

ZORA: You're listening to *Brains On*.

NAIROBI: Where we're serious about being curious.

SPEAKER 1: Brains *On* is supported in part by a grant from the National Science Foundation.

ANNOUNCER: Good people, gentle folk, gather round, gather round. Don't be shy. There's plenty of room right here in front of the stage. Best spot to see what I have to show you. And my lovelies, you are not going to want to miss this.

[DRAMATIC MUSIC]

CROWD: Oh, my goodness.

ANNOUNCER: Now, what you see before you is the latest, the greatest in gadgetry and contraptioning. I ask you, have you ever seen such a thing of beauty?

[CROWD CHATTERING]

Ladies and gentlemen, boys and girls, I present to you the nerve-o-meter.

[TA-DA CHORD]

CROWD: Ooh-ah.

ANNOUNCER: Now, some of you might be asking just what is a nerve-o-meter?

CROWD: Yeah, what is a nerve-o-meter?

ANNOUNCER: Well, it's simple. See? This nerve-o-meter measures levels of nervousness in any human. Within mere seconds of grasping the ergonomic grip on the nerve-o-meter's handle, I can tell without a doubt if someone is cool as a cucumber, calm as a clam, an agitated alligator, a sweaty Betty, or an earthquaker shaker.

[RUMBLING]

But you know, that one never happens. How about a volunteer or two?

ZORA: I'll do it.

NAIROBI: Yeah, I'll try too.

ANNOUNCER: Fantastic, now step right up here. Can I get your names?

NAIROBI: I'm Nairobi.

ZORA: And I'm her sister, Zora.

ANNOUNCER: How about that? Siblings.

[APPLAUSE]

All right, Zora, you first. Hold on to the grip while I start the nerve-o-meter.

[BEEPING]

Just as promised, the answer in seconds. Now, let's take a look. Oh, oh, my! I, uh, it says you're at earthquake shaker.

CROWD: Oh, wow! Jeez.

ANNOUNCER: That is extremely nervous. OK, well, the nerve-o-meter was acting up a little before I got here. Why don't you give it a try, Nairobi?

NAIROBI: Sure.

[BEEPING]

ANNOUNCER: Right, here we go. You're reading is a nice and steady-- wait. This-- this says, you're an earthquake shaker level too.

[COLLECTIVE GASPS]

The nerve-o-meter is never wrong. It's just that I've never seen such high readings, and two in a row. Whatever could be making you two so nervous?

ZORA: Well, we're about to go through an experiment for *Brains On*.

NAIROBI: Yeah, we're giving up our smartphones for a week.

[COLLECTIVE GASPS]

ANNOUNCER: Two teenagers giving up their phones for a week?

[LAUGHTER]

I'm sorry, ladies and gentlemen, but I just remembered I have another appointment. Yep, double booked myself again. Ugh, I do not want to be around to see how this experiment ends. It sounds dangerous!

[MUSIC PLAYING]

MOLLY BLOOM: You're listening to *Brains On* for American Public Media. I'm Molly Bloom, and joining me today are sisters Zora and Nairobi from Columbus, Ohio. Hello!

ZORA: Hi.

NAIROBI: Hi.

MOLLY BLOOM: Today's episode is going to take a look at smartphones and the screens that seem to be everywhere.

ZORA: It was inspired by this question.

IMOGEN: Hi, my name is Imogen. And I would like to know why smartphones are so addicting.

MOLLY BLOOM: As usual, an excellent question.

PROFESSOR Well, actually.

BUTTSIN:

MOLLY BLOOM: Oh, great.

NAIROBI: Who's that?

MOLLY BLOOM: Professor Buttsin. He's famous for butting.

PROFESSOR The question assumes phones are addicting, but it depends on how you define addiction.

BUTTSIN:

NAIROBI: How did he even get in here? The door is still closed.

MOLLY BLOOM: No one knows. He just butts in whenever he feels like.

PROFESSOR You see? There is debate about whether or not we should call excessive phone use an addiction. The American

BUTTSIN: Psychiatric Association claims an addiction is a brain disease manifested by compulsive substance use despite harmful consequence.

ZORA: (WHISPERING) How do we get him to go away?

MOLLY BLOOM: I wish I knew.

PROFESSOR However, currently the Diagnostic and Statistical Manual, which is the benchmark for such things, has yet to

BUTTSIN: classify excessive phone use as quote unquote "addiction."

