273 – Exercise Efficacy vs. Effectiveness

Lawrence: Lawrence Neal here and welcome back to highintensitybusiness.com. This is episode 273 and today's topic is efficacy vs. effectiveness when it comes to exercise, but more specifically, implementing exercise into the real world from the lab, trying to bridge that gap so to speak. Today's guest to talk about that is one of my favourite people in exercise, Dr. James Steele. James is Associate Professor of Sport and Exercise Science at Solent University, and is also the Principal Investigator at the Ukactive Research Institute. He has extensive research and consultancy experience in physical activity, exercise and sport working with elite athletes across the range of sports, the general population across the life span, and both those who are healthy and diseased. James is a member of the Expert Working Group revising the CMO Physical Activity Guidelines for the UK and the Expert Committee for Communication, and is a founding member of both the Strength and Conditioning Society, and Society for Transparency, Openness, and Replication in Kinesiology. James is also a member of the American Colleges of Sports Medicine and the British Association of Sport and Exercise Sciences, and is a fellow of the Higher Education Academy.

James, welcome back to the podcast.

James: It's great to be back, Lawrence. It feels like it's been a long time.

Lawrence: It does feel like it's been a long time. Far too long actually, so great to have you back, and excited to dig in to today's topic and learn about the

research from yourself. Where should we start on this one? Efficacy vs. effectiveness, so do you want to I guess start out by talking maybe about the genesis about this idea and how it developed and some of the research around it.

James: Sure, yeah. Some of us is might not be aware. A couple of years back, I took a slight turn in terms of the research I was doing, so obviously still working in around resistance training specifically with colleagues like Dr. James Fisher. But started working with the Ukactive Research Institute and looking at physical activity and exercise more generally more on the kind of public health end of the spectrum. So looking at that kind of more population health approach. But it was actually slightly before that and something that led me towards that was coming across a paper which was written by the Ukactive Research Institute's Scientific Adviser Board back in 2015 or 2016 which was called Death by Effectiveness: Exercise as Medicine Caught in the Efficacy Trap! I remember coming across it at the time because I was becoming more and more interested in how we can take some of the things that we've been learning from our studies of resistance training and how to manipulate resistance training interventions to optimize outcomes such as strength. The more and more I was realizing that these interventions could be quite simple. I was asking myself questions like, "Okay, well, how do we actually get people to do it?" I wasn't aware of the terminology at the time and so I came across this paper, but it talked about this idea of differentiating between what is called efficacy and what is called effectiveness.

To define those terms, I guess for the listeners, when we talk about efficacy when it comes to interventions whether that's exercise, or a drug therapy, or any kind of intervention, what we're talking about is whether or not the intervention has an effect on the outcome that we're interested in when it is delivered on the ideal conditions. An example of that would be in an exercise intervention, we might have a very tightly controlled protocol that we use. We would invite people into the lab or very tightly controlled environment, and we would make sure that they did the protocol exactly as it was designed to be delivered. We will make sure it has extremely high fidelity. We then observe whether or not it produces the outcomes that we interested in. This would be similar to what are called Phase 1, 2 and 3 trials in drug development. It's trying to understand whether the drug itself based on its pharmacokinetics and when people actually take it in the right dosage does it produce the desired outcome. But that's very different from asking the question of, if I recommend or prescribe this intervention, this exercise protocol, or this drug, does it produce the effects I'm interested in. Because in that question, we're then taking away some of the control over the delivery of that intervention, so we might lose some of the fidelity of that intervention and that might have an impact then on the effectiveness of it. In the exercise example, an intervention that's been shown to be highly efficacious in controlled conditions won't necessarily produce the same magnitude of results when we then go to try and apply it in the real world because we might have issues of adherence, people might not put in a sufficient intensity of effort, they might deviate from the protocol when in slight ways that impact its effectiveness. The same of a

drug treatment. When someone takes a drug is a different question or the effect that a drug has when someone takes it is a different question to what effect the drug has when a doctor prescribes it because people may or may not take the drug, they may not follow the exact dosing protocols, etc.

It's a real eye opener to me to come across this kind of area, these two concepts, this differentiation between efficacy and effectiveness. It got me thinking a lot more about, what do we really understand about exercise generally, physical activity generally with respect to how effective it actually is for improving health, well-being, longevity, etcetera. Are we limited primarily to efficacy data? And so, yeah, it was interesting to come across those concepts a few years back and it has very much kind of directed my interests in the last few years.

Lawrence: Yeah, awesome. Yes, super interesting. It's one of those things where I think a lot of people get stuck in the weeds, debating all the different studies about the efficacy of different training protocols and different variables like effort, intensity, and volume, and frequency, and all these things. Yet a lot of time we forget just that a lot of people just aren't doing anything at all and a lot of people just don't really seem to adhere to these types of protocols which is one of the main issues. I actually read through this article you just mentioned, the Death by Effectiveness: Exercise as Medicine Caught in the Efficacy Trap! We will link that in the show notes because it's a really short read which always makes me very happy. I was

printing out and it's one page, and I was like, "Thank god", versus one of the other papers you sent me which was like 20 pages.

One of the lines that I thought is really interesting on this paper actually, I just wanted to talk to you about briefly is it talks about, it says… I'll actually just read it, it says, "On the basis of the above we believe that SEM…" which is short for Sports and Exercise Medicine, "…risks being side-lined in public health. If we are to provide critical health support to SEM - and arguably to beleaguered health services - that lifeline is the production of high-quality phase IV/effectiveness research." And it occurred to me… What's your thought's briefly… I mean this is clearly very relevant right now. Basically, that's talking about the overburden in health services right like the NHS, something like that. And clearly right now that's a hot topic. I mean, the reason why COVID-19 is so feared, and we have these policies going on around social distancing is it's not so much the necessarily the direct impact to the virus but also the knock-on effect, the effect that it will have on healthcare system or perhaps cause people to die from other comorbidities or diseases which have no relation just because the health services are so overburden. I'm just curious, do you think that such this kind of exploration you're doing and looking more research around what's actually going to have the effective for the general public is actually going to really have a big impact on just healthcare and health services.

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James: Yeah, absolutely. I mean, in the last couple of years I've had the good fortune or misfortune depending on how you want to look at it of spending a lot of time with policy makers and decision makers in these areas. Through Ukactive, I spend a lot of time talking with high ranking officials within the National Health Service, speaking with Public Health England and government divisions about the policies that they are making. A lot of this work is around physical activity more generally. The question when it comes to a policy maker deciding whether or not to invest in a particular service is always down to the effectiveness that it can have. One of the things that we often kind of like overlook at… As a side note, there's this kind of debate between or rivalry between those who kind of more on the exercise physiology end of the spectrum and those who are more working in physical activity and public health. The public health practitioners are more interested in just getting people doing anything and the exercise physiologist want everyone doing high intensity training and so on.

Well in reality, the answer is probably somewhere in the middle when it comes to what's going to be the best thing on a population level. The reality is we don't really know because we don't necessarily have the research that specifically asks those questions in a rigorous enough manner. What is going to have the biggest outcome, the best outcome in terms of effectiveness? We may have two ends of the spectrum when it comes to delivering exercise interventions. We may be fairly confident that in terms of efficacy for a range of different health outcomes, and we'll set aside the fact that the reality is we have no idea whether exercise in any

form actually causally increases mortality or reduces mortality risk. But that's the set of story.

Lawrence: Hang on. I'll pause you there. Could you just elaborate on that for a moment because I just was not aware of that?

James: Sure. The evidence that we have around mortality risk reduction is purely observational. There is no…

Lawrence: Even the stuff on like grip strength and strength as being a factor to reduce or cause mortality? Is that all epidemiology, is it?

James: It's all observation of epidemiology. I know you've spoken to that before as well, but the evidence for, even the observational evidence, the impact of behaviours such as engaging in physical activity, or exercise, or resistance training specifically that's even weaker than necessarily the association between strength and mortality risk. But when it comes to, and this has to probably be a separate podcast in of itself.

