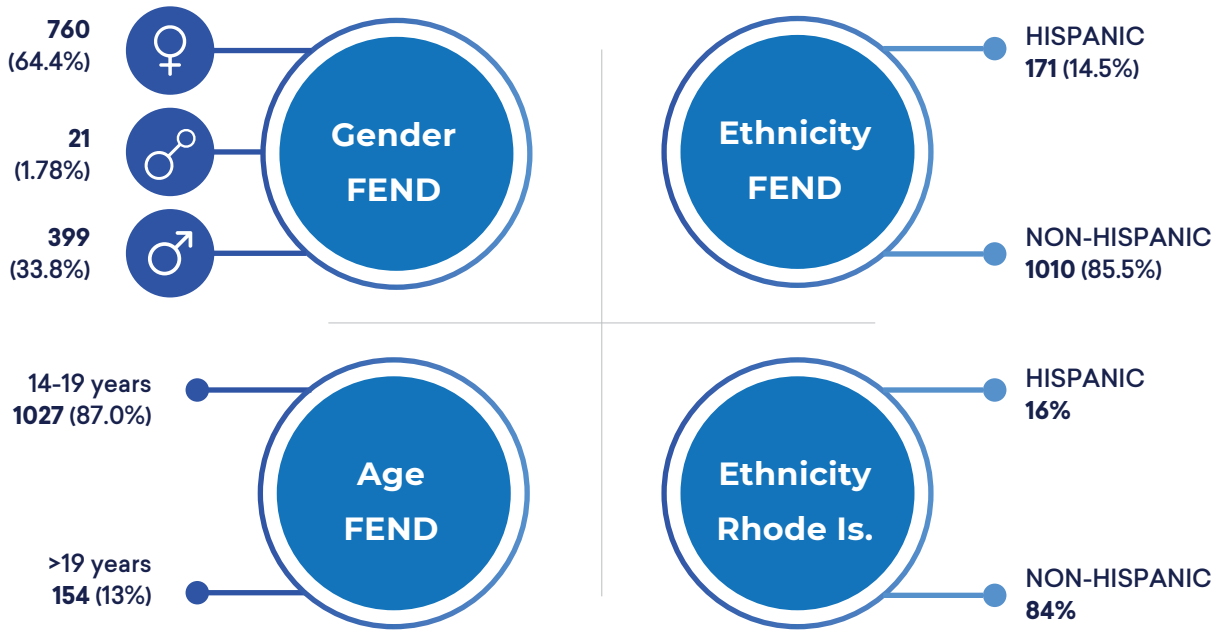
Demographic characteristics of all-aged FEND participants, and Rhode Island population 2019

	FEND N=1841	RHODE ISLAND
WHITE	**909** (77.0%)	80.87%
OTHER	**66** (5.59%)	5.50%
NATIVE ALASKAN/NATIVE AMERICAN	**16** (1.35%)	0.52%
MULTI-RACIAL	**71** (6.01%)	3.10%
ASIAN	**39** (3.30%)	3.38%
BLACK	**72** (6.10%)	6.55%
HAWAIIAN/PACIFIC ISLANDER	**8** (0.68%)	0.08%

Source: Rhode Island population data, 2020. worldpopulationreview.com

Age breakdown of all-aged FEND participants

- 15 to 17-year-olds represented the majority of ALL participants (66.7%).
- 12 to 14 years and 18 to 20 years represented 12.1% and 11.4% respectively.
- The distribution of age groups was not significantly different between the pre-test and post-test responses (P = 0.163).




Preventum
Initiative


FEND
FULL ENERGY NO DRUGS