MOLLY BLOOM: Wait, I have an idea.

PROFESSOR There are some behaviors seen in frequent phone users that lead one to think of phones as addictive.

BUTTSIN:

MOLLY BLOOM: Hey, Zora and Nairobi, did you hear Sanden and Mark are making a statue to their favorite vegetable?

ZORA: I didn't hear that.

MOLLY BLOOM: Yeah, it's a six-foot bronze statue of a tomato.

PROFESSOR Wait! Did they say their favorite vegetable is the tomato?

BUTTSIN:

MOLLY BLOOM: Sure, that's what it says on the statue, the World's Greatest Vegetable, the Tomato.

PROFESSOR But-- but-- but the tomato is a fruit. It has seeds. Don't they know this? Someone needs to tell them. This must be

BUTTSIN: corrected. I'll be right back.

[DOOR CLOSES]

NAIROBI: Wow! Gone just like that. Nice thinking, Molly.

MOLLY BLOOM: I'm just glad it worked.

ZORA: But he did raise a point. How do we know if phones are addictive?

MOLLY BLOOM: Well, when researchers asked teenagers, about half said they felt addicted to their phones. And three out of every four checked their phone at least once an hour. Some checked even more. So what is your take Zora and Nairobi? Do you think phones can be addictive?

ZORA: I do think phones can be a little bit addictive.

NAIROBI: Yeah, it depends on what you like doing on your phone.

MOLLY BLOOM: So Zora and Nairobi, you tried going phone free a while back. Why did you decide to do that?

ZORA: We decided to go phone free because one day we were watching TV, and the characters in the show, they decided to take a phone break. And Nairobi and I were like, we can do that. How are they this dependent on their phones, where they're locking up their phones and asking people like, oh, make sure I don't touch my phone. Keep it over there.

NAIROBI: Yeah, I was making fun of those characters. I didn't realize that it would actually be that hard.

MOLLY BLOOM: So was it? How did it go? Was it that hard? Were you asking people to lock up your phones?

NAIROBI: It wasn't that extreme, but I had to put it in a different room, for sure.

ZORA: I had to remove my phone from the scene just in case there was some temptation. And I wouldn't charge my phone. I'd be like, yeah, I'm just not going to charge it.

MOLLY BLOOM: That's a good way to avoid using your phone. Just let it not have any battery. Well, you two graciously accepted our challenge to go phoneless once again for five days. And we gave you some ground rules too. No phones or tablets, unless they're being used for school purposes or an emergency. And you even got a few friends to join in. And you documented your screenless days for us to hear to. Zora, here's what you and some of your friends were thinking as it started.

ZORA: What do you think's going to be the hardest part?

SUBJECT: I think I automatically just put my hand in my pocket to grab my phone and to resist that since it has become a habit.

ZORA: It's going to be hard for me too.

SUBJECT: Yeah I have I have this really bad habit of watching YouTube while eating food.

[LAUGHTER]

I have to get rid of that.

ZORA: Me too. As soon as I get home, I literally get on my phone. That's a problem. Whenever I feel uncomfortable, I reach in my pocket or I don't know.

MOLLY BLOOM: And Nairobi, here's a little of what you said on the day before the experiment.

NAIROBI: What I like the least is the usage amount of phones. For instance, whenever I watch a video on YouTube, I know that I could be spending my time reading a book. But I choose not to.

MOLLY BLOOM: Why do you think it's better to read a book than to watch YouTube?

NAIROBI: When you read a book, you're able to use your imagination. But when you watch YouTube, the video is just right there. There's no brain work going into it.

MOLLY BLOOM: And Nairobi, what do you like the least about smartphones?

NAIROBI: I don't like how addictive they are and how much the human race relies on them for everything. It's kind of scary.

MOLLY BLOOM: And Zora, how about you? What do you like the least about smartphones?

ZORA: I don't like how they pull away people's attention simply because, like Nairobi said, we rely too much on them. There's so many tasks that we can do on them now. Back in the day, they could do the task other ways. But they've all put it into this one device. And that's what makes it super addictive.

MOLLY BLOOM: And so what do you like the most about smartphones?

NAIROBI: I like how available they are, and they're just always around. And I can use them to check facts or check the weather. So I'm not walking outside with a shorts on when it's 30 degrees.

[LAUGHTER]

ZORA: I can't complain about the convenience of them at all. They're very convenient to use.

