



DANNY LENNON: And we are here. Lachlan Mitchell thank you so much for taking the time to join me on the podcast today, how are you doing?

LACHLAN MITCHELL: I am very well, thanks. Thanks very much for having me.

DANNY LENNON: Yes, I'm interested to have this conversation, because I think as I've mentioned to you over few emails I've really enjoyed some of the work that you have published along with some of your colleagues over the past couple of years, and I think in an area that will be of lot of interest to many of our listeners considering it's been focusing in on natural bodybuilding. Before we get to those papers specifically maybe just to start off could you give the listeners some background on yourself both academically up to the kind of position where you now are, and then really where the interest in looking at bodybuilding is all to.

LACHLAN MITCHELL: Okay. Yeah, so by education I am a dietician and exercise and sports scientist. I studied at the University of Sydney where I am at, at the moment conducting my research. As part of my Ph.D. I took part in this research looking at natural bodybuilders and looking at their training and dietary practices. At the point where I am at now where I've actually submitted my final emendations for my thesis that why fingers crossed that it all gets passed in the next

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week or two. In terms of how I got into this type of stuff I never really had much of an interest in bodybuilding as a practitioner myself. I come from a Rugby Union background I sort of fell into it through my supervisor who had some interest in it and she hit me up and said it was I guess a big earning area, you have research based on the level of participation in the general population and there was a bit of a hole in the research area, so we intended to fill that. So, that's how I got into this particular area of research.

DANNY LENNON:

Yeah, and I think that's quite evident when people think of it about number 1 like you say the kind of I suppose explosion in recent years, at least in this part of the world in natural bodybuilding, but I think that kind of goes all over and the kind of growing interest in that area. But also when it comes to actually getting good quality studies in this area there's often left short probably because of the kind of extreme nature of this, and then also trying to get people within those which we can maybe talk about later on. But maybe to start first your recent contest prep paper, so the case study that you published with that case study I think that it was looking at nine competitors. You can kind of fill in details in a moment, but I'm kind of interested maybe you can lay the foundation for people what was the question that you were setting out to answer or what was the real purpose behind doing that particular case study paper?

LACHLAN MITCHELL:

Yeah, so at this point in time there is very little research just describing what bodybuilders do and the subsequent implications of what they do, so their training and their diet practices, and then what those training and diet practices have on their physiology. So, we know that just generally speaking they get big, and then they lean. But what exactly does take place with their body composition, how do their changes affect their physiology, so talking things like metabolic rate, their hormone levels. So, there's very little in that area at this point in time, so there are a few case studies and a few smaller group studies that had been conducted in the past. So, we saw that hole in the research and decided well let's start off by trying to describe what actually take place in drug free bodybuilders during their competition preparation. As you correctly said we recruited nine participants and

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we followed them through a 5 month period, so we followed them for 4 months prior to the competition. We had them in at the lab on a number of occasions taking measures of things like body composition, resting metabolic rate. We took some serum and hormone samples, and then we followed them up to competition then about a month after their contest we did the same assessment. So, we wanted to track the changes that take place during their preparation, and then see how those different measures change once they get past their competition, start to relax a little bit with their training and their diet approach.

DANNY LENNON:

Sure. So, if we kind of look at some of the results that you found, first if we take the contest prep phase itself what were some of the kind of primary changes that you did see?

LACHLAN MITCHELL:

Well, I guess the important one from the bodybuilders' standpoint is that they were successful at losing body fat, which ultimately is one of their primary goals. But probably more importantly was that they were very successful at retaining their muscle mass or their lean mass. So, we measured body composition taking just surface anthropology using skin folds, but we used DEXA primarily to look at muscle mass and fat mass. And from those DEXA assessments we saw that they did lose fat mass, but most important they were able to retain lean mass. Some of them even were able to continue to build muscle mass in that 4-month period leading up to competition which is quite significant as it tends to go against the old idea that you can't build muscle and lose fat at the same period of time. So, that was I guess one of the big take home messages the body composition changes that bodybuilders are very successful in achieving the outcome of losing fat whilst also maintaining or even building muscle mass. Subsequent to that we tended to see a maintenance of resting metabolic rate, so typically what we would have expected to see as they lose body mass through losing fat mass is that their resting metabolic rate would go down and that's as you're probably aware the body's response to that attack on their energy stores. But what we saw was that their resting metabolic rate was more or less maintained along the same level as it was for that whole 16-week, 4 months

