



#295: Improving the view: Positive Psychology in preventing the repeat of psychotic episodes

VOICEOVER

This is Up Close, the research talk show from the University of Melbourne, Australia.

DYANI LEWIS

Hi, I'm Dyani Lewis. Thanks for joining us. Imagine if you suddenly felt that everyone around you was conspiring against you, or if voices in your head were compelling you to do bizarre or even dangerous things. Adolescence can be tumultuous enough, but for some young people, adolescence is made even more turbulent by the onset of psychosis, an experience that can distort life through the lens of a troubling mental illness. But does having a psychotic episode in adolescence mean that you will inevitably have another? Are there ways of preventing people from having repeated psychotic episodes? And what can psychology offer, that potent anti-psychotics perhaps can't? I'm joined on Up Close today by Dr Mario Alvarez-Jimenez, a clinical psychologist who has been looking at non-drug therapies for preventing psychosis. Mario is director of online interventions research at the Orygen Youth Health Research Centre, and a CR Roper Senior Research Fellow at the Centre for Youth Mental Health at the University of Melbourne. Welcome to Up Close, Mario.

MARIO ALVAREZ-JIMENEZ

Thank you very much. Thank you for inviting me.

DYANI LEWIS

Mario, what does it mean when we say that someone is experiencing a psychotic episode?

MARIO ALVAREZ-JIMENEZ

A psychotic episode can mean many different things. We know that there's a lot of heterogeneity in terms of the symptoms that young people can experience, but I guess that one of the most widely accepted definitions for psychosis if you include many different variants of it is that at some point, people have real difficulty differentiating what is real from what is a product of their own mind. Hallucinations and strange voices in your head. It could be distressing delusional beliefs or being

suspicious, thinking that something is happening around you, or it might also be that you find it really hard to do things that you used to do in combination with other things. It might be that you don't find pleasurable activities pleasurable anymore. The definition that we use with young people is that it is quite hard to discern reality from what is actually happening in your own mind.

DYANI LEWIS

Does having a psychotic episode immediately suggest a diagnosis of schizophrenia?

MARIO ALVAREZ-JIMENEZ

Not necessarily. Schizophrenia is a variant of psychosis if you like, but according to the current diagnostic classifications, that means that psychosis needs to go on for at least six months. So having a psychotic episode doesn't necessarily mean that you have that diagnosis. In fact, in specialised early intervention services for young people with psychosis, we are quite reluctant to use that diagnosis until we know whether there is going to be a long term episode or not. Because we know that up to 20 per cent of young people are going to experience a psychotic episode and they won't experience a second one.

DYANI LEWIS

So what other things can a psychotic episode end up being for a diagnosis later on?

MARIO ALVAREZ-JIMENEZ

What it could be, just a single psychotic episode. You might not experience that one anymore. It could be shorter than schizophrenia. It could be for instance up to three months. They refer to that technically as a schizophreniform. Or it could be just a very short episode. We call that brief psychotic episode. Or it could be quite varied in the symptoms. We call it non-specified psychosis or non-specified psychosis episode. So it could be many different things. It could be sometimes a bipolar disorder within psychosis, and certainly from the treatment point of view, normally early intervention services for psychosis also treat young people with bipolar disorder, within the early psychosis units.

DYANI LEWIS

When do people normally experience their first psychotic episode?

MARIO ALVAREZ-JIMENEZ

Well, we know that up to 70 per cent of new cases of psychosis happen in the age of 15 and 24. So that leave another 30 per cent of cases that happen after 24, 25 years of age.

DYANI LEWIS

Is there something about this particular age that makes people particularly vulnerable?

MARIO ALVAREZ-JIMENEZ

Yes there's a number of different factors that put young people at risk of developing

not only psychosis, but mental disorders in general. We know that the same sort of figure that I was talking about in terms of the incidence of psychosis, it actually applies across the board. It happens with anxiety, it happens with depression - depression probably a little bit earlier than that - but we know that most mental health disorders happen at that time. And there's a number of reasons for that. For instance, we know that at that time, there's a lot of maturity process, if you like, that happening from the brain point of view. There's a lot of opportunities for things to go wrong, if you like. But also from the psychological and social point of view. There's a lot of demands on young people, there's a lot of developmental milestones, if you like, that people need to get on with and that means that they need to finish their school, they need to start work or they need to go to university. They need to start developing the first intimate relationships. That means that they need to be flexible, they need to adapt, there's a lot of challenges psychologically, socially. That in combination with all the biological processes that are happening behind the scenes puts people at risk of developing these sort of disorders.