MOLLY BLOOM: Very true. They do have some very helpful things. So they're not all bad. Now, we should pause to say that not all kids or teens have smartphones.

ZORA: Yeah, a lot of families choose to keep their kids phone free until a certain age.

NAIROBI: Some can't afford a phone, and some just don't want them.

MOLLY BLOOM: Whether or not to give a kid a phone and at what age is a question for individual families to decide. There is a level of responsibility and maturity required, and it's a little different for everybody.

[MUSIC PLAYING]

(SINGING) Smartphones, it's a family discussion. But parents get the final say.

MOLLY BLOOM: But even if you don't have a phone yourself, you've probably seen people in your life staring at their phones. Being connected through the world of a smartphone can be so tantalizing.

ZORA: Games, videos, texting.

NAIROBI: You can tell yourself, just one more minute. But that minute could easily turn into an hour.

MOLLY BLOOM: *Brains On* producer, Sanden Totten is here to tell us a little bit about why phones are so good at hijacking our time and attention.

SANDEN Hey, guys, oof, sorry I'm out of breath. I was running late because some guy was lecturing me about tomatoes
TOTTEN: being a fruit on the way over?

MOLLY BLOOM: Sorry about that.

SANDEN Anyway, phones, what makes them so hard to put down? Well, to explain, we have to talk about how our brains
TOTTEN: train us.

ZORA: Don't you mean how we train our brains?

SANDEN Actually, both. It turns out our brain has a complicated reward system that ends up training you as much as you
TOTTEN: train it, making you want to do certain things and not do other things. It's sort of like training a dog.

MOLLY BLOOM: Woof.

[DOG PANTING]

SANDEN But in this case, you are the dog, and your brain is the trainer.

TOTTEN:

MOLLY BLOOM: Good dog. Here's a treat.

[DING]

SANDEN Now, your brain wants you to be good at life.

TOTTEN:

MOLLY BLOOM: A worthy goal.

SANDEN Yeah, and it does this by rewarding you when you do stuff it thinks will help you stay alive and be successful. But
TOTTEN: instead of giving you dog biscuits, which would be weird if dog biscuits fell out of our heads to reward us, instead of that, your brain uses a chemical called dopamine.

[DING]

It's sort of like the brain version of a Scooby snack.

[MUSIC PLAYING]

MOLLY BLOOM: Sit, stay, shake. Good doggie. Have some dopamine. Woof, woof.

[DOG PANTING]

SANDEN Dopamine makes us feel content. It's that surge of excitement when you bite into an awesome burrito, that little
TOTTEN: zing when you find out you got a great score on a test or that (SINGING) Ah you feel when you find \$1 in your pants pocket that you totally forgot about.

MOLLY BLOOM: Woof, woof.

[DOG PANTING]

A-plus on your math quiz? That's a good pup. Here's a dopamine snack. Oh, oh, bark, bark, bark.

SANDEN Every time we do something and we get dopamine, it makes us want to do that thing more and more. And one
TOTTEN: thing your brain loves giving you dopamine for is making and keeping friends.

ZORA: That makes sense. Friends have helped me out plenty of times.

NAIROBI: Yeah, I'd say they are important for survival.

SANDEN Exactly, having friends and family can help keep us healthy, safe, and entertained. So our brains release this
TOTTEN: dopamine chemical when, say, we tell a good joke and our friends laugh.

MOLLY BLOOM: Good joke. Have some dopamine.

[DING]

[PANTING]

Woof, woof, woof.

SANDEN Or when we smile at someone and they smile back.

TOTTEN:

MOLLY BLOOM: They like you. Dopamine time.

[DING]

Woof, woof.

SANDEN Or when we high five.

TOTTEN:

MOLLY BLOOM: Up top, dopamine.

[DING]

Woof, woof.

[PANTING]

SANDEN But here's the catch. Our brains developed at a time when staying alive and being successful was a lot harder.

TOTTEN: Back then, you were doing great if you could find enough food to eat and avoid being eaten. And friends? Well, we lived in small groups. You probably wouldn't interact with more than a few dozen people tops. But in today's world, the same things our brains used to reward us for are a lot easier to get. And that's where phones come in.

MOLLY BLOOM: Dun, dun, dun.

SANDEN So our phones are full of stuff that gets our brain to reward us. You've got games that give you praise.