Lawrence: Sure.

James: When it comes to determining the causal effects of doing something on an outcome that you're interested in, you need a certain type of evidence to really be able to answer that. The gold standard is obviously to do a randomize control trial. Really, this is kind of absence of evidence more so

than evidence of absence. There are very few trials partly because they are hard to do because it takes a long time to people to die and when that's your outcome the study very expensive. What studies we do have that have looked at long term intervention trials on mortality risk such as the Look AHEAD study, and couple of those studies that have looked at diabetes more specifically tend to find that actually there is not a huge impact on mortality risk itself. But, kind of background to the power point there's a big focus now more so now on adding quality to your years than extending the amount of years that you have. Policy makers are quite rightly interested in quality of life as most of us we want to enjoy disease free, healthy, happy lives. Kind of background to the point I was making, we do know that certain types of exercise interventions have a greater efficacy for improving certain markers of health, and well-being, etcetera. We know that others have less than effect on that. Broadly speaking you could probably put that on a spectrum of the harder you work, the more you're going to get out of it in terms of your exercise interventions. That's, again, questions of which is going to have the biggest effectiveness if you were to recommend it on a population level. Because it may will be that the thing that has the biggest impact in terms of efficacy, no one does, or no one does it correctly. And so that efficacy that it could have if it was done ideally never translates into effectiveness out in the real world, and contrastingly the interventions that have very poor efficacy may actually be able to maintain the magnitude of effect that it has when applied in the real world and so have potentially greater effectiveness than the things that we know are more efficacious.

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Lawrence: It's frustrating though, isn't it? Because you and I are very passionate about making exercise as efficacious as possible for ourselves as well as all of my listeners and our colleagues in fitness, in high intensity training, in business. It's just sad to hear though that you're probably right in that we're probably going to be looking at something perhaps much less intense, I don't know, or perhaps get into that to make it actually effective in the real world to the general population.

James: Yeah, very much. I mean, a while ago now, I kind of gave myself already about that. The reality is that we're probably going to be having to look for some Goldilocks zone in terms of what's the most we can get able to do rather than what's optimal. Because from what we know people are unlikely to do it. But, the reality of it as well is, is that this is still actually an unanswered question because we don't really have the studies to conclude that. Now, one of the issues with this is it's quite hard to do things like randomized control trials on the effectiveness end of the spectrum because they require tap again to either existing service delivery. I'm using terminology that kind of relate to more to healthcare I guess at the moment.

Lawrence: That's okay. I'm following.

James: I'll try to bring it back to an example that might be more applicable to business owners.

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Lawrence: No, it's fine. If it's easier to talk about it in the healthcare context, it's absolutely fine. I'll perhaps then ask you to clarify if needed but I think it's very straight forward.

James: One of the issues is that by the time you get to that kind of service delivery end of the spectrum, people have normally implementing things because they think it already works. They don't necessarily have the evidence that it has effectiveness. They may have evidence that it has efficacy and they're hoping that it will translate into effectiveness.

A good example of this is exercise referral schemes within the UK. They have been around since 1990's and generally these are schemes whereby a general practitioner or physician or some of the healthcare professional will refer an individual who is presently inactive, sedentary, and normally has some kind of long term condition like diabetes, they might have long term muscular skeletal pain, they may have cardiovascular disease, or even just obesity. These have been around for a long time and there's always been questions around whether or not they are actually producing results that are worthwhile. The argument has always been, well, we know we've got loads of evidence that follow these conditions. Exercise, I'm using the term quite broadly here because the interventions are applied quite broadly once you get to that kind of end the spectrum where they are now actually being deluded. We know they improve risk factors for all these diseases, they improve symptoms for these diseases, people feel better. But the reality is we actually have limited evidence that's to whether or not they are producing those results.

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One of the things that we did recently was to try and get a picture and evaluate what impact are these exercise referral schemes having. So we try to conduct some effectiveness research by taking data from a lot of existing exercise referral schemes across the UK and looking to see what effect they were having out in the real world on all of these outcomes where there had been evidence for the efficacy of the interventions. I think I've sent you over the paper that were published around that.

Lawrence: Yeah, right here in front of me.

James: Sure, yeah. I mean this picks up a lot of press because obviously the findings in a nutshell where that these exercise referral schemes don't seem to be having the impact that it is hoped that they would be. Very few outcomes that are examined seem to improve to any meaningful degree. This is a big analysis. We had almost 24,000 participants who had been through exercise referral schemes ranging from six weeks to three months. A caveat is we don't really know what these schemes were doing. But on the whole if we were asking the broad question of whether these exercise referral schemes are working, the answer would be probably not.

Now, I guess to kind of bring this back to how the applicability to high intensity training business owners is, we often hear that kind of question of, "Does HIT work?" It's similar to asking, "Do exercise referral schemes work?" We're asking a question about where they are out in the real world,

if we were to recommend the people do HIT, would they actually produce the results that we're interested in. Now the only way we're going to find that out is with data from real world interventions. And so it may will be that one way of looking to answer this question is to more business owners who are delivering these interventions to collect data on outcomes that are of interest to identify whether or not it's working. And you know, that might be strength but it might be broader outcomes such as quality of life measures, well-being, mental well-being, etcetera. In exactly the same way is how we evaluate to this exercise referral schemes. We tact into existing data sets that were being collected by these schemes. Now the interesting thing is most of these schemes are collecting data and they didn't really know what to do with it. They were just collecting it for the sake of collecting it because they felt that they have to do so. It wasn't until we came along and took that data and then decided to analyse it that we were really able to put it to good use. But there's no reason why high intensity training business owners couldn't be doing the same thing, contributing to some kind of bigger public data set that would enable researchers like myself, James Fisher, or others to tap into it and try to identify are these interventions, are these approaches to training people producing the outcomes that we would expect them to when they're applied out in the real world.

Lawrence: Let me just pause you there for a sec. So, obviously the difference is, is in the HIT studio you've got typically 1-on-1 or small group supervision and you've got someone who's perhaps more of an expert in terms of their

understanding of how to apply evidence-based exercise. I mean, in that environment like we know people are going to get good outcomes right for a lot of these measures. I mean all those measures in this particular paper include things like BMI, systolic blood pressure, those kind of mental health well-being measures you mentioned. Is that not fairly conclusive like do we not know that that's the reality and the problem is adherence in self-efficacy and being able to produce a high degree of effort in isolation, is that not the issue here, or am I off the mark?

James: No, you bang on there, Lawrence. We then move on to the next question which is something that we have to acknowledge as our limitation for example on this exercise referral scheme is we analyze "exercise referral schemes". The reality was though all of these schemes that we evaluated could have been doing very different things. If we knew what they were doing, we would then be able to perform some kind of comparative analysis. Expanding that point about why the data collections will enable that larger evaluation of real world practice to take place. What you would want to see as well is data being collected in alternative approaches that might employ, for example, a similar sort of approach of 1-on-1 personal training by employing different types of resistance training interventions. And that way you can start to take those data sets and compare them to see which interventions are having the greater impact out in the real world upon effectiveness.

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To give you an example, I'm currently working on something that employs these. Because the reality is and somewhat ironic manner, these are technically observational data sets themselves. They are still technically, no, they're not experimental. They're not data sets where people are being randomized to receive an intervention. Now there are confounders that might influence the effectiveness of the intervention or even the likelihood that people are going to choose those interventions. More and more recently now these are techniques that have been around for a long time but are more widely being now applied across fields such as healthcare, and found their way into physical activity and exercise interventions on the public health end of the spectrum. But there are actually ways of using observational data and drawing causal inferences about the effects of interventions or behaviours upon certain outcomes. For those who want a really great introduction of this idea of kind of causal inference from observational data. I definitely recommend that people look up a book called The Book of Why by Judea Pearl and Mackenzie. It's a fantastic introduction to causal inference. It's written for a kind of more wider popular audience. But they talk about ways in which… The idea of a randomized control trial is that the randomization element effectively takes care of all the confounding variables that could influence or could mask the intervention effect. And so when you don't have the ability to randomize individuals, you have to come up with ways of accounting for that. And to do that, you have to think what's going to potentially impact my intervention. To comeback to an example of where we're currently or

we're going to be looking at observational data to try and draw a causal inference about the effectiveness of a particular intervention.