DYANI LEWIS

Is there any way that we can predict who will have a psychotic episode from things like their family history?

MARIO ALVAREZ-JIMENEZ

Yes. There's a lot of research these days about trying to predict prospectively whether someone is going to develop first episode of psychosis. In fact there's clinics. In Melbourne, we've got a very pioneering clinic trying to detect psychosis prospectively. They combine different kinds of markers to establish whether someone is at risk of developing psychosis. For instance, some of them might be whether they've got a history of psychosis or schizophrenia within the family or have psychotic symptoms, but they're not full blown psychotic symptoms. They're not enough to meet diagnostic criteria. It could be also that they've got a drop in functioning that happens around that time. We combine this criteria to try to predict psychosis.

DYANI LEWIS

Is a psychotic episode something that's easy for people like family and friends to recognise in a person who is experiencing the psychosis? Is it easy to recognise from the outside?

MARIO ALVAREZ-JIMENEZ

In some cases, it will be quite easy for the family and for the young person to know that there's something quite wrong and the beginning will be quite abrupt, and there will be a lot of odd behaviour or suspiciousness or social withdrawal. Things that are actually quite different from the normal behaviour of the young person. In some other cases, it could be a lot more progressive. It could be that they don't have that very obvious symptoms like hearing voices or being very suspicious or acting on those symptoms. It could be that they drop in functioning and they have some negative symptoms which are not enjoying things and being quite socially isolated, and in combination sometimes with some of those positive symptoms such as

hallucinations and delusions. So mostly people who know a little about of would be able to identify.

DYANI LEWIS

Often when we hear about schizophrenia in the media, we hear about violence. Is violence actually common in psychotic episodes?

MARIO ALVAREZ-JIMENEZ

Not at all. In general, when there is any case where someone with diagnosis of schizophrenia or psychosis act on symptoms, they attract a lot of media, but it's not frequent at all. I've been working as a clinical psychologist and as a researcher for 10 years with young people with psychosis, I haven't experienced a single case of clear violence towards other people. It might be obviously more prevalent in the general population, but it's not frequent at all.

DYANI LEWIS

What about for the person who is having the psychotic episode - are they aware of their own illness, or is the psychosis simply their new reality?

MARIO ALVAREZ-JIMENEZ

There is different phases young people can go through, depending on the severity of the symptoms, depending on how quickly it develops, depending on what they're going through in their lives, depending on their previous experiences. Normally people will be very aware of the fact that there's something wrong when they start hearing voices and they probably have the experience that those voices are very strange and mostly distressing. And sometimes they might be talking about them or they might be telling them to do certain things and to act on certain thoughts. But in many cases, young people are quite scared of those symptoms, they don't know what's going on and they might be quite reluctant to actually seek help. Hence the new youth friendly services that we're trying to develop across Australia to facilitate for young people to actually seek help. While at the beginning young people might know and might be aware of the fact that there's something wrong, as symptoms are more obvious or they progress, they might not be aware of the fact that something like that happening. They might believe in those ideations, if you like, those ideas. They actually - they're being followed or there has been some sort of plot against them and things like that. So there's different degrees of insight or awareness of what's happening, depending on the severity of the symptoms.

DYANI LEWIS

This is Up Close. I'm Dyani Lewis and in this episode, we're talking about psychosis with clinical psychologist Mario Alvarez-Jimenez. Mario, how long can a psychotic episode last if left untreated?

MARIO ALVAREZ-JIMENEZ

It can last a long time. It can last years, in some cases. I can talk about some examples. I come back from my country, from Spain, like before they began early intervention services, we had some young people who had untreated psychosis for

years and they would be experiencing those symptoms on and off for many years. So in some cases it's shorter, but it can go on for years.

DYANI LEWIS

So what's the standard treatment for someone who has been identified early enough?

MARIO ALVAREZ-JIMENEZ

Typical treatment to start with would be receiving intervention as early as possible, so we can minimise the impact of the psychotic symptoms. And typically, they will go into a youth friendly early intervention services in which you'll receive multidisciplinary support all the way from [unclear], anti-psychotic medications that are pretty good in terms of dealing with symptoms. But also you would receive a wide range of supports around you, like psychological therapists or social support, group therapy, that is going to help you to get on with life once the symptoms resolve.