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period leading up to the competition. We did see changes in some of the hormone measures, so in particular testosterone level were decreased. Didn't see any changes in leptin which I personally I was quite surprised at in seeing no changes in leptin. I expected to see quite a significant reduction in leptin and that would be based on previous research in general weight loss but also case studies looking at bodybuilders where we did see reductions in leptin, so again that was quite a surprise to see that. So, they were probably the big take home changes in that they were very successful at losing fat mass whilst retaining lean mass and in doing so they were able to maintain their resting metabolic rate just by changes in anabolic hormones, such as testosterone and IGF-1.

DANNY LENNON:

Yeah, super interesting stuff there and maybe we can go through those bit-by-bit. One thing that I'm interested to ask about is kind of getting an idea of the individual data points, because given the fact that we have a scenario here where you are not putting everyone on like the standardized program that they're all kind of doing this exact same contest prep that rather they have kind of each their own approach that they're doing anyway. I'm wondering for example, when you look at those changes in lean body mass whilst you say that pretty much most people had very little lean body mass loss, and in some cases some were able to actually have a small increase. What was the kind of variation in that ability across the dataset if you can remember off hand and were there any other big differences in some of those other measures too?

LACHLAN MITCHELL:

Yeah. I think it's important for the listeners to understand that we didn't prescribe a diet or a training program for the participants to follow. We just let them do their own training program and diet. We just followed what they did and we assessed it. Some of the differences that we did see were that we started our initial assessment 16 weeks out from the competition and we based that on previous individual data points which indicated most bodybuilders' released the bodybuilders' weights bracket to here in Australia used about a 16-week preparation period. We did find though that they were of the nine participants I would say off the top of my head two or

three of them that were already well into their preparation. So, I think one of them had about a 32-week in-season period where they were prepping for their final competition. So, that basically meant they had about another 16 weeks where they already been dieting before we see them which meant some of those individuals were already very lean. So, these guys were starting at about 8% or 9% body fat at the 16-week mark, whereas other who were probably a little bit bigger and had the way their in-season dieting period they were coming in about 12% or 13% off the top of my head. So, we did tend to find were the ones that started already quite lean tended to lose less fat mass, because they didn't have as much fat mass to lose. But they also did tend to lose a little bit more lean mass than the ones who had a more delayed start, so they basically started their dieting at the 16-week mark. So, that's those just to reiterate those that had a longer dietary period in the 16 weeks that we were assessing them they tended to lose a little bit more lean mass and a little bit less fat mass. We also found that there was a bit of variation in their initial body weights when they came into us, so we had guys who were in what we would classify here in Australia as the heavyweight division. So, they were above 90 kilograms we had a couple of guys competing in that division, and then we had a few guys in the lighter weight divisions. So, they were competing at the low 70 kilos and a little bit above 70 kilos. So, those guys who were lighter also tended to lose a little bit more lean mass, whereas those guys who were much bigger we tended to see that they were able to maintain and even build a little bit of lean mass, particularly in that period between 16-week measurement and the 8-week measurement. So, in those first 2 months of us following them they tended to gain a little bit of lean mass. So, from a statistic standpoint they was a significant affect whereby there was a very small reduction in lean mass and a significant reduction in fat mass. But looking more specifically at the individual data points, and I think – at least I tried my best with the figures that we had published, we tried to show the individual data for the participants being a smaller sample size we were able to do that. There was a bit of variation in the actual changes seen between individuals.

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DANNY LENNON:

Yeah, and that's really interesting and I think for – in practice at least, I think this makes maybe a lot of sense to some people listening who would have heard at least anecdotal evidence in recent times coming from some of the let's say more evidence based coaches within natural bodybuilding who are making this case for taking a much longer time than typical for a contest prep with that idea that you can essentially be able to get to your level of desired leanness but perhaps in a way that maintains a bit more muscle mass and you don't have to have as aggressive as a diet for continuous period, and all these other things that we can hypothesize on. But it's interesting now that we're starting to see some data here that kind of clearly shows at least a trend in this case where a longer time point for a contest prep maybe beneficial for overall body composition. The other thing that I was interested like you said there's kind of a finding that might catch a few people by surprise was the failure for leptin to decrease during that fat loss phase. Is there any kind of hypothetical things that you guys had discussed even amongst yourselves of how this could have been the case given that there was quite substantial loss of fat mass and we typically correlate that with there's going to be a decrease in leptin because of diet decrease and energy availability. Is there any hypothesis to explain some of that lack of a change I guess?