I'm working with a group in Greater Manchester here in the UK a project called the Prehab4Cancer Project. And then, I got involved in the project because they were looking to design a pre-habilitation program for cancer suffers who undergoing elective surgery, and they had a very short window of time based on how they system here in the UK works base on when diagnosis happens and they have deadlines for when people have to be kind of refer to surgery and so on. There's kind of like very short windows and essentially they have 3 weeks to deliver an exercise intervention to try and get these cancer patients as strong, and fit, and healthy as possible before going into a surgery. There are some data from some randomized trials suggesting that pre-habilitation prior to surgery or treatment in cancer may improve recovery, may improve mortality. But these trials are really, really hard to do as previously explained. It's hard to do these kind of randomize trials out in the real world.

In Manchester, instead, what they just decided was is they would just start doing this as standard delivery and they would look to then evaluate it using a slightly different method. People are probably wondering what is the intervention. The intervention is essentially a high intensity effort of resistance training protocol in addition to a high intensity interval training program as well. So it's twice a week for three weeks using a progressive introduction of greater and greater intensities of effort by manipulating the

certain points of start off doing kind of non-repetition maximum, they then go to self rep max, so they kind of stop in one rep short of failure and then culminating and finally getting the patients to train to failure and using a whole body program, and then they also do a twice a week reduce intensity of effort interval training session as well.

Lawrence: Was that designed and influenced by… I remember the other podcast we did about effort and some of the science you did there about how people get better. I can't remember, you have to remind me, but is it people get better at training with high degree of effort once they're more practiced and more exposed to training stimulus. Did that have a part to play in the study design there where you have them ramped up?

James: Yeah, to some extent. I mean it was actually, really it's a… We did a study with [unclear 31:20] in older adults which was a 6-month intervention which we essentially took them truncated into this 3-week protocol. But really it was an element of trying to anticipate what factors might improve the effectiveness of it by facilitating its implementation. Most of these patients were people receiving a cancer diagnosis and last thing on their mind is wanting to begin an exercise protocol. But also a lot of them were completely sedentary beforehand as well. We had 3 weeks to throw them in. We didn't have time to do kind of familiarization and period before the interventions, so we have to kind of build it in there as well and gradually build them up.

Lawrence: Do you have the outcomes? Sorry, yeah, go on.

James: No, we don't. The evaluation is going to be taking place because it's a very big trial. They aren't trials technically. The evaluation is still running actually, so we don't have any outcome there at the moment. From the implementation of the Prehab4Cancer Program, essentially every patient who met the criteria and was diagnosed was offered the intervention. Because of that, we don't have any bias based upon self-selection into the program. It's not like specific group of people were offered it and they might therefore be confounders because we target particular group. Everyone in Greater Manchester was being offered this intervention if they met the criteria of being diagnosed and referred for elective surgery.

Now, what that did was that creates one big intervention group. The issue that you have with that is without some sort of comparator, you're unable to really know whether or not the intervention produces the outcomes or not, or whether it was just something else, time, or some other confounding variables. One of the benefits we had in this case was that Manchester has a lot of historical data in these types of patients. So before the implementation of this Prehab4Cancer Program, there was what you could call standard care, which was they got a little bit of advice on what to expect with respect to their surgery when it came around. But other than that they didn't really get a lot. What we're going to be able to do is go back and take access all of the health record data from this group which includes everyone pre a particular time point who were given this kind of care approach, and look at their outcome in comparison to the

people after the implementation of the Prehab4Cancer Program. And we're going to be able to use techniques such as what's called Propensity Score Matching to essentially create two groups that control for the types of variables that we think might confound our outcomes, so will be able to look at the data and draw similarly match age groups, similarly match for gender or sex, similarly match for things like baseline BMI, and so on and so forth. We're able to ahead of time think what things do we think other than our intervention are going to impact these outcomes, and then using the data set that we're creating from doing this intervention, and using other publicly available data. We're able to essentially kind of emulate the randomize control trial that we would do if we were logistically able to actually do that by the trial.

Again, bringing this back around… and this just doesn't apply to HIT. It applies really to any kind of exercise intervention between this kind of warring camps. We all argue about the minutia but what we're arguing about is minutia relating to efficacy. So really get at the question of whether or not there are differences in effectiveness. We need to be looking at how do we facilitate these types of studies. How do we create large publicly available data sets that we can then take and potentially compare in the same sort of ways which we're doing with the Prehab4Cancer Program that enables us to draw some causal inference that's to be effects of these interventions and comparisons of one another.

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Lawrence: Maybe you've touched on this already to an extent, but what would be your advice to those interested in trying to contribute to that? What would they need to be tracking, how are they are going to design that in their studios in a nutshell?

James: Yes, that's a great question. One good thing about the HIT community is that everyone collects data anyway. I mean, it may all be on old paper records and so on and so forth. But there's a lot of data out there and there is the possibility that that data could be collated and some kind of database produced from that. Some businesses do use electronic records. They have big data sets that are there waiting to be examined.

One example is fit20. In fact, I'm going to be at some point working with them to look at their data and see what we can identify from it. But the problem with that is we're still just looking at one broad kind of intervention. We're not necessarily able to draw comparisons. We're only able to look at what outcomes people have decided to collect. This is a problem we had with the exercise referral schemes when we look at them is that we were limited to look at what data was available on. It just so happened that a lot of schemes collected blood pressure, a lot of schemes collected Body Mass Index, and so we were able to collate quite big data sets looking at these. It may be that a lot of, well, most HIT facilities I imagine are probably collecting low progression which we can use as a for strength or it is strength. We'll probably likely have the strength data. And we've argued this with respect to exercise referral

schemes more broadly as well is when it comes to thinking about what outcomes to collect, really, you've got to think about who's asking the question, who really cares about the answer as to whether or not x is better than y; or whether or not high intensity training works out in the real world. Who are we trying to convince?

Now, with exercise referral schemes the people that you are trying to convince or you are trying to help make decisions are policy makers and people who are investing in these schemes as a public health intervention. Really, the question comes down to what do you want to measure. Well, you should measure the things that would help these people makes decisions. Now, this may not be something that's quite is applicable for all high intensity business owners out there, people are from different countries, whether different local context, and it maybe that these individuals are not necessarily trying to broaden out to employ even sort of their interventions as public health measures. But, you could take this and apply on a smaller scale even within your own facilities as well. You could quite easily, for example, ask the question of, "Within my facility, what types of interventions are going to be most effective for my clients?" You don't necessarily need to run a randomize controlled trial to find that out, but you do need to collect data on these different types of interventions, and then look to apply the right sort of analytic techniques to be able to draw those causal inferences from them. So you might think yourself, "Well, I want to know whether or not applying these kinds of advance techniques versus just doing a simple one set to failure approach which is

going to be more effective." Not more efficacious, what's going to be more effective. And that's a different question from what's more efficacious which is… Even the types of studies that we've done with Luke and the guys at Discover Strength, they're still focus on answering the question of efficacy, not necessarily answering the question of effectiveness. You could employ different interventions, collect the right data, and then work with individuals, researchers who are experiencing understanding causal inference from these types of data to find out what's working better for the outcomes that are interesting to you and meaningful to you, or meaningful to your clients, to understand whether it's working.

Lawrence: Can you just clarify what outcomes would you be trying to measure in this particular example to understand effectiveness over efficacy?