DYANI LEWIS

You particularly look at non-pharmaceutical approaches to treating psychosis. What sort of standard treatments are there in the psychological realm for people with psychosis?

MARIO ALVAREZ-JIMENEZ

There's a number of them. I mean the reason why we are so interested in psychological treatments is because we know that when young people develop psychotic symptoms - voices, delusions or strange beliefs, suspiciousness and so on - we know that pharmacological treatments are actually really good in terms of dealing with those symptoms. The most likely scenario is that for many people, for up to 90 per cent of young people, they do take the anti-psychotic medication. Many of these symptoms are actually going to settle down over a period of six to 12 months. However, there's many, many problems that are actually there, present, after the symptoms go away. Like for instance, we know that many young people might be depressed. It might be anxiety and social distress too. Young people might find it quite hard to finish school, to get a job, even to keep their friends. They might be socially isolated or they might have post-traumatic stress disorder from their psychotic episode, depending also on the kind of treatment that they received. If they were admitted to hospital on an involuntary basis, that can be quite traumatic for the young person and their family. So what psychological treatments do is they focus on all those massive hurdles that young people need to deal with in the aftermath of the psychotic episode. It might be dealing with depression, it might be dealing with anxiety, it might be helping them to stay in touch with their friends, it might be helping them to find a job and to get on with life. The standard treatment, the most evidence based treatment that we've got at the moment for psychosis and - my speciality I should say is young people with psychosis, but this also applies in long term psychosis or schizophrenia or adults with psychosis - is probably CBT or cognitive behavioural therapy. What CBT does is just helping young people or adults in this case to control their thought processes, being able to deal with negative thoughts, being able to get on with things that make them feel better, to deal with the stress or

to cope with stressful situations in a more efficient way, to be able to [be] exposed to different things that they are scared of. That sort of thing.

DYANI LEWIS

For symptoms like depression and anxiety that people are feeling following a psychotic episode, is that a result of having had the psychotic episode or is it also perhaps partly to do with the anti-psychotic medications that they are taking?

MARIO ALVAREZ-JIMENEZ

That's a really good question. There's a lot of research now looking at the relationship between psychosis and depression. We know that sometimes depression was there before the psychotic episode. We know that some young people develop depression after their psychotic episode, because they're very aware of the fact that they went through an episode like that, or they might develop negative thoughts or hopelessness, if you like, about the future. And the same thing with anxiety. We know that anxiety and stress is quite frequent at the beginning of a psychotic episode. It might be there before the psychotic episode or some people might actually develop stress or anxiety disorders after the episode. In terms of anti-psychotic treatment, now there's a lot more research, very fashionable sort of topic in terms of whether they might contribute in some ways to the development of some sort of depressive symptoms. The evidence so far is inconclusive. There is research at the moment looking into the effects that this medication might have on things like that. I don't think at the moment there's evidence that anti-psychotic medication triggers depression.

DYANI LEWIS

Anti-psychotics are fairly well known though for having the side effect of people putting on a lot of weight and that sort of thing. That certainly can't help with a young person coping with this new diagnosis.

MARIO ALVAREZ-JIMENEZ

Yes, you're quite right. We know that anti-psychotic medications have significant side effects. One of the most obvious and prevalent ones is the fact that young people, when they start on anti-psychotic medication, they put on a lot of weight. It varies from person to person. It varies from anti-psychotic to anti-psychotic. It is very hard to predict when this is going to happen, but it happens quickly in most cases. Once again, this is one of the areas in which there has been quite a bit of research trying to come up with alternatives for these young people so they don't suffer the consequences of putting on, in some cases, just to give you an example, up to 12 or 13 kilos within three months. It's something that is absolutely unacceptable. Sometimes the consequences of putting so much weight, [are] worse than the fact that a young person experienced a psychotic episode. It is definitely something that we shouldn't ignore and is being ignored for way too long.

DYANI LEWIS

Now you've been looking at positive psychology in particular as a way of helping to prevent young people who have experienced psychosis from having future episodes,

or to support them after their diagnosis of having had a psychotic episode. What is it about positive psychology that makes it an attractive approach for you?