TOTTEN:

AI: You got the high score.

MOLLY BLOOM: Well, I guess that's important. Here's some dopamine.

[DING]

[PANTING]

SANDEN Your phone gives you pictures of delicious food and cute puppies.

TOTTEN:

MOLLY BLOOM: These things are good. I guess I should reward them.

[DING, DING]

Woof.

[PANTING]

SANDEN And our phones are full of social interaction, sort of like a friend buffet.

TOTTEN:

MOLLY BLOOM: That person in the video is smiling.

[DING]

Oh, someone just liked your photo.

[DING]

Someone commented LOL.

[DING]

I guess you're doing great at this.

[DINGING]

[VOCALIZING]

[PANTING]

SANDEN So like I said before, when we get dopamine for doing something, it makes us want to keep doing that thing. But

TOTTEN: over time, your brain gets wise to this. Eventually, it starts giving you less and less dopamine for doing the same thing over and over.

AI: You got the high score.

MOLLY BLOOM: Well, you always get the high score. I don't know. Here's half a treat.

[DING]

Woof. Another person reacted LOL? Everyone says that. Here's a quarter treat.

[DING]

Woo.

SANDEN This makes it so you have to do the thing more and more and more just to get that same satisfied feeling. With
TOTTEN: phones, you start by checking once in a while. But soon, that doesn't make you feel good enough, so you check more and more. And you try to get more comments, more likes, more high scores. And pretty soon, you're pulling out that phone every two minutes just to see if there's something in there your brain will reward you for.

MOLLY BLOOM: Like a dog begging for treats, woof.

[PANTING]

SANDEN Yeah, pretty much, which is a large part of how we end up obsessed with smartphones even though they don't
TOTTEN: really help us do much better in life. Oh, and by the way, dopamine is also involved in a similar way when people get addicted to drugs or gambling. So this is a very powerful force we're up against.

MOLLY BLOOM: Yikes.

SANDEN Yeah, but hanging with friends, IRL, getting some exercise, eating a wholesome meal with your family, those
TOTTEN: things also tend to give a dopamine boost. And they usually do help you succeed more at life. So maybe skip the screen next time you're bored and try doing some of those things instead.

MOLLY BLOOM: Thanks, Sanden, you did a good job. Here's a treat.

[DING]

SANDEN Yes, [CHOMPING].

TOTTEN:

(SINGING) Brains, brains, Brains On.

MOLLY BLOOM: All right, are you ready for some completely screen free fun? It's time for the mystery sound.

[WHIRRING]

SPEAKER 2: (WHISPERING) Mystery sound.

MOLLY BLOOM: Here it is.

[REPEATING BEEPING TUNE]

Any guesses?

ZORA: I think it's a notification of some sort.

MOLLY BLOOM: Mmm, excellent guess. Nairobi, do you have any thoughts?

NAIROBI: A pager?

[LAUGHTER]

MOLLY BLOOM: We're going old school. I like it. Stick around. We will hear the answer a little later in the show.

[MUSIC PLAYING]

We're working on a new *Brains On* series all about emotions.

NAIROBI: It's going to have all the feels.

ZORA: And we need your help.

MOLLY BLOOM: Send us a short recording answering this question. How does your body feel when you're happy?

NAIROBI: How about it, Zor? How do you feel inside when you're happy?

ZORA: When I'm happy, I kind of feel light, and I feel like humming and dancing. I feel super energetic. I just feel super light if that makes sense.

MOLLY BLOOM: That's an excellent answer. What about you, Nairobi?

NAIROBI: I feel awesome inside. It lifts my spirits, and I laugh a lot.

MOLLY BLOOM: Awesome. Well, you can send your answer to how your body feels when you're happy by going to BrainsOn.org/contact.

ZORA: That's also the place to send us your mystery sounds, artwork, and questions.

NAIROBI: Just like this listener.

JULIA: Hi, my name is Julia, and I'm from New York, New York. My question is, why are bruises purple and blue, and how do we get them?

MOLLY BLOOM: Stick around to the end of the show to hear the answer to that Moment of Um question. Plus, we will hear the new members to join the Brain's honor roll. Oh, and parents, you know how you love this show, how it's great to just put it on and hear well researched facts, top notch sound design, and real experts talking in everyday language?

PARENTS: Sure, yeah.