James: The outcomes don't have to be different in those respects. To give a simple example, let's say, in a tightly controlled study where you're looking at the efficacy of intervention you decide you want to know it's efficacy upon strength. And so you do an intervention, you might compare it to another one, or you might just compare it to control, and you find out how big is the impact on strength for doing this intervention in terms of its efficacy. Now you could still ask the same question and look at the effectiveness on strength. But what you're doing is you're then taking that intervention outside of that tightly controlled environment and you're employing out in the real world. You can still look same outcome measures, but what you're seeing is whether or not the magnitude of that

outcome when looked at under tightly controlled context whether that translates to a similar magnitude out in the real world. So it does that efficacy translate to effectiveness.

Lawrence: It's almost in your interest to have lots of confounding variables when trying to look effectiveness. Because just trying to understand how a particular protocol is going to apply out in the real world, right. So you almost encourage that. Am I right in my understanding of that?

James: Yeah, yeah, well. Encourage is maybe a little strong. Another way of looking at it is in terms, people may or may not be familiar, is the idea of maximizing internal versus external validity. I think we've sometimes use the phrase ecological validity. When you maximize internal validity, you're trying remove as many compounding variables, if not, all of them. So you can just understand the impact of the independent variable, the thing that you're manipulating. The thing that you are interested in. Whereas, when you're maximizing external validity or ecological validity, you want all of those. You want to see whether or not the effect is still there even when there's all of this other confounding variables impacting it.

Lawrence: Right, right, right. So let me just make sure I understand this. Okay, so you've got a group, one that's looking at efficacy is tightly controlled lab almost conditions. You're controlling all the variables. You've got a control group, and then you measure that the outcome for strength does improve by x protocol. But you then carry out the same kind of thing but in an

environment with less controls, and you just basically looking for if, by using all proper analysis after the fact, you see the same effect then you know that that intervention of efficacy is also effective.

James: Exactly, yeah. Yeah. Absolutely.

Lawrence: I did not articulate that anywhere near as you did but I'm trying to understand it for myself.

James: No, no, no, that was good summary.

Lawrence: Okay. Just curious, I want to dig into this paper for a moment if it's ideal time to do so, your paper Effective Exercise Referral Schemes is that one unless you are on a roll there and you wanted to continue your line of thinking.

James: No, no, no. We move on to talking about that.

Lawrence: Okay. So I have a question, the exercise referral schemes, when you kind of described how they kind of work and where they sort of come from, but what are they actually look like on practice. I mean you said in the paper, obviously this came from an enormous national referral database where there were 23,731 participants. But what are these, what are they telling to do? I know there is a lot of heterogeneity in terms that they're all different and you don't actually know what they were specifically. But what is your

feeling like what do you think the types of schemes were actually, what were the actual exercise recommendations and things?

James: Yeah. That's a great question. I guess just to quickly sort of like explain the purpose of that. Within that paper, we focus on the question very broadly of, "Do we broadly see that people going to exercise referral schemes improve their health outcomes to a meaningful degree?" We didn't ask which types of exercise referral schemes work best. What we found was that there was as a lot of differences between schemes. We had 13 different schemes, as you say, with nearly 24,000 patients going through there for a number of years. We found that when look at the… We use a technique called Individual Patient Data Meta-Analysis. Not to confuse anyone, but when people think of meta-analysis they often think of taking the results of other studies and then calling them together to draw a general conclusion. And that's exactly what meta-analysis most commonly useful, but really it's just a statistical technique. It can be use for data from within one study as much as it can be used to collate data from other studies. All that really is it's a form of what we called Multi-Level Statistical Model. And so in this scheme, because we knew that we have lots of different schemes and we didn't know what they were doing, we assumed that there will probably be a lot of variations between the schemes and so we use this technique to draw an overall conclusion as to broadly what effect that they are having. But as I said, different schemes are having greater or lesser effects than other schemes. And if you look at some of

the forest plots in the paper, you'll see that the estimates of the effect of all of these schemes are all over the place. There's a lot of variation in them.

Now, this is interesting because we did… I should know that this database is also being use for one my PhD student's research who's recently graduated, that's Dr. Nikita Rowley who has been focusing on the physical activity levels as an outcome from this data. She's recently have that paper accepted as well and that will be published shortly. But one of the things that we or she decided to do retrospectively was in this data we didn't, like I said, have information on what the schemes are doing. So to answer your question we didn't know what they were doing. We suspected that because most exercise referral schemes purely just based on our experience and having Nikita work for a number of years with various exercise referral schemes. Most of them are a standard kind of mixture of resistance training in cardio done in a larger center or gym base setting normally under supervision whether that's for the entirety of the intervention, or whether it's that provided with the program and then they could do it themselves can vary. But we thought it would be more prudent to actually ask the schemes themselves that question. And so we were able to go back and ask some of these schemes, what are they actually doing. We use a standard template for reporting of exercise interventions such as used in research called The Consensus on Exercise Reporting Template, and we formulated a series of questions based upon that template to find out exactly what the scheme are doing. We got that paper under preparation at the moment. Not all of the schemes responded. In

fact, some of the schemes that we didn't actually have data on responded to the survey as well. So we got a slightly wider one. Hang on, I'm going to quickly open the paper because I sort of forget exactly how many schemes we manage to survey. It was around 30 to 40 schemes across the UK. Actually a caveat as well, we actually have no idea how many exercise referral schemes exist across the UK. The latest estimate, although there's no indication of where they came up with that number, is almost around 500 or so schemes across the UK. So 30-40 is probably just shy of 10% or so of schemes across the UK. But, it pretty much confirmed our conclusions that or our assumptions that most of these schemes are just employing the general bog-standard kind of ACSM three sets of 10 type. Resistance training intervention, they're doing some low intensity, low to moderate intensity of effort cardio type training whether that's on a treadmill or a bike or whatever. And they delivered and implemented in a variety of different manners as well. So some of them were implemented by those individuals who have specific exercise referral qualification, other are not, some include additional behaviour change techniques alongside the implementation of the intervention itself to try in maximize. It might be something as simple as goal setting.

But what we found was that there's seems to be quite a variety of ways in which this schemes are being delivered. But one thing that stuck out to me was that we also ask them, "What's the typical kind of intensity of effort that they employ." Most of these schemes are very kind of low intensity of effort, so they're not particularly using… They don't necessarily

collect it but retrospectively when they are reporting it, they seem to be sub optimal to what we would expect based upon the efficacy research. And so, you know, this almost comes back on full circle. We have this evidence that the effectiveness of the interventions of exercise referral schemes doesn't seem to be particularly impressive, but, that might be because of the way which they are being implemented.

Lawrence: Interesting. Do you know what, you just made me think of a message I had from I think it was Skyler or Bryce a while back and they said, they made a joke they said, "To be or not to be", in relation to 2B muscle fibers. I thought you might appreciate that you maybe think of that when you said that they were using a low moderate intensity. I'm sure you probably agree that their outcome will be much better if they're able to train with a high degree of effort and actually fatigue those higher order motor unites. But that's a whole another conversation that we've spoke on at length at another podcast. So this study which I would just read out the title here so people can find it in the show notes. It is called Effect of Exercise Referral Schemes upon Health and Well-being: Initial Observational Insights Using Individual Patient Data Meta-analysis from the National Referral Database. We'll link that up.

You already mentioned this about the results although there were statistically significant changes in things like BMI, systolic blood pressure, mental health and well-being outcomes, resting hear rate. They weren't really meaningful degrees of improvement. Now one of the things I just

want to ask you about is at the start the of the Results it says, "Estimates (95% CIs)", is that confidence interval? Is that what that means?

James: Yeah, that's correct.

Lawrence: What does that mean? Is that the accuracy based on the measurement method you used. Could you just explain it because I really don't understand that?