LACHLAN MITCHELL:

I guess I can throw out a couple of very easy ones, perhaps a little bit cynical, I mean there's always a potential of laboratory errors in the pathology system itself where we're measuring it. Also I think a smaller sample size that may be diluting some of the effects, but I guess from a scientific hypothesis the actual volume of fat mass loss if we look at that it worked out to be on average about 3.5 kilograms which may not sound a lot but when you've got individuals who only have 7 or 8 kilograms of fat mass in total if they are losing 3.5 kilograms that's a significant amount of fat mass loss. If we were to compare that to say an overweight or obese individual 3.5 kilograms of fat loss it's good, but it's probably not as significant as what they would be looking to achieve. So, the absolute loss of fat mass in terms of only being about 3.5 kilograms perhaps that wasn't enough to see significant reductions in leptin. In terms of the leptin

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values themselves, because they were already quite lean although the leptin values were within the normal range that you'd expect to see they were in the lower end of that range. So, again I think that those two explanations probably would account for that in that the absolute amount of fat mass loss was small, but because they were already at a lower fat mass level the leptin changes wouldn't be all that significant.

DANNY LENNON:

Right. That makes a ton of sense. And like we mentioned previously each of the participants obviously were doing their own training and own kind of dietary approach outside of the study. So, this was more just looking at this from a case study perspective. Was there through other interviews or anything else did you take a look at what those participants were doing and was there some clear things that most people were doing, was there a wide variation in their dietary approaches, was there anything that stood out there if that was something that you kind of collected?

LACHLAN MITCHELL:

Yeah, we did collect 7-day food diaries at each of the testing points, and there are limitations to using a food diary approach but we were very confident given that the bodybuilders were collecting food diaries and the way they're documenting what they were eating, they were weighing all the food that they were eating anyway, so always quite confident that they were accurate. When we analyzed those food diaries I think some of the big take home points were the very high protein intake, the timing distribution of the protein was very similar across the cohort of the participants that we had, and that they were eating a large serving of protein five or six times a day which I think that really does fit in with the general sports nutrition consensus nowadays to maximize the protein synthesis that's the type of approach they should be taking. A few of the participants were using what they terms re-feed day and that's an area that I'm quite interested in following up on. And it was first identified to me in a previous study where we interviewed some of these bodybuilders; the use of this re-feed day where they were more or less dieting for say 5 or 6 days per week, and then they would implement a single day or perhaps 2 days a week where they would pump their energy intake up, and

the idea behind that they reported was that first of all it gave them a bit of a psychological edge that it allowed them to relax for a day. It was a day that they looked forward to. They would also tend to couple that day with high resistance training or the high training volume day, so there had to be more energy for that. But a lot of them reported that it gave them a bit of metabolic boost whereby it tended to negate some of those negative metabolic changes that are occurring when you're in a negative energy balance for a long period of time. And that was something they reported and I did find that I think four or five of the participants in this nine participant cohort were using the re-feed day. I couldn't correlate that with any success in terms of competition success or body composition success, but there was definitely no decrease in outcome based on those participants who were using the re-feed day. So, I think that's certainly an area of interest for myself and I think certainly potentially in the research realm which could potentially prove to be quite important both in the bodybuilding context and in sports nutrition context in individuals who are trying to maintain a lean mass whilst getting reductions in fat mass. But also there is potential I think for transferring that to more of a clinical setting.