MARIO ALVAREZ-JIMENEZ

I've been very interested in promoting meaningful, real world recovery. Something that young people care about. Something young people demand from us. For a very long time, both anti-psychotic medications but also psychological treatments have focused a lot on psychotic symptoms - hallucinations and delusions. We've done a good job with it. There's been a lot of progress in the field in terms of developing new treatments, either psychological or pharmacological, that deal with symptoms very well. But having said that, young people sometimes are not that bothered by their symptoms, and even when their symptoms go away, they've got very significant problems that affect recovery and the quality of life. So that's the reason why, been so interested in looking at different ways of promoting recovery and social functioning, which is [what] young people are demanding from us. CBT, what I was talking about, or cognitive behavioural therapy, once again is an effective treatment in dealing with symptoms, in dealing with sadness if you like, in dealing with stress or in dealing with negative thoughts about experiencing symptoms. It's fair to say, there's [an] evidence based treatment and there's nothing wrong with it, but it actually ignores a pretty significant aspect of recovery, which is getting on with life. It neglects all the positive aspects that we kind of actually promote through psychological interventions. Let me give you some examples. For instance, we know that young people are very resilient. We know that they've got personality strengths, but sometimes they're not even aware of them. We don't talk about them in therapy, and we know that capitalising on personality strengths may be a really good way of not only engaging young people in therapy, which is one of the challenges that we're facing at the moment, but also a really good way of dealing with the stress. A really good way of connecting better with other people. It would be a good way of making the most of your life. So something that positive psychology offers that CBT for instance doesn't offer at the moment, but also it's about finding meaning and purpose in life, is the recognition that young people or people with psychosis, are not psychosis or are not symptoms. They've got lives, they've got hopes, they've got dreams. They're resilient and they can have fulfilling, meaningful lives like any of us. And it's the recognition that recovery is a lot more than symptoms.

DYANI LEWIS

So what types of positive psychology techniques can you use?

MARIO ALVAREZ-JIMENEZ

One of the things that positive psychology does pretty well - and this is without ignoring the fact that young people struggle with symptoms and there might be a stress and we don't ignore those things. We help young people to deal with all of that. But the techniques that we're trying to use is to develop very specific ways of identifying what your personality strengths are in a very systematic way. Once we do that, we can actually profile the strengths of a young person and we can develop ways of using those strengths in accordance to what we call in one of our experimental studies at the moment is the CEC model, or coping, enhancing and

connecting with your strengths. So we're trying to be very concrete and go from the abstract concept of having a strength to actually very specific techniques or specific ways of putting those strengths into practice, to deal with the stress if you're struggling with things, to connect with other people if you are feeling socially isolated, or to make the most of that - we know that there's other ways of promoting wellbeing, for instance. We know that just thinking about three good things that happened to you every day before you go to bed and write it down actually have long lasting effects on wellbeing. Or we know that expressing gratitude, for instance, has long lasting effects. We know that altruism, finding purpose and meaning in different things, actually have lasting effects of wellbeing.

DYANI LEWIS

All of this suite of techniques that you use, whether it's positive psychology or cognitive behavioural therapy or indeed, anti-psychotics - what is the purpose of the therapy? Are there particular behaviours that you are trying to modify with these interventions?

MARIO ALVAREZ-JIMENEZ

It varies from therapy to therapy. Anti-psychotics - the main focus of anti-psychotics is dealing with symptoms and they're actually really good at that. They're very effective in dealing with hallucinations and delusions. CBT so far in psychosis has been very much focused on dealing with symptoms and dealing with the stress and dealing with deficits, if you like. Dealing with depression for instance, or negative thoughts. Positive psychology at the moment is not an evidence based treatment in psychosis. We're doing newer studies looking at the potential of positive psychology to enhance recovery and the focus will be social functioning. The focus will be connecting with other people in a better way. It will be psychological wellbeing, experiencing more positive emotions, having a more meaningful life. So it varies depending on the therapy, but the movement in research and also in terms of we're trying to do in treatment, is actually to move away from symptoms. We know that we can do that, to more sort of comprehensive focus on recovery and social functioning. That's where positive psychology can actually add something. Time will tell.

DYANI LEWIS

Do these therapies help prevent a future psychotic episode?

MARIO ALVAREZ-JIMENEZ

They do. All of them do. With the exception of positive psychology which at the moment is not an evidence based treatment for psychosis, but we know that taking anti-psychotics prevents having a second episode. There's a trade off at the moment in terms of taking anti-psychotics for a long term versus developing a second episode, and what developing a second episode actually means. We know that also CBT can actually prevent a second episode. We actually ran a study a few years ago with one - a very close collaborator of mine, Professor John Gleeson from ACU.

DYANI LEWIS

ACU, that's the Australian Catholic University.

MARIO ALVAREZ-JIMENEZ

And the idea was to develop a new CBT treatment, cognitive behavioural therapy treatment, very much focused on addressing risk factors for relapse in young people with psychosis. It also included a family component. And we actually showed that we could prevent relapse in young people with psychosis. However, the treatment effects were not lasting and this happens again across the board in mental health. We know that we can do things, we can improve things, we can shape the course of mental health disorders, but sometimes once we stop providing that sort of support, some of the benefits that we have achieved during treatment are lost. But yeah, they do work.

DYANI LEWIS

You mentioned that there are risk factors for having a repeat episode. What are some of those risk factors?

MARIO ALVAREZ-JIMENEZ

We've done quite a bit of research into that, actually. We know that some of the most important ones would be cannabis. That's one of the most important ones. Stop taking anti-psychotic medication against medical advice, because it's not clear that anti-psychotic medication needs to be prescribed for a long time for everyone. It could be also being exposed to a stress in the social environment. For instance, we know - this is bit of a tricky concept - we know that if young people are exposed to a lot of criticism because they find it quite hard to get up in the morning, because they're finding it quite hard to go and look for a job. If they're exposed to a lot of criticism that normally comes from a really good place within the family or within friends, they may be also more likely to develop a second episode. Just to name a few.

DYANI LEWIS

I'm Dyani Lewis and my guest today is clinical psychologist Mario Alvarez-Jimenez. We're talking about psychological interventions in the treatment of psychosis here on Up Close. Mario, the other area that you are exploring is the use of social media in preventing relapses. Why were you interested in this?

MARIO ALVAREZ-JIMENEZ

Our interest in social media came from our own research. What we found is that we're actually quite good in dealing with the symptoms, but the effects were not lasting and we were not changing people's lives. We were not promoting recovery, real recovery. This is what we were after, really. So it occurred to us that we needed to provide young people with some sort of ongoing support. That support should not be limited. Anyone should get appropriate support anytime if they need to get that sort of support. At the same time, we wanted to move away from dealing only with symptoms and we wanted to promote real recovery, real world functioning. That's when we started thinking about social media and the internet. The internet, because it offers that exciting opportunity to be able to delivery ongoing support beyond face to face treatment. Social media because we really want to move away from only individual based treatments that don't take into account the fact that we live in society

and the fact that social aspects are so important, both in the recovery but also in the treatment of psychosis. And if you ask me, I think a lot of the advances that we're going to see in the next few years from the psychological point of view, from the treatment point of view, is going to come from more socially based treatments. So new social media based interventions offer a tremendous opportunity to advance in this area.

DYANI LEWIS

So describe for us the system that you have developed. What does it provide for participants?

MARIO ALVAREZ-JIMENEZ

We have developed this thing that we call MOST, and it stands for Moderated Online Social Therapy. It actually combines the engaging power of online social networking with peer support and peer moderation with individually tailored, individual interventions that are provided through online platforms and with moderation, like this is moderation coming from different experts that actually come from different disciplines. That's quite technical, I suppose, so if you are a young person and you start using one of our systems, the one that we have developed for young people suffering from psychosis is called HORYZONS. Basically you go into a seamless, pretty advanced social platform in which you can actually interact with other young people. You'll receive a lot of suggestions as to how to deal with the stress or how to experience positive affect or how to connect with other young people. And then you'll receive a lot of support from young people who have gone through the same experience that have been trained to provide support. You also will be able to ask experts about different treatments. That would be sort of the experience, I suppose, that you'll have.

DYANI LEWIS

Are participants willing to share their experiences with each other or is it more about providing participants just with non-judgmental peer group that they can discuss anything with?

MARIO ALVAREZ-JIMENEZ

We're trying to develop cutting edge, fully flexible interventions that provide for anyone's needs and preferences. So if you go online and you don't want to interact with other young people, that's okay. You can do therapy, you can see what other people are doing, you can like different things, you can follow things that you're interested in. If you want to talk to other young people you can do it, or you can talk to moderators or you can talk to peer supporters. We know that there's differing young people or different profiles of usage. We know that some people are very happy to share and self-disclose online and they will do that more happily than actually disclosing anything in a face to face intervention. We know that some young people are more reluctant to do so and they are a little bit more private, but they still use the system and they actually see what other young people are doing and they benefit from it. And we know that there's other group that is quite interested in learning about psychosis and using new techniques, learning about their personality

strengths and putting things into practice.

DYANI LEWIS

Social media can often be anything but a positive and supportive environment. So how can you prevent people from being bullied in this environment?

MARIO ALVAREZ-JIMENEZ

That's again a good question. John Gleeson said to me once when we started doing all of this, we should leave in the hands of multimillionaire people what our young people do online. It should be up to Facebook or Google only to decide what our children and our young people do online. We should have a say. We should be able to develop cutting edge interventions, online technologies that people can benefit from, and that's what we're trying to do. So there's many ways of doing that. For instance, we provide enclosed social networks for young people, so we know who they are. We haven't seen a single case of any kind of abusive behaviour towards each other. It's quite the opposite in fact. Young people really want to help each other. But we've got a lot of - I probably cannot go into too much detail - but we've got a very comprehensive safety protocol I should say that we follow to ensure that young people feel safe and secure. We have run a number of pilot studies and 100 per cent of our young people have felt really safe using the platforms that we have developed.

DYANI LEWIS

With these online strategies as well as other psychological interventions, can you see a day when perhaps we don't need to turn to anti-psychotic medication?

MARIO ALVAREZ-JIMENEZ

That's a difficult question. I certainly can see a day where we can provide everyone with effective individualised support for as long as they need it and when they need it, right at the time when they actually need it. I think there is going to be great opportunities in the future to do that. For instance, with new mobile phones, the smartphones and with new very exciting developments in terms of being able to link up with other people and using even newer smarter technologies, we're already thinking about looking at the next generation of mobile devices as a way of providing that real time support. I can envisage a future in which we can support people for as long as they need it and provide that support exactly when they need it, and for good. I certainly hope that we have services that reach out to young people. We don't expect that young people come to the services, that we actually have the technologies and the services that actually respond to the needs of our young people and they don't experience any stigma or any discrimination on the part of mental health services. I certainly hope that we are able to offer young people what they need, whether that is anti-psychotic medication, whether that is anti-psychotic medication for a while and then not taking them anymore. I certainly hope that we can develop cutting edge technologies that are able to bring the 21st century technologies that we have available to us. To offer young people evidence based treatments for as long as they need it when they need it, and they were to connect to other young people if they need do, and we have interventions that look at people

from the social perspective, not only from the individual perspective. So that's what I hope happens and we are starting to do that in Australia. It has happened in other western countries and I really hope that we follow that way. We can reach out to young people who have no access to treatment as we speak. We can actually offer support beyond face to face interventions. We know that early intervention services at the moment provide support for up to two years of treatment. That's due to resources. Ideally, we will support people for up to five years within that. That's what is actually needed, but we don't have the resources to do that. But these platforms can actually extend the period of care for those young people, and hopefully we'll be in a situation in which we can actually prolong the benefits of what we do face to face through innovative social platforms. The advantage of these platforms, and it's not the reason why we're doing it, but one of the huge advantages of them is that it can be easily rolled out nationally. As part of the national roll out of intervention services that in Australia there's going to be up to 10 - probably nine early intervention services that are going to be rolled out in the next four or five years. But they can actually be used, these sort of platforms to reach out to people who are not getting support as we speak and one of the advantages in a country such as Australia is that we'll be able to reach out to young people who live far away or in removed areas or in areas where they have very difficult access to specialised mental health services.

DYANI LEWIS

Mario, thanks for being our guest today on Up Close.

MARIO ALVAREZ-JIMENEZ

Thank you very much for inviting me.

DYANI LEWIS

Dr Mario Alvarez-Jimenez is the director of online interventions research at the Orygen Youth Health Research Centre and a CR Roper fellow at the Centre for Youth Mental Health at the University of Melbourne. If you'd like more information or a transcript of this episode, head to the Up Close website. Up Close is a production of the University of Melbourne, Australia, created by Eric van Bemmelen and Kelvin Param. This episode was recorded on 27 March 2014. Producers were Eric van Bemmelen, Kelvin Param and myself, Dr Dyani Lewis. Audio engineering by Gavin Nebauer. Until next time, goodbye.

VOICEOVER

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