James: Technically speaking, the technical definition of a confidence interval or 95% in this specific example, it's based upon the idea of frequencies statistical paradigm where you consider probability to be a long run frequency essentially. So in a similar way to a p value, a 95% confidence interval, essentially tells you that if you were to run this study for example. So randomly sample, a number of exercise referral schemes, and calculate and then do the same analysis and come up with an estimate. If you were to do that say a hundred times for example, then 95% of the confidence intervals that you produced would be likely to include the true population estimate that you're trying to get. I guess to expand them a little bit more, part of the reason for using statistics in this studies is because we're trying to draw an inference about something that could not be necessary observed for ourselves. So when we say right the estimate for example for changed in body mass index was a reduction in body mass of -0.55kg/m^2 with a confidence interval of -0.69 to -0.41. What we are saying is that we have a sample of data but we're trying to draw an

inference as to what we think the actual mean change in BMI would be in the larger population from which that sample is drawn. In this case everyone undergoing every exercise referral scheme in the UK would be what we are trying to estimate with our sample. And it is exactly the same in the studies that we do. We run a study with 50 individuals and what we're doing is we're using the data from that study to draw an inference about what we think the effect is in the larger population if we are able to actually measure in that population.

Lawrence: Got it. Okay, cool. One thing you sort of started talking about there before I jumped over that question, was you were talking about, you kind of say, "We don't know if the exercise referral schemes don't work or that they're being implemented incorrectly." Can you expand on that, like, what does that mean by being implemented incorrectly? Maybe there's a set protocol but they're not delivering it as prescribed. Is that kind of what you're suggesting there and maybe there's more with the system that it is the protocol, service delivery using your terminology?

James: You are a seasoned podcaster there now, Lawrence. You really draw me back into the final point.

Lawrence: That was accidental.

James: Absolutely. For the listeners, when I suggested this to Lawrence I said we should talk about efficacy and effectiveness but also implementation. One

of things I mentioned very early on was this idea of fidelity and really all that's talking about is whether or not be the thing… So in this context like I say you come up with a protocol that you want to deliver and that protocol can be as fine grained as I want people to do this many sets, this many reps, go to failure or whatever. It can be very specific around the parameters around the exercise itself or it can include other elements. It has to include this kind of behavior changed technique or has be delivered by this type of person with these qualifications, or it has to be delivered to this specific population and so the protocol will include the interventions only be implemented to people who are currently classified as an inactive for example. When we talk about the fidelity of an intervention which is an important thing to consider because that might be something that is impacting the effectiveness when we evaluate it. We're talking about whether or not the intervention is actually being delivered and implemented as it was intended. So with respect to the exercise referral schemes, when you look at the National Institute for Health and Clinical Excellence guidelines in the UK, they are, one they are very vague. But there are a couple of things they are quite specific about with respect to exercise referral schemes and that is with respect to who they should be delivered to. The recommendations from NICE are that they should be delivered to individuals with existing, pre-existing long term health conditions and so that is something that those needs to be adhere to. People don't typically get recommended or referred to an exercise referral scheme if they don't have those. But they are also supposed to be delivered to those who are currently inactive because the limited evidence

that existed when those guidelines were put together were that if you give an exercise referral scheme to someone who is already pretty active it doesn't have much of an effect which kind of makes sense. The best efficacy thing to be, actually in this case it was effectiveness. The effectiveness seems to come from giving exercise referral schemes to people who are currently inactive. And this is in the paper, I mentioned that recently accepted, we also look at the physical activity levels of individuals undergoing this exercise referral schemes. We look at their activity levels at the beginning of the scheme and we also looked at how much the activity level changed as a result with the scheme. The most interesting findings for us was that the majority of individuals beginning the exercise referral schemes were already classified based on the physical activity guidelines as being moderately active. And so that could be one reason why we're not seeing meaningful improvements in health and well-being outcomes because the individuals, the protocol, the prescription that it says that this scheme should be limited to people who are currently inactive is not being followed to high enough fidelity. People are being referred to the schemes are already active and this then gets why does of particular discussion around these type of schemes. There's always been talking, I remember hearing it years ago, that people would pretend to be inactive to get a free gym membership by joining a exercise referral scheme. The wider point then comes around to this idea of implementation science. Implementation research is kind of the next step from effectiveness research. Actually, there's been more of a push now to try and combine effectiveness and implementation research together to be

a bit more kind of efficient in this type of work. So thinking about the kind of research translational pathway, you start of well actually even before that you might start off with kind of mechanistic studies looking at and say, "Does this exercise intervention impact this particular pathway that's responsible for, I don't know, those regulations. Oh, looks like this scheme, this type of intervention has an impact on this. Okay, right. Well, now we want to do an efficacy trial and see whether or not delivering that intervention in a very internally valid study with tight controls actually reduces blood glucose or improves insulins sensitivity or whatever. Okay, we find out the intervention works. It produces those benefits. But now we want to know whether or not if we take that exercise protocol and deliver it as part of the Type 2 diabetes exercise program out in the local clinics whether or not we're still be able to see the magnitude improvements in glucose regulation or [unclear – 01:05:11], or whatever, or HbA1c. Whether or not we can translate that out. So you do that trial and maybe you find out that it seems as though the effects on anyone near is good as we would hope they would be based on the efficacy of the intervention. And so the question becomes we know it works if people do it, so now we do is we have to figure out different ways of packaging it and different ways implementing it. And maybe whether or not we need to implement it with additional add-ons to the intervention in the form of behavior change technique and things like that to try and maximize the fidelity of that intervention. But even before that, before you decide what those things are, you might want to do some kind of process evaluation to find out, "Okay, what elements of the intervention weren't being delivered to the

degree of fidelity that we would expect based on what we've decided. And this is where, in one of the papers I sent over they talked a lot about evaluation frameworks. These are frameworks for trying to understand how interventions have been implemented out in the real world, so you've got things like the Consolidated Framework for Implementation Research, frameworks like one that I'm particularly fond of and we used a lot is the RE-AIM Framework which looks at various different aspects of intervention delivery. RE-AIM for example looks at the reach of the intervention. I mean, how many people within the target population that you're trying to deliver to is actually reaching the effectiveness of it, so measuring whether or not it's translating that efficacy into effectiveness, looking at the adoption of it. You might prescribed it to or recommend it to individuals that how many then are actually do adopt that intervention and start doing it. You then got the implementation elements of it so that might be adherence, it might be various things, the intervention being delivered by training staff for example. Then, are they actually, you might design the intervention, give it to the trainers and then they go away and deliver it, are they actually delivering it? Is that intervention that you designed being translated and does it reach the end user in the way you intended it if it goes through to these different steps.

There are all these different areas where the interventions can leak effectiveness I guess is one way of putting it. Unless we kind of evaluating and measuring them we don't really know where we should start to try different things to improve the language we implement in those

interventions. But once we have figured that out, “Okay, well, maybe it seems as though for some reason people are adhering to the intervention or it seems just though you know some people… my trainers, the participants don’t the intensity of effort required, and my trainers aren’t encouraging them enough that is important. And so they are letting intensity of effort slip. How do we then address that? We then come on to the implementation questions which is essentially no different than questions about efficacy or effectiveness. We can design different implementation interventions to then compared to another. So for example, in facilities you could decide to have a go delivering an intervention but manipulating the way in which you implement it. In this case, you could even for example try your own randomize control trial. And companies do this all the time in the form of tests like A, B testing. They’ll tweak a slight different thing on their website and of course it’s a bit different thing because if you got hundreds of thousands of clicks that’s coming through you can very quickly do a very highly statistically powered randomize control trial where you randomize how to receive this header in this message, and how to receive a different header in this message, or this picture of Lawrence smiling, or this picture of Lawrence with sunglasses.

Lawrence: Both will get no clicks.