DANNY LENNON:

Yeah, for sure. I think for quite a while at least anecdotally there has been talk of using re-feed days for some of those reasons to trying to mitigate some of the metabolic adaptations that essentially happen with dieting. At least theoretically there is good cause for that I mean we have research showing that overfeeding on a high carbohydrate intake obviously can change things like leptin, for example. So, I'm just kind of wondering maybe depending on the timing of when different samples were drawn in relation to the re-feed day maybe it's playing some sort of a role then. But then I suppose going forward like you say it's really interesting of how do we tease out what's actually happening here, because as far as I know we still probably don't have a definitive idea of like how much of a re-feed is actually going to have a certain benefit and is doing it for one day enough to have any of these particular benefits, is that too short-term, does it need to be multiple days and all this type of stuff. So, yeah it's very interesting that that's been

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noted as an area for future research and I agree hopefully we can see something on that. Maybe if we just turn to the kind of second part of the study where you look at the recovery phase itself, so that kind of 4-week block after the competition had been finished, again just an overview of some of the main findings and in particular if there is anything of note for people?

LACHLAN MITCHELL: Yeah, from a dietary standpoint as you'd expect that was seen as a period where they could rest and recover. They had gone through a long period here 16 weeks, some of them even longer than 16 weeks where they had been dialing in their nutrition. So, they'd been so focused on making sure that when they're eating that there's certain amount of protein, carbohydrate and fat. Once they had reached their competition it was seen as a time where they could relax a little bit, and certainly we saw that in the 7-day food diary, the 4-week post competition in that the total amount of food had gone up in terms of energy, carbohydrate, protein but certainly the types of foods themselves had changed. So, there was an increase in fast food intake for example, what I would be describing as discretionary foods certainly went up as opposed to pre-competition where they were following I guess a more healthy diet in terms of the types of food that they were eating. So, definitely there were significant changes in the dietary intake there. In terms of other results body composition we did see an increase in fat mass, a small increase in lean mass that may be attributed to changes in fluid, so a bit fluid accumulation after being dieting or fluid accumulation is probably a wrong word but probably a little bit more fluid there which may attribute to an increase in lean mass. As I said an increase in fat mass the hormone level tended to level out, so the testosterone level which throughout the competition had gone down below the sort of the normal range that we expect to see in some of those individuals tended to go back up to within that normal range. So, we saw I guess a restoration of those anabolic hormones where we saw some reductions prior to competition. No changes in metabolic rate given there were no changes prior to competition, but certainly an increase in energy intake both from total calories but also the types of calories and types of foods that

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they're consuming. A very large reduction in carbohydrate intake compared to pre-competition. In terms of exercise most of them were continuing to maintain their resistance training program already with one eye on trying to build muscle mass for their next competition which would have been 12 to 24 months down the track, but certainly the aerobic training that had more or less dropped off. The ones that were conducting aerobic exercise prior to the competition they weren't doing any of that after the competition. So, I think that they were the big changes that we saw post competition.

DANNY LENNON:

Yeah, interesting and I think something of note for people is probably that these changes in certain hormones that we see during a contest prep that once we get to a point where energy intake comes back up some fat mass is regained and so on that these changes are pretty transient or at least they should come back up close to baseline after a certain period of time of recovery and there's certainly not any permanent damage that's been done in these cases with the diet, so I think that's interesting to note there. Is there anything that we've missed out on Lachlan that I haven't touched on there in relation to that case study that you want to bring up?

LACHLAN MITCHELL:

No, I think that covers everything. I think we'll talk about this a little bit further along in the conversation, but we did at some psychological measures there. I think based on the sample size we won't be able to get that published given it was only a participation number of 9, but there were some psychological stuff in there that we looked at perhaps we could talk about that a little bit further on when we get into that area of the research, but I think we've covered all the take home messages from that published study, yeah.

DANNY LENNON:

Sure. One other piece that you have put out was titled 'Do bodybuilders use evidence based strategies,' and I think it kind of in a similar way through interviews kind of looks at some of the strategies being used. Was there anything that you noted in that particular piece that was different to what we've discussed in this particular case study right now that is worth kind of getting into?