MOLLY BLOOM: We love it too, and we put in a lot of hours to make it happen. Please, support the show so we can keep making it. Go to BrainsOn.org/donate.

ZORA: There are lots of cool thank you gifts to pick from.

NAIROBI: And you'll make it easier for us to create more fascinating, fact-filled shows.

MOLLY BLOOM: Thanks.

NAIROBI: And keep listening.

[MUSIC PLAYING]

ZORA: This is *Brains On*. I'm Zora.

NAIROBI: I'm Nairobi.

MOLLY BLOOM: And I'm Molly.

PROFESSOR And I'm Professor Buttsin. Did you know research suggests that the more time spent on screens the less happy a teenager is?

BUTTSIN:

ZORA: Oh, no, not this guy again.

PROFESSOR A study published in the journal *Emotion* looked at over one million US teens. They found the less screen time, the happier the person.

BUTTSIN:

NAIROBI: Ugh, nobody likes interruptions.

PROFESSOR We can't say--

BUTTSIN:

ZORA: Wait, I have an idea. Please, excuse my phone use here.

PROFESSOR But there seems to be some--

BUTTSIN:

ZORA: There.

[BUZZ]

PROFESSOR Huh, I just got a text. I was invited to give a Todd Talk. Obviously, I'll be amazing at it. I'm going to go work on my slides.

BUTTSIN:

[DOOR CLOSSES]

MOLLY BLOOM: Fast thinking, Zora. Man, every time there's an interruption, I lose track of where we were at. OK, oh, right, I was going to ask about your phone-free experiment. So Nairobi and Zora, we've heard a little about what you thought you might be in for while you tried to go for a week without using a smartphone. But what actually happened? How, in those first couple of days, were you feeling mentally?

NAIROBI: I felt lonely because none of my friends texted me.

MOLLY BLOOM: Oh. How about you, Zora?

ZORA: I felt kind of left out. I was like, oh, I wonder if my friends are saying something that I'm just missing out on.

MOLLY BLOOM: Is that because a lot of that stuff happens on phones?

ZORA: Yes, especially with texting since you're in immediate communication. You don't have to wait to get back to school. So they'll have an entire conversation while you're not there.

NAIROBI: Yeah.

MOLLY BLOOM: That sounds really hard. Well, it's really interesting to listen back to your diaries. And I don't know if you know this, but you both sound like you had a change around day three. Here, let's listen.

NAIROBI: This is Nairobi, and it's day three with no phones. Today, I am feeling relaxed because I was busy most of the day at the swim meet and wouldn't have been able to use my phone in the first place. Instead, I spent most of the day reading a book that was assigned for school and actually read almost the entire thing. I feel like I have way more time without my phone as a distraction. When I did use it on a regular basis, I would hold it in my hand and move it around, touching it, checking it every few minutes for messages. And it was kind of stressful.

ZORA: Hi, this is Zora, and--

REBECCA: This is Rebecca.

JASPER: This is Jasper.

ZORA: And this is day three of our experiment. We're going to give you what happened. So on day three, how were you guys feeling?

REBECCA: I was very busy that day.

JASPER: I kind of forgot about my phone since I was involved in other activities.

ZORA: By that time, I was kind of used to it because I found other things to do with my time.

REBECCA: Wednesday is a busy day for me.

ZORA: Wednesday wasn't that busy for me, so I was on the bus for internship. And I had nothing to do the entire bus ride because I had my phone, and it was tempting. But I was like, can't use it. So instead, I drew pictures. What did you do?

JASPER: When I was in the bus, I just looked out of the window. And I noticed a lot of things.

ZORA: Yeah, I started noticing more. Without my phone, I was more observant.

MOLLY BLOOM: So did you start to feel a change in yourselves?

NAIROBI: Yeah, I got a lot more work done. I got a lot more rest. And I talked to my friends more.

MOLLY BLOOM: Really? So even though you missed those text conversations, you were maybe talking more?

NAIROBI: Yes, since I wouldn't be able to talk to them when I got home.

MOLLY BLOOM: So were there other things you started to do because you couldn't use a phone?

ZORA: I would say I started-- I think I played a card game with my friends. I was like, instead of you playing your game on your phone, here go some cards. We're going to play a card game. I decided that I would practice my saxophone a little bit more and my music skills a little bit more. And that actually took up a whole bunch of time. Probably the time that I would have been on my phone I spent doing that.