James: But the point is you can effectively do that research yourself. You can ask those questions and you can employ as simple randomize design to try

and maximize the implementation. And when it comes to the implementation question, although it's useful to have a measure of the effectiveness to see what impact those implementation approach is having on effectiveness ultimately as well. It may be you also want to know whether or not they're impacting the things that you think are affecting effectiveness. if you think that adherence or whatever is the thing that's leaking the effectiveness in your implementation of a particular intervention. Then you want to know whether or not the thing that you're doing to try and implement and improve adherence is actually doing that or not, and then therefore translating in to greater effectiveness. Because you might find that, you manipulate, you do a slightly different way of implementing your intervention and you notice that effectiveness doesn't change. Well, is that because adherence didn't improve or is it because adherence did improve, and it turns out that actually adherence isn't the thing that's important. Unless you're measuring these things. You're not really able to come to evidence in forms conclusions about what's affecting what.

Lawrence: Yeah, absolutely. Do you know I was going to ask you questions to try and figure out how the implementation science would apply to HIT business but you just answer that all for me. I think, there's a common saying. I think it's a Peter Drucker quote, "You can't manage what you don't measure." You know, Luke's popular if you are talking about rifle shots which is a concept from Jim Collins who wrote Good to Great, Built to Last, and many other books. Basically the concept is kind of related to

what he saying, you take a rifle shot which is you want to test the change in your business to improve certain outcome like a marketing change, or retention, or fill in the blank. You test it on a very small low cost low risk basis, so the idea being a rifle being a small instrument of warfare. I think the example in his book is he's aiming, he's on one ship aiming another ship and they want to launch all their canons at the ship, but in order to calibrate- obviously make that, shoot all these canons is highly costly and they'll have to reload. If they get it wrong, it could be very vulnerable. It's a really long winded analogy, but then the idea is if you have to shoot a rifle and you calibrate that, then and when you lined it all up, then when it comes to launching all canons that you've already figure out how to calibrate them optimally and it is low risk because it's a rifle. That was terribly explained analogy, but hopefully it makes sense. I'll point people to the original article. And if you're interested in HIT Business Membership, Luke actually describes his entire strategy around rifle shots for testing changes in his business with low risk, so there you go. Sorry, you go ahead.

James: Yeah, no. I was just going to that was a good analogy. Actually, I like that. I guess there's probably one last thing to add which if people are going to, for all intents and purposes do their own research, is that one question you need to ask yourself is, "What is meaningful to me? What is meaningful to my clients? What is the smallest effect that I would be interested in? What's the smallest effect that I would care about? What's the smallest effect where anything less than that for all intents and

purposes I consider to be no effect whatsoever?" This is a really important question to ask because you need to know that before you can really evaluate whether or not the results that you've got are big enough to care about. This is something that is not even done in research you know. Our field of exercise science as a whole is terrible at this. We've been terrible in the past. If you ask me now whether or not any of the studies that are currently existing literature measuring hypertrophy reflects meaningful improvements in muscle size. I don't think anyone could answer that question. No one knows whether or not a change of 1mm of muscle thickness translate to something that anyone would care about. So when it comes to deciding on what outcomes you want to measure also think yourself how big does the effect for me to give a shit at that way.

Lawrence: Well said. James, just aware of time can you run over. What is your hard stop on your side?

James: No, I'm pretty good. My wife will be home shortly but she knows that we are chatting.

Lawrence: Okay, cool. Good to hear. Alright, so just thinking where we can go from here. Do you know what, I did have some questions if you don't mind backtracking for a moment to your paper about referral schemes.

James: Sure.

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Lawrence: There's a couple of things I wanted to mention. Let's see here. Yeah, there's this one. One of the findings in the Discussion section of the paper, you talked about how with regard to systolic blood pressure you had significant improvement. I don't know if this is meaningful. Maybe you can clarify, with isometric exercise which produce far larger reductions in systolic blood pressure. I thought that is quite interesting. Is that interesting enough that you could actually infer anything from that as isometric exercise being an interesting protocol as more effective in this context? Do you know the one I am referring to?

James: Yeah, absolutely. Just for clarity in that paragraph we talked about the results on systolic blood pressure. I think if you go to Figure 3, we have a forest plot of the results of systolic blood pressure. For those of you reading along…

Lawrence: They are all reading along.

James: For those who are unfamiliar with what a forest plot is, so this would be very familiar for anyone who's looked at a meta-analysis where they've looked a second re-analysis of studies. Normally, you would see on the x-axis you've got, in this case each exercise referral scheme that was looked at. You've got the sample size of referral schemes there as well so you can see some of them are quite big, some of them are quite small, or at least the data available was more or less depending upon the scheme. And then, on the y-axis at the bottom, you've got the change in systolic blood pressure. So this is how much it changed from pre to post scheme.

You've then got little square boxes with lines in either side of them. Those are the estimates for the change in blood pressure from each of the schemes individually along with the 95% confidence intervals as I mentioned earlier. And you can see them on the right hand side in text as well. And then at the bottom, you've got that diamond shape. Now the middle of the diamond shape is essentially the overall estimate from all of these schemes using this random effectiveness analysis model which takes into account the fact that all of these schemes are essentially a random selection of exercise referral schemes from all of the schemes that could possibly exist. They probably all differ in various different ways and so it takes into account that heterogeneity.

In the model itself, you can see that some of the squares are actually slightly different sizes. Some of them are smaller, some of them are bigger. Depending upon how variable within those schemes the effects were that estimate gets more or less weight in the overall statistical models. So if it's a big square then it means that we've got more weight to the estimate from that one. For example, if you look at the very bottom scheme 5056, it had the largest number of participants in the scheme and so it had a very precise estimate. The confidence interval is very narrow compared to say, 5063, which only had 7 people in. I think it was quite a new scheme when the database started.

Anyway, the diamond at the bottom, the length of the diamond essentially corresponds to the confidence interval so the overall estimate, and the

middle of the diamond is the main value essentially. But what we've got on the graph as well is we've got these two red dashed vertical lines. The reason they are on there is because we start doing our analysis we ask ourselves the question of how big a change in systolic blood pressure we need to see to give a shit about it essentially. Because we were interested in whether or not we got meaningful changes, we determined what would be considered a minimal clinically important change in that outcome. Well, for all of the outcomes that we were able to go back into the literature and see whether or not they were either accepted and kind of thresholds for what would be considered a meaningful change, or whether there were studies that anchored it other outcomes. For example, some studies look at proxy measures but then they anchor them to the measure that they are really interested in to see. And how big a change in the proxy do you need to see before you start seeing changes in the thing you are really interested in. And so what you can see with, systolic blood pressure was actually one of the variables that did change. That was almost big enough for us to care about. What we saw was that the confidence intervals for our estimate ever so slightly nudge into the what we call the null intervals. So between those red lines, for instance, perhaps they are saying that it's no difference than zero really. What we did conclude is we said, look, there might be meaningful in systolic blood pressure because our estimate includes these null effects as well. We are not going to pin our hat on that and be completely confident.

But anyway, in that section of the Discussion we obviously compared the findings that we had to other studies that had looked the effects of exercise more generally on systolic blood pressure. Studies that previously looked at exercise referral schemes similarly to this had found similarly small effects. But one type of exercise which there is actually very good evidence at least in terms of efficacy with respect to reductions in systolic blood pressure is isometric exercise. There are studies looking at grip strengthening. There are studies looking at my favorite exercise, the wall sit, that have found much bigger reductions in blood pressure compared to just exercise generally whether that's endurance exercise or dynamic resistance exercise and obviously meaningful changes as well. You could even argue meaningfully more than the changes seen in other interventions. So yeah, isometric exercise. And there's actually good evidence from meta-analysis on this looking at the efficacy of isometric exercise for reductions in systolic blood pressure.

Lawrence: Cool, okay. Awesome. Alright, so let me just see what else I had.

James: I suppose it is worth quickly saying as well though we do still lack effectiveness data on that. There's not that many people doing isometric exercise.

Lawrence: What was the end of the study, the end of the Discussion bit, there is the acronym ESES. What does that stand for again?