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LACHLAN MITCHELL: There were a few things which caught our eye when we conducted that study. I think the biggest thing as the title of the study suggests was that the bodybuilders predominantly did use evidence based practices in that they used a highly distributive protein intake, they were very periodized with their carbohydrate intake around their training programs, they followed what was generally a very healthy training program and very healthy dietary program. They did implement the re-feed days predominantly, but there were some I guess questionable tactics which we identified things like the water loading practices which I think are quite common in the bodybuilding realm. The more I immerse myself into it the more I find that those types of practices are very common, and so carbohydrate loading, water loading in the week leading up to competition. These guys did report not that they had necessarily done it, but they did report other bodybuilders doing things like drinking wine on competition day or smoking cigarettes on competition day to try and boost their metabolic rate or increase vascularization prior to stepping on stage. So, some very what I would classify as questionable strategies were identified. I think it'd be difficult to research some of those things. I think the water loading would be a very worthwhile case study to try and conduct to try and look at the changes in not only body composition but perhaps sort of visual physique measure if there's some way of doing that in the sort of the 7-day period leading up to what we would classify as a competition day to try and look at that. But yeah certainly some questionable tactics which were used and I think as a dietician it's probably worthwhile for dieticians to know these types of things are taking place just so if a bodybuilder was to approach a dietician they can give at least some form of evidence based recommendation and probably some recommendations which would be a little bit more easy to follow and probably a little bit safer.

DANNY LENNON: Yeah, sure. I think that's particularly an area that kind of peak week as most bodybuilders refer to it is trying to get these acute changes in these final few days with changes in water or you even see people doing things with sodium and so on and whilst I've definitely heard people report that they've used them and they seem to

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like them, at least to me it hasn't made too much sense, at least from a standpoint of physiology of what they're trying to do with that. But that being said like we said we can't really point to any clear research done definitively, and it'd probably be a difficult one to do presumably given the kind of subjective nature of assessing a given look. So, I wonder what would be the best way to assess. Does this water manipulation actually have a good desirable effect, are people able to – essentially I presume they're trying to lose some water from the kind of subcutaneous layer but without losing water from the muscle which is the difficulty I see in using such a strategy, how do you selectively lose water. So, I just wonder and is there a best way to assess that?

LACHLAN MITCHELL: Yeah I would agree with you there. I think given that bodybuilding is a subjective sport and it's not what percentage body fat you are at how the judges observe you that needs to be taken into consideration. As you mentioned try and pick and choose which compartments you lose water from is going to be difficult. If you would reduce water from the muscle than the muscle volume itself is going to reduce and that's not ideal. There has been a study or two conducted down at the Australian Institute of Sport which have looked at I think judo athletes or taekwondo where they looked at water loading leading up to competition, but they are looking more at a trying to reach the bodyweights. So, they were able to show that there were changes in fluid volume based on these types of water loading protocol which assisted in reaching the cut off weights for their weight class, and then they were able to rehydrate post that weighing but that's not necessarily what bodybuilders are trying to do. It's not really trying to reach a weight class it's more a visual change that they are trying to achieve. So, yes certainly difficult in that regard in terms of whether it's effective and it's going to be very difficult for a research group to assess that I think.

DANNY LENNON: For sure, and I'm glad you bring up that important distinction using some of these methods as far as their effectiveness goes the clear difference between using water loading and restriction protocol for a visual look versus actually making weight for a weight class based

sport. It's good that you bring up that research we actually had Reid Reale who is the lead author on one of those big water loading papers out of the Australian Institute of Sport on the show to talk about that. But again doing that for making weight is of course a different thing to a visual look for a bodybuilder, so extremely important point you make there. Lachlan to turn to some of the psychological things that you mentioned earlier on, you talked about some of the different psychological measures that you looked at. But you also have published a paper looking at I think muscle dysmorphia. Can maybe just give an outline of that for people first off what exactly it is that you were looking in the paper or what this term even means I guess?

LACHLAN MITCHELL: Yeah. Muscle dysmorphia is the term – it's a psychological condition, it's currently classified as a sub-branch of body dysmorphic disorder whereby an individual has this perception that they view their body to be small where in fact you and I would see them as very muscular and large. So, they have this distorted self perception similar to anorexia nervosa, but in the reverse direction. In fact, when it was first identified it was termed Reverse Anorexia, so individuals who were large and muscular, strong and muscular would view their body as small, and low muscularity and weak basically, and then associated with that self perception they tend to follow certain behaviors and attitudes. So, they follow very strict dietary protocol, they follow a very strict training regime, there is an anxiety associated with avoiding or going away from these regimes that they try to follow. There have been reports of individuals turning down well paying jobs instead just to get a job at gym so that they can maintain their training protocol. We see changes in the social behavior, they won't go out to dinner with their friends because they're concerned they won't get enough protein in or enough energy in, for example. So, this idea that they have is distorted self perception, and then there are these behavioral changes associated with it, so that's muscle dysmorphia. The research that we have conducted, so we had a paper published where we ran an online survey looking at a number of different things including some measures of muscle dysmorphia, and we tried to correlate the symptoms of muscle