NAIROBI: I also played my instrument more, but I usually use my phone as a tuner. So I think I was playing it out of tune.

[LAUGHTER]

MOLLY BLOOM: Another reason phones are so good at hooking us is that they're sort of random. When you check a phone, you never know what you're going to find.

ZORA: Like how sometimes you have 20 texts and other times you just have two.

NAIROBI: Or how some posts get tons of comments but others get zero.

MOLLY BLOOM: Exactly, and studies show that random rewards make us more likely to keep doing a behavior.

[MUSIC PLAYING]

This research dates back to the 1930s and a guy named Burrhus Frederic Skinner.

**BURRHUS
FREDERIC
SKINNER:** My BFFs call me BF because Burrhus Frederic is kind of a mouthful.

MOLLY BLOOM: BF Skinner did experiments with mice. He put them in little boxes with levers in them. If they accidentally bumped the lever--

[DING] --a treat would appear.

**BURRHUS
FREDERIC
SKINNER:** It was magic to the little mice. But believe you me, as soon as they figured out they could push the lever and get a snack, it was like, bam! Bam! Bam! Gimme those snacks!

MOLLY BLOOM: Now, Skinner did a lot of variations of the experiment. Some mice got a treat every time they hit the lever, and other mice got a treat more randomly.

**BURRHUS
FREDERIC
SKINNER:** Those mice would hit the lever, say, three times and then get a treat. Then next time, maybe they'd have to hit it four times for a bite, or six, or just two. There was seemingly no order to it. It was impossible for them to predict.

MOLLY BLOOM: Skinner learned that mice who got predictable treats ended up acting pretty differently from mice who got random treats. For a mouse that got used to getting a treat every time it hit the lever, if the treat stopped coming, that mouse would quickly stop hitting the lever. But for the mice who got treats at unpredictable times, they'd keep hitting that lever long after the treats dried up.

**BURRHUS
FREDERIC
SKINNER:** It was so fascinating. When rewards were seemingly random, it became very hard for the mice to stop hitting the lever. It's like they kept thinking, I know I didn't get a treat the last 100 times I hit this thing. But the 101st time's the charm, right?

MOLLY BLOOM: This is sometimes called a variable reward schedule because the timing of the rewards is variable. It changes. And this sort of pattern is really good at getting us to do something over and over.

ZORA: It's like a slot machine at a casino.

[BEEPING AND CLINKING]

MOLLY BLOOM: Exactly, you never know when it's going to pay off.

[SLOT MACHINE MUSIC]

[CLINKING]

NAIROBI: Or maybe fishing?

MOLLY BLOOM: Yeah, you can't predict when you'll get a bite. Our phones do this all the time. Since the rewards like comments and messages come at seemingly random times, it makes us want to keep checking more and more, kind of like those mice who keep hitting the lever even though they rarely get treats.

BURRHUS Yes, despite all our wisdom and age, we are still just like rats in a cage.

FREDERIC

SKINNER:

[MUSIC PLAYING]

MOLLY BLOOM: OK, let's get back to the mystery sound. I'm going to play it one more time. Are you ready, Zora and Nairobi?

NAIROBI: Yes.

ZORA: Yeah.

MOLLY BLOOM: All right, here it is.

[REPEATING BEEPING TUNE]

Any new guesses?

ZORA: I still think it's a notification.

MOLLY BLOOM: Some kind of notification. Nairobi, what do you think?

NAIROBI: Video game.

MOLLY BLOOM: Video game, all right. Here is the answer.

DAVID LIDENS: Hi, my name is David [? Lidens. ?] The sound you just heard was the low glucose alert sound. That sound goes off when my blood glucose is going too low. The sound comes right from my phone.

MOLLY BLOOM: So it is a notification. Excellent work, Zora. And so David has Type 1 diabetes, and that means his body needs help keeping his blood sugar or blood glucose at the right level. He uses a sensor under his skin to track his blood sugar, and that sensor connects to an app on his phone. The app shows how his blood sugar is doing all the time.

DAVID LIDENS: Because I have Type 1 diabetes, I need to be responsible for monitoring my own glucose. For people without Type 1 diabetes, the pancreas, an organ in your body, takes care of that work for them. But since I have to take over that job myself, this app gives me support to make that job easier. If I weren't getting the information from this app, I would need to put in a lot of work to manage my own glucose levels using more equipment to manually check my glucose. With the app, though, I get different beeps to tell me if my glucose is going to high or low so that I can address it.