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James: Oh, that was the Exercise Self Efficacy Scale. I think there was… if I'm remembering rightly…

Lawrence: That was improved, yeah. Sorry, go on.

James: Yeah. This is the interesting thing that we've found. We are now trying to… It's a big task but we are trying to get a standardize set of outcome measures for reporting for exercise referral schemes across the UK. Because in this database we just had data available on whatever the scheme has collected. It's just so happen why the schemes collected this outcome for some reason. Really, it's a scale that measures people's efficacy to engage in exercise, but that improved as a result of it. But we never really know whether that's meaningful or not because there's not a lot of evidence on that scale particularly.

Lawrence: Cool. I'm going to ask you to probably prognosticate a little bit here and speculate which I know you hate to do, but I'm going to put you in that position anyway. Obviously, your work you did here and the other paper we've touched on which is Implementing Exercise in Healthcare Settings: The Potential of Implementation Science which is actually fascinating and relates back to what we were talking about regard to how you might implement a change in your HIT studio business for example and see if that change is meaningful. I'll link that paper up in the show notes.

I'm interested, James, on what you think might be the protocol that we finally get to maybe in 5 years, maybe in 10 years, as the one that is effective for the general population. Do you have an ideas based on what research we have done what that might look like and what we might end up rolling out nationally in the UK?

James: That is a tough question. Because I guess you could refine that question a little bit more or even break it into multiple questions whether or not you're asking about specific implementation of interventions within particular setting. For example, in healthcare settings where exercise is delivered, they employ a particular resistance training protocol or whatever. And then you've also got the question of that exercise and physical activity recommendations more generally like the Chief Medical Officers' Physical Activity Guidelines for the UK. I think surely because there is more control we are more likely to be able to influence change and effectively implement things in particular setting as opposed to on a population level.

On the population level that's very difficult particularly when it comes down to essentially making recommendations because you can't necessarily deliver the exercise to everyone. You mentioned right at the beginning, I'm currently involved in the Expert Working Group that are working on what the communication structure is going to be within the UK for the Physical Activity Guidelines. We're still trying to figure out what evidence is available regarding the effectiveness of different interventions around messaging and communication to influence people's awareness,

people's knowledge, and also the thing that people really care about which is whether or not their behavior actually changes.

But in the healthcare settings, I don't necessarily know whether or not the intervention specifics itself are going to be the important thing here. I think the main barriers are structural and systems and what stakeholders there are. Ultimately, what you have to do is you have to influence the stakeholders and decision makers when it comes to implementing anything. Coming back around full circle again you have to have some evidence that you can demonstrate effectiveness before you can then even persuade a decision maker or key stakeholder to then have a go implementing the thing that you're selling essentially. And then what you have to do, and this is something that we try and do obviously a process that we use at Ukactive, which is to say we often start off by working with organizations whether that's public organization or private organizations and we are looking at interventions, we often start off with pilot studies. Almost similar to as you were talking about with the rifle analogy, we'll try something on a small scale to give us an idea of whether it looks like going to work or not. And also get a feel for how feasible it is to actually deliver in that setting before then deciding whether or not it is worthwhile trying to scale up and implement it. If we do get to that stage, then one of the things that we always encourage is the implementation alongside or the embedding alongside any kind of implementation of the relevant data capture, so as you go along you can evaluate whether or not it's having the effects that you are interested in and make decisions as you go, as to

whether or not you should continue, whether or not you should scale up further, etc.

It's a difficult question as to what specific intervention is going to be. I think you are hoping I'm going to say is like, "Yeah, in 5 years' time it's going to be doing HIT training and so forth."

Lawrence: Two workouts a week, one set to failure.

James: I could tell you categorically that is not what it's going to be. Although having said that, there may be some individual organizations or even public health organization that may start to use that. A good example is the Prehab4Cancer program. They are essentially using single set protocols, progressively working toward single sets to failure using full body workout. And that is being implemented with every cancer patient undergoing electrosurgery in Greater Manchester at the moment or at least the funding for the service delivery lasts. But if it shows outcomes, the things that we're… We're actually with that study going to be looking at primary outcomes like recovery after surgery and also looking at survival rates as well. We are going to look at hard outcomes using the available health records to see whether or not the people getting this prehab program are they actually more to survive surgery, are they more likely to recover more quickly and to a greater degree afterwards, and so on. I can tell you now the reason that that happened is partly fortuitous because I happened to be the individual who got talking with the people

involved in that project and they got me onboard. It probably would have been a completely different intervention if someone else had been involved.

Lawrence: Good. Well, I'm glad you are involved in that. It's interesting to hear about that and it's great to hear. I know someone here in Galway actually who is a professor of oncology and he is also doing some research around using high intensity training potentially combined with intermittent fasting protocols to see how they would help with patients going through chemo. He hasn't yet actually started doing anything in terms of the strength training side of things. He's been doing mostly the intermittent fasting which I think is inspired by Valter Longo's work and his product. I don't know if you are familiar, James, he's got this food product that's based on his fasting protocol. And so he is doing stuff on that which is cool. Maybe at some point when it makes sense I might connect you two. Maybe there's some collaboration opportunities there. He is one of this people who is kind of come across Body by Science and become a recent convert to HIT and just super passionate about as many people do become.

Final question for you, James, before we wrap up. I can't do a podcast with you and not ask you about your current training regimen. I mean, that's just a staple isn't it for every podcast we do. You know what made me laugh, I've been talking to Luke a lot lately. In fact, I've been talking to talk a lot over the last couple of years because we have so much work

together and I'm really grateful. He obviously always is taking the mick at you for training with bodyweight and not using the wonderful machines and the MedX stuff you've got at Solent as much. He said to me the other day, he saw that you had your chin up bar and your dip station outdoors in your back garden. He was like, "James, what are you doing?" Obviously, now, with all the stuff that's going on with this pandemic DS have transitioned completely to virtual training and now they are all massive advocates of virtual personal training and using bodyweight and whatever is available. Now he is like a total convert which is hilarious. Now that he didn't understand obviously that you would get just as good results probably training with bodyweight before but he just loves his machines. So tell me, I've been enjoying some of your Instagram videos of your quarantine workout. Do you want to run us through what you've been doing lately?

James: Yeah, sure. I must say, Lawrence, I laugh with James Fisher about this. I said, "You know, if there is anything about this quarantine, I feel so seen." Everyone is on the bodyweight bandwagon at the moment. I was 10 years ahead of the game.

Lawrence: That you were. Go on. Yeah, go ahead.

James: Actually, yeah, I'm quite fortunate actually because last year I was actually for a period of maybe 6-8 months I was training in facilities quite regularly partly because I had a free gym membership as a result with my employment in Ukactive. And so once a week with a colleague at Ukactive

who recently got into doing more high intensity strength training, I was training with him once a week at a facility in London. It was a Fitness First facility.

Lawrence: Which one? There's a lot.

James: [unclear – 1:34:50]

Lawrence: Oh yeah, I used to train at that one.

James: Really?

Lawrence: Yeah, right by the crossroads right by the station. I used to work at a firm called Claranet who are like an IT service provider right near the station and I'd train at that Fitness First… I was doing HIT then so like couple of times a week.

James: I mean it wasn't bad. It was a small facility, and as London it gets super busy. We'd always try and get in there just before the lunch time rush. I was doing that and I also had a free membership at Places for People Leisure here in Camberley as a result of Dr. Steve Mann who was on the Death by Efficacy paper. He was the previous Research Director at Ukactive and then went to work at [unclear – 1:35:44] so he hooked me up with that. But in the space of a month, of course I also had obviously access to the gym at Solent, and then in the space of a month we lost our

memberships as a result in changes in some policies, changes in some memberships at Ukactive, so I no longer had access to the Fitness First for free, mind you. Also there's friends and family policy at Places changed so I no longer had access to that. And then obviously, Solent, has now opened in the last year a big new sports complex. And so the gym that we used to have as part of our labs has been got rid of and now we've got three brand new gyms which are very well, they are really nice, but they are in a specific sports complex and they are not openly accessible.

Lawrence: Please tell me you still have the MedX, right?

James: Yeah. That's all been moved into we've now got like a specific muscular skeletal testing lab where all the dynamometers are. Obviously, they were testing devices as well as exercise devices so they've been kept in the lab.

Lawrence: Can I come over and play at some point? Is that a possibility?

James: Yeah, absolutely. Of course you can. Do you know what, when they got moved I got a bit worried because obviously the lumbar extension is my baby. As much I don't really do any research on it right at this moment, I did have a PhD student who actually graduated the past last week, so [unclear – 1:37:2] has been doing his PhD research on the effects of lumbar extensive fatigue on hamstring injury risk. But when they moved it,

there was a few things I didn't quite put back together correctly and so I got absolutely covered in grease trying to take it apart and put it back together properly.

Anyway, long story short, was that I lost access to all these gyms. After spending 6-8 months actually getting back into training in facilities a little bit more regularly I suddenly have to go back to training at home. We bought a new place a couple of years ago. I think I told you the last time we spoke I made the mistake of not checking all of the door frames to see if they fit in there.

Lawrence: Which is obviously key criteria for any house purchase.

James: Yeah. I don't know how I missed that, but anyhow I missed it. I said myself, "That's it. I'm going to build a pull up bar and dip station in the back garden." Last summer I got some four-inch fence post, and some iron bars, and some non-slip outdoor fence tape, bags of concrete and put it together myself. To be fair it's been really nice to train out. Actually, even getting out and training in the rain, there is kind of a rocky element to it. It feels quite good. I must say, actually I trained outside all through the winter. As it starting to get warmer now I'm actually missing training outside in the winter. Training in the winter was really nice when it was nice and cool outside. It's like much better being in an air-conditioned facility. I must have to pick up a few extra bits and bobs as well. I may actually get hold of when they were clearing out the old gym… I don't know if you

remember we have a rack of rubberized dumbbells. They sold off all the equipment but there were some bits that didn't get taken. And so there was a pair of 27.5 kilo dumbbells that were left on, I wrap them and took them home. I picked up a belt with a chain so I could use those dumbbells for weighted dips or weighted pull ups if I felt like it. And then, I obviously got the suspension trainer for doing bodyweight rows. I have that years anyway. Actually in the last two weeks I actually pick up a set of old rusty iron plates and a couple of EZ bar and bits and bobs just to do some curls for the variety. Not that I need it or care about it, but hey, if you got it why not.

Lawrence: I thought you are going to say curls for the girls then.

James: Well, that's it for the grand. I mean, I was previously up until quarantine I was doing training twice a week. I was doing an A, B, routine, very similar to what I was previously doing when I was bodyweight training almost exclusively. The reason for that is I was also playing basketball once a week and I was still doing a little bit of strength training as well. But now, I'm actually training doing three sessions a week at the moment and have been since the lockdown started just partly to keep myself sane at the moment I was being locked in.

James: You find recovery fine with that?

Lawrence: Yeah. Not too bad actually. I had actually in the last couple of weeks I've done a couple of 5K runs because someone nominated me to do it for this charity run thing on Instagram. So I was like, yeah, why not. I don't think I've run a 5K for probably 15 years or at least not when I try to run it fast. Of course, I have no idea on the pacing so I've set off way too quickly and destroyed myself. But it was quite good and as the weather had been nice I thought, last week I went into another one.

I've actually got very much the same. I've got two bodyweight workouts sort of Monday, Wednesday, normally two or three days apart; which is exactly the same as I used to be, so push ups, pull ups, supinated wall sit and bodyweight squats, dips, bodyweight rows, and then I do isometric abduction/adduction, and plank into like McGill crunch.

Lawrence: So you do isometric with like a band for abduction?

James: Yeah, no, it's actually just a belt.

Lawrence: Belt, of course it is.

James: Like canvas belts. I think it came with a pair of shorts that I bought so the belt was hideous, so I just tuck it in my drawer with other workout paraphernalia.

Lawrence: What do you used for isometric adduction? Do you just have like a squeeze ball or a mat or something in between your thighs?

James: I actually got a foam roller which is a nice kind of, because it is quite long as well. It's quite nice because you can have it sort of like down in between your shanks and sort of push.

Lawrence: Why I laugh at that, you used the word shanks I think is what got me going. Sorry, what's the McGill crunch? What is that?

James: I think we have talked about it before.

Lawrence: Yeah, I forget.

James: You normally have one leg raised at a 45° angle and have your other leg out straight, and then you normally support your lower back with your hands. It's a very small range of motion and you are just literally curling from the torso. I mean, if you Google it you'll see it. You'll probably find some videos of it. I think it's called the McGill crunch because it comes from Stuart McGill.

Lawrence: Yeah. Let me ask you about an exercise quickly and then we'll wrap up. Obviously, I'm loving what Discover Strength is doing right now, the virtual training. I had a workout with Xavier Robinson who destroyed me virtually and it was amazing. I just never would have thought that I could get such improvements in my workout in this context being supervised, but I definitely did. Actually, he didn't know me doing it during this workout. I

did it self-supervised afterwards in like a B routine. It was a plate touch. So you have your feet up on a chair, I mean like a push up position, and you have a plate or could be any object on the floor sort of downwards you are facing on the floor there. And then you are just alternating your hands in touching the plate and your just sort of swaying your hips to left to right. Does that make sense? Are you getting where I'm coming from visually?

James: I'm trying to visualize it so hang on. I'll describe it again, so you are lying on your back.

Lawrence: No, no. You are in a push up positon but your feet raised on like a chair or something like that, and then you've got an object on the floor which is directly between your shoulders so if you face down it's right there. Basically, what you are doing is you're alternating touching the object with each hand. To do that you have to basically balance your entire bodyweight on one hand as you alternate, and so lots of your different muscles are in play in terms of keeping you stable as you touch the object. It's quite a nice post exhaust once you've done quite a lot of push ups or triceps work and things like that. I think that's how they use it in their programming. I'm guessing you haven't probably done that exercise before or know much about it. I was just curious if you did, if you knew what muscles would be mainly involved in that type of exercise?

James: Well, I mean, it seems like essentially a variant of a plank.

Lawrence: Yeah.

James: I mean, it's as you say there, there's going to be a lot of "core" stabilizers involved in maintaining that trunk posture. Obviously, if you are putting your weight through one arm unilaterally and your center of axis is offset from that there is going to be kind of stabilizes around your shoulder working as well. I think I have said before, I'm way more open than some of the kind of old school HIT advocates nowadays. Because I speculate that having a little bit of variety is probably good on a grand scale for translating effectiveness because people are more likely to do it, so somebody is more interesting.

Lawrence: Bring it back.

James: A little bit of novelty and variety. Not everyone is a robot like me and able to do the same exercises for an entire lifetime. He says also, he has recently just added back in some curls and skull crushers just for the fun of it. Having those different exercise and trying out different things, you know, variety is the spice of life for most people. Yeah, no, I mean, I like the idea of that. I don't know if you've seen it. I've been actually doing like muscle up and stuff recently not really as an exercise for "training" but more just because I happen to have a bar out in the garden and I was curious as to whether I could do them or not. I did a couple and it was quite fun so. So I thought, hey, why not do them every now and then.

Lawrence: Awesome. We'll have to do another podcast at some point, James, just about this stuff and just about your training and exercises in general, because I'd love to cycle through some of the popular exercises and talk about your, sort of learn from you in terms of the muscles that are involved to help us all with our own programming. Maybe we'll do that at some point. I just wanted to say thank you so much for joining me today, mate. This has been really fun and different and informative. Thanks again, I really appreciate it.

For everyone listening, to find the blog post for this episode and download the PDF transcript, please go to highintensitybusiness.com and search for episode 273. Until next time. Thank you very much for listening.