dysmorphia with other characteristics. We did find that eating disorder symptoms or disorder eating practices were highly correlated with muscle dysmorphia symptoms and that feeds into I guess the theoretical idea of muscle dysmorphia in that there is this training component to it. So, this highly routinized exercise protocol that they need to follow, but the eating component of muscle dysmorphia is just as important if not more important in that they need to be following a really strict diet, they need to be consuming a certain amount of protein, a certain amount of calories every day in order to maintain and build muscle mass. And their eating practices is not just the types of foods that they're eating, but their eating practices tend to be distorted. So, their calorie count to the Nth degree, they were stringent with the types of foods they were eating when they eat, they were strict with whatever dietary protocol. So, that fits in with some previous research in that muscle dysmorphia, eating disorder realm which tends to suggest and certainly some of the authors are trying to push towards re-classifying muscle dysmorphia as an eating disorder as opposed to a body dysmorphic disorder and this finding of ours is a co-relational finding tends to add a little bit of evidence to that. I tend to sit on the fence with it classifying it one way or the other, but the evidence does suggested it may be classified as an eating disorder. One of the other big findings to come out it was the right that the bodybuilders were losing weight was highly correlated with muscle dysmorphia symptoms. So, we looked at this idea of how long do people conduct the in-season for prepping for a bodybuilding show, and then how much of weight they tend to lose in an in-season. So, those who had a large amount of weight to lose in a shorter period of time, therefore losing more weight per week those are the individuals who tended to be more disordered with their eating practices may tend to just show more muscle dysmorphia symptoms. So, I think from a practical standpoint as a dietician or even from a psychological standpoint as a practitioner that type of activity or behavior is something to be looking at for sort of the earmarked if individuals are losing a large amount of weight in a short period of time that could be suggestive of some form of disordered or pathological behavior that they're conducting.

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DANNY LENNON: Right. So, it seems there is this element of not only the perception of kind of current body composition, and then it's also that ties into having certain behaviors, and habits, and actions surrounding that to try and alter some of these things. Does that then kind of infer that no matter what someone's actual body composition is there's probably a degree of like constant dissatisfaction with that?

LACHLAN MITCHELL: Certainly in those individuals who were displaying symptoms of muscle dysmorphia or suffering from muscle dysmorphia depending on how you want to phrase it. Yes, it would infer that there is regardless of their body composition there's going to be some dissatisfaction associated with it, and unfortunately I think one of the repercussions of that is continual dieting and continual exercise with a potential to lead to other practices particularly anabolic androgenic steroid use in an attempt to try and build muscle mass whilst reducing fat mass. So, I guess to answer your question yes there would be some underlying distorted self perception or dissatisfaction with their body composition despite how lean and muscular they would get.

DANNY LENNON: Sure, and I suppose when this topic then comes to kind of tying this in with competitive bodybuilding it's obvious that not every competitive bodybuilder is going to be suffering with this and vice versa. There are people who are not competitive bodybuilders or ever will be but who perhaps have symptoms here too. Do you have any idea of typical prevalence rates within either a general population or kind of based on some of your work within a population of bodybuilders?

LACHLAN MITCHELL: In short, no we don't really. There had been numbers running out there a similar percentage in terms of the broader population as female who is suffering anorexia nervosa that type of number had been thrown out in terms of a population of bodybuilders. There had been suggestions that the proportion would be greater. In terms of an actual number I couldn't give you anything. Difficulty with diagnosis certainly one of the limitations with my research from the reviewers was that we weren't able to diagnose people

we were only able to identify symptoms of muscle dysmorphia and that's because you can't really diagnose just using a questionnaire. You need to have a face-to-face interview in order to diagnose people. So, I think that's one of the limitations with trying to identify those types of rates of muscle dysmorphia. But certainly as you suggest being a bodybuilder doesn't imply that you have muscle dysmorphia, and certainly there would be individuals who aren't bodybuilders who may potentially suffer from muscle dysmorphia. So, I think it's certainly very safe to conduct resistance training to take part in bodybuilding is very safe. Perhaps the context of bodybuilding or the sport of bodybuilding does lead individuals susceptible to muscle dysmorphia to take part, because it maybe a potential to negate some of their symptoms or at least appease some of their symptoms. But certainly conducting bodybuilding or taking part in bodybuilding doesn't increase the risk of developing muscle dysmorphia in individuals who aren't inclined to develop muscle dysmorphia if you don't already have some psychological condition leaning i.e. are depressed, have a low self esteem those types of psychological features which have been shown to be correlated with muscle dysmorphia. Individuals who aren't really displaying those types of features have very low risk of developing muscle dysmorphia by taking part in bodybuilding.

DANNY LENNON:

Yeah, and I suppose it kind of throws up this interesting question of whether if someone already has maybe muscle dysmorphia or is expressing symptoms of that is that person then just going to be drawn to something like going to compete in bodybuilding or does it kind of work where someone who is just more susceptible whether it's genetically or whatever else and then starts doing bodybuilding, and then that's the kind of trigger to make some of this stuff manifest. I guess there's kind of presumably right now no clear way of knowing – and maybe it's a case of both things could be happening in different individuals I guess?

LACHLAN MITCHELL:

Yeah, I think certainly both things are potentially taking place. There is always the argument that individuals who may be susceptible or even displaying symptoms of muscle dysmorphia being to take part in

bodybuilding, and then they find that participation in bodybuilding appeases their symptoms, and then they reduce those types of muscle dysmorphic behaviors and it becomes more of a healthy practice. So, yeah there are pros and cons to the argument at this point in time. As I said and as you said the research at this stage it's very difficult to ascertain which is the cause, I wouldn't say bodybuilding is the cause or I tend to think that this sport attracts individuals who would be susceptible. Those who maintain muscle dysmorphic symptoms perhaps they dropout, those who are able to continue to participate in bodybuilding perhaps that continued participation reduces symptoms and it becomes more of a therapeutic type practice. And I guess you could more or less say that it's beneficial in that regard. That's speculating off correlation and a co-relational evidence at this point in time there.

DANNY LENNON:

Sure. So, before we start wrapping things up is there anything in that line of research or maybe even perhaps related to some of our earlier discussion that are some of the next big questions that you would like to see looked at within research in natural bodybuilding whether that's from your own group or from other groups just kind of in that general area what are the kind of big research questions you hope to see covered over the next number of years?

LACHLAN MITCHELL:

Well, I think from the muscle dysmorphia area of research there's been no longitudinal research conducted at this point in time, at least none has been published. As I mentioned we took some muscle dysmorphia measures during the longitudinal study we conducted. Unfortunately with the sample size we have not been able to get that published, but I think the next logical step would be to conduct large scale longitudinal research to assess changes in muscle dysmorphia symptoms over a period of time. We speculated, we hypothesized that as participants reduce their fat mass and I guess move towards their ideal physique their muscle dysmorphia symptoms would reduce just because they're reaching that ideal physique where they're going to be muscular and lean. But whether that actually takes place we don't know at this point in time. So, if research groups are able to conduct larger studies, large cohort studies looking at the temporal changes, temporal characteristics of

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muscle dysmorphia symptoms I think that would really benefit the psychological research area, both practicing and research psychologists, psychiatrists but I think also strength and conditioners would benefit from that type of stuff because it's something that at this stage is really an unknown. So, certainly that type of area of research would be very beneficial.

DANNY LENNON:

Cool. And one thing just on the looking at research in natural bodybuilders in general presumably there is a difficulty in trying to get a lot of good research done given how different the conditions are for say a competitive bodybuilder versus someone in the general population when we're trying to maybe extrapolate research on general principles of fat loss or just generally effects of resistance training that tends to be brought at various different extremes in terms of the training experience of the people involved here just how far they're going to be dieting, the physiological change that happen etc, etc. So, number 1 in terms of trying to get good research done I'm interested to ask about some of the challenges like just trying to get people recruited into studies number 1 given how a smaller percentage of the population there is, but also considering how many of these guys and girls would be willing to maybe try alternate dietary or training approaches just in the name of science when they are coming up to a competition is a very difficult thing to get them to buy into. Is that potentially one of the reasons why we maybe don't have as much kind of clear research in some of these areas as we would like to?

LACHLAN MITCHELL:

Yeah. I think certainly I can speak from experience that recruiting bodybuilders is very difficult. I don't know an exact reason why it is difficult. Potentially as you said there is a very low number of actual bodybuilders in the population, although it is increasing. In my research we focused on the bodybuilding category as opposed to – there are other categories here in Australia; fitness model, male model, beach model that type of stuff which probably aren't extreme. They follow very similar strategies but aren't as extreme, certainly their body composition. So, I think with the increasing popularity of those divisions potentially there's going to be a reduction in numbers of participants in the pure bodybuilding

category, so again that may limit potential for recruitment. But I tried a lot of different avenues for recruitment, we went through social media, we contacted one of the Natural Bodybuilding Federations here in Australia, I contacted lot of the bodybuilding coaches in an attempt to try and get them to recruit participants or at least pass details onto them of the research, I questioned perhaps the bodybuilding coaches maybe a little bit afraid of us scientists coming in and saying, “Hey you’re doing things wrong. You’re charging these people lot of money for an ineffective dietary practice, training practice,” and so potentially that was a limitation. The bodybuilders potentially are set in their ways, they don’t want someone else come in and saying you should be doing it differently. I think their potential explanations for why it’s difficult to recruit participants to get them to – if we would have provide them with a diet and training program again I think that would be difficult given that particularly the experienced ones that are somewhat set in their ways have been trailing and erring for a number of years trying to find a program or a protocol that works for them and once they get to that point when they find it is working for them for someone to come in and say, “Hey can you do it this way instead?” It’s difficult to convince someone who is really set in their ways to change the dietary and training approach to achieve that certainly is quite important to them to get on stage and not feel confident in their body, in their physique because their diet or training program isn’t what they’re used to or they don’t think it’s going to work then that’s going to be difficult as well. Having said that though I know that there are more research groups out there who are conducting research in natural bodybuilding. I hope they have more success than I did in recruiting, but certainly I think the more research that is conducted then the more some of those evidence based practices which would come out would become more mainstream in the bodybuilding population, and then I think as a result of that potentially more bodybuilders would be inclined to take part in further research.

DANNY LENNON:

For sure. Before I get to the final question here where can people get their hands on some of these studies, where can they find more of your work, can they track

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you down on Twitter or ResearchGate anything like that, where is the best place to send people online?

LACHLAN MITCHELL: Yeah, ResearchGate you can find me on there. I am not sure my profile name is Lachlan Mitchell from the University of Sydney. I am in Twitter, I've got a handful of followers, I don't do it all that often but I try and tweet whenever I'm doing something interesting, going to conferences and presenting those types of things, when I publish a paper but I am Twitter and ResearchGate, they're probably the two best ways to follow what I'm doing. If you go onto PubMed you can find couple of my publications as well. So, I'm out there but still building a name.

DANNY LENNON: Awesome! And so everyone listening I will link up to all that stuff in the show notes as well as the research papers that we've discussed today, so you can go and check those out yourself in more detail. So, with that Lachlan we end the show on the same question every week and this can be to do with something completely outside of the topic we've discussed today and forgive me for this being such a big broad generic question. I'm putting you on the spot with it, but it's simply if you could advice people to do one thing each day that would have a positive impact on any area of their life what would that one thing be?

LACHLAN MITCHELL: Oh, jeez. I would say lift weights, resistance training, lift weights yeah.

DANNY LENNON: Yeah something I can get onboard with for sure. So, a good way to round this out and with that Lachlan I want to say thank you so much for taking the time to do this today, for all the information you've given, and also for your continued hard work in getting some of this research done and put out to the science community. It's very much appreciated, so thank you for all that my man.

LACHLAN MITCHELL: My pleasure, thanks very much for having me.

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