[REPEATING BEEPING TONES]

Once I hear the low alert, it's a pretty easy fix. I just need to make sure I eat some glucose of some sort. A lot of times, I'll solve that just by drinking a juice box or eating a few cookies. By having this app on my smartphone, I know that, even if I'm not necessarily paying attention to how my energy level is feeling, it'll let me know if it's heading in a dangerous direction.

MOLLY BLOOM: So we've talked a lot about our phones pulling us in and being distracting. The tricky part about phones is that they do helpful things too. In David's case, his phone is actually a helpful tool for tracking his blood sugar. There are also the apps that help us get from place to place. And we can't forget that our phones help us find facts and keep families and friends connected over long distances.

So the trick is using our phones in a healthy way, and we've asked science journalist Catherine Price to give us some tips.

NAIROBI: Her book *How to Break Up With Your Phone* offers lots of ways we can use our phone responsibly.

ZORA: Welcome, Catherine.

CATHERINE Thank you guys so much for having me.

PRICE:

ZORA: We just finished doing an experiment for five days where we didn't use our phones for an entire week. And we invited friends to join in with us and not use their phones for an entire week and see how that affected them and affected us from throughout the entire week, and in which ways it was hard and which ways it benefited us.

CATHERINE Very cool. I think that that's wonderful. And yeah, what kind of questions do you have for me?

PRICE:

NAIROBI: What makes a good amount of screen time or a good screen time habit?

CATHERINE People ask me what the ideal amount of screen time is per day, and what I tell them is that's a really personalized question. So there's no right answer to it. It's really about how you feel about the time that you're using and how it's impacting other things in your life, like your sleep or your relationships.

In terms of healthy screen habits, I think you guys have already started to pick up on some of these, even though you were doing the extreme version of not using your phone at all. I always tell people, get your phone out of your bedroom because if you have your phone in your bedroom it will affect your sleep. And your sleep is so important. But a lot of people use their phones as alarm clocks. So one of the practical tips I give is that you should have an alarm clock that is not your phone in your bedroom and that the whole family should have a charging station that is not in the bedroom.

And I also really recommend to tell the adults in your life how their phone habits make you feel because adults don't pick up on that. And if you say something like, I really wish you'd pay more attention to me not your phone, they'll pretty much-- they'll cry. But I think it's a really important wake up call because they're so clueless about how what they're doing can affect their families.

I also recommend make sure you turn off the notifications on your phone because you really need to be very defensive around your phone because it is designed to addict you. And I don't even say that lightly. That it is literally designed to addict you, and I think that's something people are only now starting to wake up to.

ZORA: How is it designed to addict you?

CATHERINE PRICE: The bright colors on a phone, every single color on that phone has been chosen to be as attention-grabbing as possible. The colors of notifications are interesting also because, if you notice, it's really like a blood red or same color as a stop sign. It's an alert signal. Very difficult not to pay attention to it. Sounds, things that happen in response to something you do. So if you send a message and then it has a little whoosh sound afterwards, that's great.

And also another big one, which is very important to recognize if you're a social media user is the likes and the hearts and things like that. It's someone telling you, oh, yeah, you're valuable or I like you or I see you. That kind of thing is so powerful to humans because we're very social animals. And so when you see the little number next to your likes and you feel good about it, that is dopamine. And that is specifically, deliberately incorporated into the app to make you want to check it again.

ZORA: Thank you so much. You're very insightful.

CATHERINE PRICE: Thanks for having me, and you guys should be really proud of everything you just did during that week because you were way, way advanced.

NAIROBI: Thank you, Catherine, for your time. Goodbye.

CATHERINE PRICE: All right, take care, guys.

MOLLY BLOOM: So Zora and Nairobi, now that you have gone through this experiment, are you going to change how you interact with your phones?

NAIROBI: Yes, I think I will let my phone charge in a different room or put it in a different room whenever I do my homework.

ZORA: So I think I'm going to start doing things that I'm passionate about, like reading, separate from my phone. I won't use my phone to do that. I'll use an actual book.

MOLLY BLOOM: Those are very good ideas. You know--

[BUZZING]

Oh, shoot, my phone. I thought I turned it off. Hold on. OK, this phone is off. You have my full attention.

NAIROBI: Cool. Thanks for shutting it off. Nobody likes it when someone is constantly checking their phone during a conversation.

PROFESSOR BUTTSIN: There's actually a term for that.

ZORA: Again? Seriously?

PROFESSOR BUTTSIN: It's called phubbing. It's a portmanteau, which means it's a combination of two words in this case, the word phone and snubbing, phubbing. It's actually been studied--

MOLLY BLOOM: You know, I really think we need to deal with this head on. Excuse me, Professor Buttsin.

PROFESSOR BUTTSIN: Yes?

MOLLY BLOOM: Thanks, for all the information, but we're actually in the middle of a conversation. And it's very distracting when you show up. If you have something to share, why not try setting up a time to talk later or sending us a letter or maybe waiting for us to reach out to you with a question.

PROFESSOR BUTTSIN: Hmm, I apologize for that distraction. That sounds reasonable. I'll do that. Expect some letters, many, many letters.

[DOOR CLOSES]

NAIROBI: Wow, that was great.

ZORA: Yeah, you handled that well.

MOLLY BLOOM: Thank you. You know, I value your time. You are both important to me, and I want to show you that by giving you my full attention. So I'm going to cut out anything that distracts me, whether that's a phone or a person.

NAIROBI: Yeah, conversations are the best when you're focused on your friends. I guess the professor is a nice reminder of that, even if he's super annoying.

ZORA: Yeah, distraction free is the way to be.

[MUSIC PLAYING]

MOLLY BLOOM: Checking our phones can give us a dopamine boost, but over time it can take more and more comments and likes to get the same boost.

ZORA: We can end up feeling like we need to check constantly to be satisfied.

NAIROBI: And the unpredictability of things like messages, likes, and comments can make it harder for us to stop clicking.

ZORA: But there are things we can do to help us cut back on screen time.

MOLLY BLOOM: Like turning off notifications or charging your phone away from your bedroom. And remember--

(SINGING) Smartphone, it's a family discussion, but parents get the final say.

NAIROBI: That's it for this episode of *Brains On*.

ZORA: *Brains On* is produced by Marc Sanchez, Sanden Totten, and Molly Bloom.

MOLLY BLOOM: Our fab fellow is [? Manica ?] Wilhelm who produced and sound-designed this episode. We had engineering help from John Miller and Corey [? Chappell ?] and special help from Eric French and Derek [? Clemons. ?] Many thanks to Keesha Whitfield, Todd Masterson, James Kim, Austin Cross, Laura Galleretta, Jamilla Joyner, Jonathan Shiflett, and Teagan Wall.

NAIROBI: *Brains On* is supported by you. So go to BrainsOn.org/donate to do your part.

ZORA: That way the show will keep popping up in your feed every week.

NAIROBI: Now, before you go, it's time for our Moment of--

(SINGING) Um. Uh. Um. Uh. Um. Um.

JULIA: Hi, my name is Julia, and I'm from New York, New York. My question is, why are bruises purple and blue, and how do we get them?

[DRUMMING]

SHIRA ROSENBERG: So when we have a bruise, it's because we get a little bit of a cut in one of the tubes that the blood travels in. My name is Shira Rosenberg, and I'm doctor for kids. So blood travels through our body in these small tubes. The smallest of the tubes are called capillaries. When we hit ourselves or we knock our skin, the capillaries are really fragile. And they have a small tear in them. And the liquid inside, which has the blood, escapes out of the capillary into the tissue below our skin.

So the blue color is because blood is blue when it doesn't have oxygen. And once the blood escapes from the capillary, the tissue, the muscles, the skin, all of the stuff in your body near the capillary uses the oxygen. So the blood becomes blue and not red. And it stays there because it's not in the tube that moves it throughout the body.

Your body has all sorts of mechanisms for cleaning up the blood after it escapes from the capillary. And as it takes back the blood, the blood turns different colors, and that's why bruises go from blue to purple to yellow and then disappear altogether.

[DRUMMING]

(SINGING) Um, um, um.

MOLLY BLOOM: These names have left a mark on my heart. It's time for the Brain's honor roll. These are the brilliant kids who help us keep the show going by sharing their ideas, questions, mystery sounds, and drawings with us.

[LISTING HONOR ROLL]

(SINGING) Brains On [INAUDIBLE].

MOLLY BLOOM: We'll be back soon with more answers to your questions.

ZORA AND Thanks for listening.

NAIROBI: