52| The Hierarchical Taxonomy of Psychopathology (HiTOP) – With Dr. Robert Latzman

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NAVIGATING NEUROPSYCHOLOGY

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Speakers: Robert Latzman, Ryan Van Patten, John Bellone

Intro Music 00:00

Ryan Van Patten 00:17
Welcome, everyone, to Navigating Neuropsychology: A voyage into the depths of the brain and behavior, brought to you by INS. I'm Ryan Van Patten.

John Bellone 00:25

…and I'm John Bellone. Before we get into today's episode, we want to remind you that select NavNeuro episodes are now available for CE credits through our partners at INS. If you want a convenient way to get your CEs, and you also want to support the show, visit navneuro.com/INS.

Ryan Van Patten 00:45

Today we speak to Dr. Robert Latzman about the hierarchical taxonomy of psychopathology, or HiTOP. Rob is an associate professor in the Department of Psychology at Georgia State University. He's also the co-chair of the Neurobiological Foundation's work group for HiTOP. If you aren't familiar with HiTOP, don't worry, Rob does a nice job of describing HiTOP and we also include a visual depiction of the framework on the episode webpage at navneuro.com/52.

In a nutshell, HiTOP is a nosology of psychopathology - an attempt to classify, organize and describe the nature of mental illness as it exists in humans. It stands in contrast to the current status quo, which is manifested in the DSM, the Diagnostic and Statistical Manual of Mental Disorders, and the ICD, the International Classification of Diseases. The DSM/ICD model is often labeled the categorical model, or the medical model of classifying mental disorders.

John Bellone 01:51

And while this topic is broadly applicable to all mental health professionals, more so than some of our other episodes, it is also highly relevant to neuropsychologists. We don't spend a lot of time talking explicitly about cognition in our discussion with Rob, but we know that psychopathology such as depression, anxiety, somatic symptoms, mood instability, are very common in patients who present to neuropsychological clinics, and that these emotional disorders have a significant impact on cognition. Consequently, it's important for neuropsychologists to be aware of HiTOP, both from research and clinical perspectives.

Ryan Van Patten 02:29

And we are psychologists after all, so this is inherently relevant to us. In our conversation with Rob, we cover the following topics: limitations of the DSM and ICD model, the inherent hierarchical structure of psychopathology and the tools used to explore it, similarities and differences between HiTOP and related nosologies, such as the research domain criteria, or RDoC, examples of HiTOP consistent research methods, examples of HiTOP consistent assessment

instruments, and the current and future clinical relevance of the model. So, with that, we now give you our conversation with Rob.

Transition Music 03:09

John Bellone 03:18
Rob, thanks for joining us on NavNeuro.

Robert Latzman 03:20
It's great to be here. Thank you so much for inviting me.

John Bellone 03:22
So let's talk about the hierarchical taxonomy of psychopathology, the HiTOP model. What are a few of the issues with our current nosology, the DSM, the ICD that HiTOP attempts to correct and potentially improve upon?

Robert Latzman 03:38
So the HiTOP consortium - just to take a quick step backwards - was developed as an effort towards establishing a consensus of a dimensional system to work in a way that DSM has not. Or I should say, more broadly than just DSM. I think more traditional classification systems have not, and so I'm including both DSM as well as the ICD system in there as well. So HiTOP represents an effort towards a dimensional system. It's developed by a consortium that consists of over, at this point, 100 researchers and clinicians and the aim of the consortium was really to review and integrate findings concerning the organization of empirically derived dimensions of psychopathology. These are dimensions that cut across traditional diagnostic boundaries. And this effort sort of culminated - or I guess culminated may not be the right word because it was really the starting point of a consensus based model, as a starting point. That's really that hierarchical model that people think of when they think of HiTOP.

So then to go back to the question, in terms of what does that overcome vis-à-vis our current systems, I would say there are probably four big problems with our current system, and there are a lot of others that HiTOP directly addresses. The first is pervasive comorbidity. That is, comorbidity among diagnostic categories is the norm rather than the exception. Just to take one example, in terms of the area of the literature that I spend a lot of time focusing on, in the personality disorder

literature, meeting criteria for only a single diagnosis is the exception rather than the rule. We know this from a number of different studies. But just to take one, the The Collaborative Longitudinal Personality Disorders Study suggests that not only is meeting criteria for one the exception, but the modal number is five.

Ryan Van Patten 05:44
That's outrageous.

Robert Latzman 05:46
It really is. I mean, I think those sort of numbers - yeah, [laughs] it really is.

John Bellone 05:51
So, many people meet criteria for five different DSM diagnoses is what you are saying?

Robert Latzman 05:57
The modal number. For those who meet criteria for a personality disorder diagnosis in this very large longitudinal study of personality disorders, the modal number - that is the most common number of different diagnoses in individual patients is five. Five. And if you think about these things from the perspective of, they're supposed to be separate entities that don't covary in a systematic way, right? The covariation among diagnoses, at least according to the DSM, especially DSM-IV and still DSM-5, if you meet criteria for two, it's by chance.

Ryan Van Patten 06:32
Right.

Robert Latzman 06:33
Right. Like I say in my abnormal psych class all the time, if you have red hair and freckles, that's not a fluke. It's not by chance. You don't just happen to have two great qualities.

Ryan Van Patten 06:48
[laughs]

Robert Latzman 06:48

Those phenotypes covary systematically as a result of shared genes, for example. I say that my little brother has red hair. [laughs]

Ryan Van Patten 06:56
[laughs]

Robert Latzman 06:57
So that's pervasive comorbidity. The second issue is diagnostic heterogeneity. One of the big selling points for categorical diagnostic systems is communication. That is, I should be able to tell you the diagnosis a patient meets and you should know something about that patient. And not just something but you should know a lot about that patient. If I tell you that these three patients meet criteria for the same diagnosis, you should know a lot about all three of those patients because what you know about this patient should be similar, right? That's just not the case, however. In fact, diagnostic heterogeneity, that is, variation among individuals who meet criteria for the same diagnosis, again, is the rule rather than the exception. Just back to some numbers that I find humbling. If you look at the DSM-5 diagnostic criteria, there are 227 possible combinations of symptoms that can result in diagnosis of major depressive disorder. It gets worse. There are over 600,000 symptom presentations that satisfy diagnostic criteria for DSM PTSD.

John Bellone 08:10
So these look very different. Even though you have the same diagnosis, two people can look very different.

Ryan Van Patten 08:15
You can have two people, importantly, with completely non-overlapping symptoms and with the same diagnoses, right?

Robert Latzman 08:21
It's exactly what I was just going to say. In fact, you can have two people with the same diagnosis with zero overlapping symptoms. A really good example of that is if you think about depression. Depression has the two core symptoms, loss of interest or pleasure in things that [you] used to enjoy, sort of that Anhedonia piece, and/or feeling sad and depressed more days than not for at least two weeks. And then once you hit one of those two, you go into symptoms below there. If you think about what it takes to make up the diagnosis of depression, there are symptoms like appetite loss or appetite gain, right? Sleeping too much or sleeping too little. So,

from that perspective, you can have two people with zero overlapping symptoms. Diagnostic heterogeneity.

The third issue that the literature is really clear on has to do with the poor reliability of categorical diagnosis just writ large. In fact, going back to some numbers, DSM-5 field trials found that approximately 40% of diagnoses examined don't reach the cutoff for acceptable inter-rater reliability. And that's really troubling when you think about one of the major important pieces of DSM, particularly the shift from DSM-II to DSM-III, was diagnostic criteria focused on signs and symptoms. And, really, the purpose of that was entirely to increase diagnostic reliability. As many of us use the term, DSM made a decision to sacrifice validity on the altar of reliability, and that was a thoughtful and purposeful decision. If we're at a point now where we have two out of five of all diagnoses in DSM not meeting even acceptable cut points for interrater reliability. That's really problematic to me. The final...

John Bellone 10:21
Sorry. Just to hammer down there. So, for listeners, that means that two providers can see the same person and come to a different conclusion about the diagnosis.

Robert Latzman 10:30
Correct. Yes, exactly.

John Bellone 10:32
Perfect. And then the fourth one?

Robert Latzman 10:33

The fourth one, I was going to say is this idea of not otherwise specified diagnoses as well as this idea of subthreshold cases. So let's start with the not otherwise specified. Let's go back to the personality disorder literature. We know that the most common personality disorder among patients from a diagnostic perspective is personality disorder not otherwise specified. That is, they don't meet specific criteria for any of the personality disorders, but they do seem to have the *je ne sais quoi* of personality pathology, right? [laughs]

Ryan Van Patten 11:08
[laughs] "Axis II."

Robert Latzman 11:09

Right. To use the DSM-IV terminology. They have that "Axis II feel." So they meet criteria for this NOS, which, it seems to me, is an admission by the framers of DSM with an understanding that the majority of patients are not going to fit into one of these neat boxes. That goes along with these subthreshold cases. This idea of people who are not fully meeting criteria for a disorder as described or as defined by the DSM, but are still experiencing a number of symptoms and may, in fact, be experiencing impairment at levels greater than someone who does meet criteria for a disorder. What we know is those people are oftentimes just as in need of treatment and identification as those who meet the criteria. We also know that individuals, and this goes back to this idea of temporal stability, which I haven't really talked about, but the idea of, “Do you meet criteria today, tomorrow, and next week for a disorder that you should meet criteria for?” Again, personality disorders are notoriously bad for this. It means that a single individual can bounce in and out of meeting diagnostic criteria. I think, where HiTOP comes into all this is an understanding that a different approach, a radically different approach, is needed to overcome these issues. And HiTOP was developed to be part of this solution.

Ryan Van Patten 12:41

That's a great intro. I think the next logical question that I have to move forward in your description of the model is to zero in on the hierarchical component of the model. That's very important and unique about it relative to other statistical or quantitative models. Tell us about the hierarchy and what it does.

Robert Latzman 13:00

It's a really important feature of HiTOP. This hierarchical structure, the hierarchical nature of HiTOP, reflects the empirical structural organization of psychopathology. What I mean by that is that it reflects it quantitatively. That is, constructs higher in the model summarize tendencies for constructs lower in the model. And not just tendencies, but the co-occurrence of specific behavioral patterns are reflected in the tendencies from levels higher up in the model. So individual differences, dimensions can be organized hierarchically, from more general to more specific. And that explicitly incorporates covariation of symptoms. It's one of the major ways that the HiTOP model overcomes things like ramping comorbidity in categorical systems - because the comorbidity that we see in categorical systems, we understand as being part of the structure of psychopathology. It's not noise, it's part of the signal.

So just to drill down as a specific example of this - social anxiety and depression. They're typically moderately to highly correlated with each other in the literature. Situated within a hierarchical model, however, this covariation is explicitly incorporated into the framework. So specifically, for example, in the HiTOP model, the covariation between depression and social anxiety, we think of as a narrow, internalizing spectrum within which distress and fear are more specific subfactors. Again, at a lower level, something like social anxiety is an expression of this fear subfactor, while something like depression is an expression of this distress factor. If you think about things hierarchically, this hierarchical structure allows for us to think about causes or outcomes of mental illness that can emerge because of its effects on a broad higher order spectrum or because of specific factors that may influence sub-factors or specific lower order syndromes or traits. So it really depends on which level of the model you may be interested in studying. In fact, and we'll probably talk more about this in a little bit, one of the recommendations that I think HiTOP has made is to consider both. This model allows for the flexibility to do so. Is this a process or mechanism that's working at a spectrum level? Or is this a process or mechanism that's working at more of a syndrome or trait level?

Ryan Van Patten 15:52
Those distinctions are really helpful. Without a hierarchical model, we are only considering a single level, the disorder level, and what's above it and what's below it. To drill down even further - I should just tell our listeners that all of your papers that I've seen, all the HiTOP papers and your website, include the current iteration of your model, visually depicted, which is very helpful to see. Of course, this is an audio podcast so our listeners can't see it.

Robert Latzman 16:21
[laughs]

John Bellone 16:21
We'll link to it in our show notes.

Ryan Van Patten 16:22
We'll link to it. But for our purposes now, could you just briefly describe the model verbally?

Robert Latzman 16:29

Sure. So at the top most level of the HiTOP hierarchy are broad dimensional spectra and superspectra. This includes an overarching general psychopathology dimension that is sometimes referred to as a *p* factor, or a general factor of psychopathology that's thought to reflect a broad liability to diverse forms of psychopathology. A step below that is that - so that general factor is followed by three superspectra. Those three superspectra are externalizing, thought disorder or psychosis, and internalizing. Falling within each of those superspectra are specific

forms of psychopathology. So falling within each of those superspectra are specific forms of psychopathology situated lower in the hierarchy, with the core of the model encompassing six spectra falling within internalizing - internalizing breaks into somatoform and more narrow internalizing. So you see somatoform breaking off of that more broad internalizing. You see thought disorder or psychosis breaking into a more narrow thought disorder factor, or spectra, and a detachment spectrum. And finally, you see externalizing that breaks into two subdimensions - disinhibited externalizing and antagonistic externalizing. Each of these spectra that I'm talking about have narrower syndromes. And then even more narrower specific symptoms that fall within these spectra.

John Bellone 18:10

It's like a - what's the Japanese Plinko board* that kind of goes down? [laughs]

[*Transcriber's note: Pachinko board.]

Robert Latzman 18:15

Yeah. So I often think about it like a - I forget what they are called. Those Russian dolls?

John Bellone 18:22

Oh, yeah. The nested?

Robert Latzman 18:23

The nested Russian dolls. Right.

Ryan Van Patten 18:25

[laughs]

Robert Latzman 18:26
I think another way you could think about it is just thinking about - if you think about it like the United States, right? There's a federal government that's overarching. Then within the federal government, there are states. And within the states, there are counties. And within counties, there are cities and then there's neighborhoods. You can think about it at different levels of analysis, if you will.

Ryan Van Patten 18:45
Yeah. The visual model is very helpful.

John Bellone 18:48
Right. So just to give one example - you've given a couple already, but you mentioned the distress subfactor. Within that, it incorporates major depression, generalized anxiety disorder, and PTSD. All those are the syndromes under that subfactor that's under the internalizing spectra. Right?

Robert Latzman 19:11
You're touching on a really important issue and question. Instead of answering your question, I'm going to say something else, which is that the DSM language within the HiTOP model is for ease of communication only. The DSM categorical diagnoses are not officially, if you will, part of that model. They're placeholders. The reason that they're placeholders is that the majority of the psychiatric literature on which this model is based uses DSM categorical diagnoses. So it's what was available to develop this model. As we move forward and as we start analyzing large datasets with symptom level data, I think the hope is and I think the direction is, and I'll speak for myself, I haven't been HiTOP sanctioned on this, is we can just drop out diagnoses entirely from this model and that they're no longer needed for the communication. That being said, I do think and I think your question is a nice example of the importance of those diagnostic placeholders from a communication perspective. To allow people who understand a categorical diagnostic system to also understand how HiTOP incorporates those data in.

John Bellone 20:42
Gotcha.

Robert Latzman 20:43
I'm not sure if that answered the question. But… [laughs]

John Bellone 20:45
Right. This is a completely different system for people. You need training wheels to get there. [laughs]

Ryan Van Patten 20:51
I imagine that some of the language we might use to replace old DSM language would be what is these days called transdiagnostic constructs, which there's a lot of literature on. As I was in grad school, I learned more and more the power of transdiagnostic constructs - impulsivity, anhedonia, you had mentioned stress reactivity.

Robert Latzman 21:13
Yes.

Ryan Van Patten 21:14
At the time, they were labeled transdiagnostic because they cut across the DSM categories. Over time, though, we were finding there may be more power in these constructs than in the original diagnoses.

Robert Latzman 21:27
I think what you're describing is exactly what the HiTOP model incorporates and portrays. And I think one way you can think about the spectra or the subfactors is as transdiagnostic constructs. I mean, I think you're absolutely right. I think that hesitation - and when when I write about it, I use the term transdiagnostic, so I'm as guilty as anyone - but I think the hesitation using that word is that the word diagnostic as part of that, which implies that there's some meaning to the categories across which these dimensions are situated. Does that make sense?

John Bellone 22:06
Yeah. And that gets to the crux of the major differences. That the DSM, it's more based on the categorical structure. There's a threshold and once you hit a number of symptoms for a certain period of time, we give you that label. But the HiTOP is more of a dimensional model.

Robert Latzman 22:24
Correct. It's inherently dimensional. So, I mean, how is HiTOP different? You can think of probably two different approaches. So you can think of a traditional official classification system approach, and this is where the DSM is situated. This is where

ICD is situated. This is based on a diagnostic paradigm of discrete categorical entities and each category has its own set of symptoms. The presence of these symptoms, in sufficient numbers, as determined by an expert consensus group, indicates the presence of illness. The symptoms and individual categories are determined based on expert consensus. Cut points are determined for a variety of reasons and considerations. The primary reasons and considerations that cut points are determined are typically not necessarily scientific. And if you think about it from that perspective, people have referred to this approach as an authoritative approach. That is, you gather a bunch of experts in a room within some sort of authoritative official body - with regard to DSM, we're talking about the American Psychiatric Association - and you delineate classification rubrics through discussions, through an iterative political process. We can think about that as a top down approach, right? That is, experts make decisions and dictate that to the world. I like to visualize things. I always think about this as like Pharaoh, you know, "Let it be said, let it be written, let it be done," right?

Ryan Van Patten 24:05
[laughs]

Robert Latzman 24:05
That's the approach this authoritative approach takes. HiTOP is a really different approach entirely. HiTOP, in contrast, is an empirically derived model. It's agnostic. It doesn't start with a preconceived notion of what this should be or how this should look. It lets the data do the talking. It was developed in this way to meet both clinical translational and utility needs. That's a really different approach. Inherent in that approach is the dimensional classification system that encompasses the full range of clinical psychological conditions. If you think about it from that perspective, as compared to an authoritative approach, we can call this an empirical approach. The data are the building blocks of psychopathology. Then we can leverage those building blocks to build a model and to address specific research questions. From that perspective, it's bottom up.

John Bellone 25:00
Right. Similar to the origination of the MMPI, which was empirically keyed. They didn't use the questions that most experts felt would tap into depression. They looked at what the data showed in terms of distinguishing groups and they used whatever was the best fit, question-wise. Seems like it's the same sort of process.

Robert Latzman 25:24
So… [laughs] because a lot of what I do sits in personality assessment, I'll say the reason it's different than the original MMPI approach is the MMPI approach is a criterion keyed approach. That is, they chose items that maximally distinguished between patient groups.

John Bellone 25:42
Right.

Robert Latzman 25:43
Right. So they compared a diagnostic patient group to a non-diagnostic group. It's a case control design, way back when. Of course, my favorite point is that the original MMPI was developed by comparing psychiatric patients to the "Minnesota normals".

John Bellone 26:03
[laughs]

Ryan Van Patten 26:03
[laughs] Yeah.

Robert Latzman 26:04
It's what they were originally called.

Ryan Van Patten 26:06
The “gold standard” of human functioning.

Robert Latzman 26:10
Right. I mean, which gets better because I just gave this lecture in a class recently. What I like about the MMPI story is that [for] the original MMPI, the "Minnesota normals" were friends and family members of the psychiatric patients. [laughs] That's changed. The MMPI looks very different now than it used to. But that's different than the HiTOP approach, which is really based within a factor analytic tradition.

John Bellone 26:36
Okay, gotcha.

Ryan Van Patten 26:37
Yeah. That was going to be my next question. We're talking about HiTOP as quantitative, empirical, which is hard to argue with. It's not based on subjective opinion so much as the old "rational model of the DSM". We're using data and science to guide how we conceptualize psychopathology. So explain how and why exploratory and confirmatory factor analysis are so integral to this approach.

Robert Latzman 27:05
Yeah. So HiTOP is based within a large literature. The original 2017 Abnormal paper that was published that has that original figure was based on, I believe, something like over 100 published studies, a number of which were genetic studies, etc, etc. Those studies all used factor analytic techniques. So what I mean by that is that the way HiTOP was developed was a consideration of the covariation of clinical symptomatology. That is, why do two symptoms co vary with each other systematically more often than others? What does that look like? You could think about that in two different ways. I think this is what you're getting at, right? This idea of exploratory versus confirmatory approaches?

Ryan Van Patten 28:03
Yeah.

Robert Latzman 28:03
An exploratory approach is a way of deriving these sort of latent dimensions. I guess I should back up and ask myself the question of what is a latent dimension?

John Bellone 28:17
Sure.

Robert Latzman 28:18
So the way I always talk about latent dimensions, and, again, I don't have good examples, so I use these sorts of things. Sort of, God created the earth on six days, he rested on the seventh and created latent constructs on the eighth.

Ryan Van Patten 28:31
[laughs]

Robert Latzman 28:32
Right. As a result of that, these are things that are out there, but we can't directly measure them. A good example is temperature. The way mercury moves in a thermometer is an indirect indicator of temperature change. Does that make sense? It's an indicator. Latent dimensions are thought to influence the indicators of interest. So the reason I respond to a depression inventory that I have lost interest in things that I used to enjoy or that I'm not sleeping as much as I used to or I'm feeling blue, my favorite depression item, is a result of my latent level of depression. Those symptoms are indicators of that latent construct. So an exploratory factor analytic approach isn't a theoretical approach to determine the number and nature of latent dimensions that undergird whatever you may be studying or measuring. An example - I live in Atlanta, and we're really big soccer fans, we're big Atlanta United fans. Atlanta United's colors are black and red. If you were to go to an Atlanta United game, which has an average attendance more than any other team in the country and rivals the EPL in England - side note.

John Bellone 30:00
[laughs]

Robert Latzman 30:01
[If] you were to factor analyze the shirt color of Atlanta United fans, you'd get a two factor solution. Now there are going to be a bunch of people wearing different colors as well. That falls off in terms of noise. But there are two latent dimensions that can represent shirt color in an Atlanta United game. That's the same sort of thing we're applying to data when we run an exploratory factor analysis. We're looking at covariation. Now, some people may be wearing light red and some people may be wearing darker red and whatever, but the common variant among all those shirts is red. So it's going to hold together.

An exploratory factor analytic approach is an atheoretical approach. We don't know what's out there, we just want to check it out. We want to find out. That's different than a confirmatory factor analytic approach, which is a hypothesis driven approach. Researcher specifies the relations of symptoms or whatever might be of interest to the latent dimensions, and then fits a model to test whether or not those specifications fit the data. So the symptoms of depression, those are depression symptoms, so I use them as indicators of my latent depression factor and I explicitly load them onto that factor. The HiTOP model is based on a combination of exploratory and confirmatory approaches. Typically, exploratory approaches are taken when we don't really know the lay of the land yet and confirmatory

approaches are taken when we know what's going on and we want to see how well it fits in other samples or other contexts.

Ryan Van Patten 31:43

That's great. So in that vein of EFA and CFA covariation of symptoms and latent constructs, I have thought about HiTOP in the following way and I'm curious about your feedback. For people who haven't heard of it, I say HiTOP is to psychopathology what the CHC model is to intelligence and what the Big Five are to personality, respectively, or we might say non-pathological personality. What are your thoughts on this conceptualization?

Robert Latzman 32:14

Yeah, I think that's generally correct. I mean, I think my caveat on that would be - I mean, well, I think that's probably accurate with regard to the CHC model in that the CHC model really attempted to bring in all different pieces of cognitive functioning and see what shakes out. I think the big five similarly does that, although I think the boundaries are in some ways less clear, maybe.

Ryan Van Patten 32:43

Yeah.

Robert Latzman 32:44

I think the other thing I would say that's similar to HiTOP and similar to those other two models and CHC and Big Five as well, is what we know about both of those models is that they can also be organized hierarchically. So if you think about the Big Five, for example, there's a lot of factor analytic work to suggest that personality, whether it be pathological or normal range personality, because the structure looks very similar, we can organize personality trait dimensions in a hierarchical manner as well. In a manner, by the way, that overlaps close to perfectly with the HiTOP model. That is, you have these two large broad dimensions [that] have been termed alpha or beta or stability versus plasticity. And within there, you can recover something that looks like the Big Three model of personality - negative emotionality, positive emotionality, and constraint or disinhibition. And then at a subsequently lower level, more fine grain level, you can recover the big five - neuroticism, extraversion, openness, agreeableness, and conscientiousness. You can then go further down because a lot of the Big Five measures also include facet level data. And the facet level data are more fine grained sub-components or facets of those higher level traits. So I think the comparison is appropriate in a lot of ways.

Ryan Van Patten 34:12
Yeah, that's helpful. Especially for people who haven't thought about psychopathology in this way. I think it's more common for us to be trained and learn about the Cattell Horn Carroll model, and to learn about the Neo Big Five, but my understanding and learning about that type of quantitative hierarchical model as a part of psychopathology is much more recent. It is very helpful.


So something you mentioned earlier that I'd like to zero in on for a moment is the idea of little *p*. So, similar to the CHC model, which popularized Spearman's *g*, the HiTOP spectra and superspectra are correlated with one another, suggesting the existence of this general psychopathology factor or little *p*. I think this idea might not be obvious to many people in clinical psychology especially. The meaning we can derive from it is that someone with symptoms of social anxiety, for example, is at risk both for similar syndromes such as free floating anxiety or generalized anxiety, but also is more at risk for relatively disparate symptoms such as problematic substance use. They are at greater risk for internalizing symptoms than they are for externalizing symptoms, but they're more at risk for externalizing symptoms than someone who doesn't have social anxiety. Can you talk about the importance of *p*?

Robert Latzman 35:38

So as the hierarchical models started emerging in the literature, one of the big questions that came from it, and I should just say that this is, I think, oftentimes seen as a relatively new contribution to this field in terms of the hierarchical structure of signs and symptoms, but it's really not that new. The child literature has been talking about these things for a long time. In fact,since probably the late 60s some of the first papers started coming out on this. But one of the things that's repeatedly found across studies, across samples, across ages is that the correlation between broad dimensions of psychopathology is substantial. That is, depending on which paper you're reading or what sample you're going to look at, the correlation between internalizing and externalizing, for example, is usually 0.5 to 0.6 or 0.65, which is a pretty good correlation between two separable dimensions. What this led to is a lot of discussion as well as hypothesizing about what might be accounting for the covariation of all forms of psychopathology, which led to the beginning of fitting these - depends on how you think about them - but fitting of either higher order models or bi- factor models, which are two similar sort of models, but at the same time, very different with regard to the quantitative approaches as well as theory underlying them. Regardless, the idea is that there's some sort of shared variance across all forms of psychopathology. And that shared variance, people call it the general factor of psychopathology, or the *p* factor of psychopathology, low *p* being psychopathology - what is it? I think that was the

question. I wish I had a really good answer to that question. I'm not sure we exactly know. It appears to reflect a broad liability to diverse forms of psychopathology. In fact, we know that that is not simply a phenotypic correlation. That is, it's not just about the correlation among signs and symptoms of psychopathology. We also know that there are shared genetics or shared genes that account for that phenotypic correlation. We're learning more and more also about shared neural systems that appear to be underlying that general factor, if you will. There's a recent paper just coming out now, it's in press, using the longitudinal sample from New Zealand that appears to show cortical thinning being a broad risk factor for all forms of psychopathology. Really getting at that general factor without necessarily having the specificity of any specific form of psychology.

Ryan Van Patten 38:41
Yeah. The salience network would be another one, right? The cingulate insula mPFC.

Robert Latzman 38:47
Yeah. I was going to say, if you think about some of the neural network analyses there, and they're coming out more and more as people are starting to fit the psychopathology side of things more in this way, you're definitely seeing more and more of this sort of general risk versus specific risk.

John Bellone 39:06
Do you think that the HiTOP model is going to help advance research on genetic markers and vulnerabilities further? I mean, clearly, there's more to be known in this area quite a bit and neurobiological markers as well. I can envision this making some substantial contributions.

Robert Latzman 39:24
Yes, yes, and yes. I mean, we've been doing a whole lot of work. I co-chair the neurobiology foundation's work group of HiTOP. There's also the genetics work group in HiTOP and we can talk about work groups, I guess, at a different time. But, I mean, the short answer is yes. I think, from my perspective, from a HiTOP perspective, I think I could talk more broadly even, is that the past two decades, past three decades even, have witnessed the development of new and powerful tools for thinking about biology. I mean that both from a genetics perspective. In the past 20 years, right, we've mapped the human genome. We've also advanced neuroimaging techniques in amazing sorts of ways. I should also add that a huge amount of monetary resources, as well as time, has been devoted to these efforts,

but I think only modest progress has been made. I don't think I'm alone in saying that. I mean that with regard to really identifying reliable biological indicators of mental illness. We spent a lot of time chasing the holy grail of biomarkers and we've identified some seemingly reliable "biomarkers" that explain very, very, very small amounts of areas. I think that one way to think about this, and I think the growing consensus would say that a lot of this can be attributable not to any shortcomings in terms of biological measurement, necessarily, but really, in terms of the way we were understanding the targets of these investigations, that is psychopathology. That the current categorical diagnostic systems really limits progress. In short, these categorical diagnoses are just suboptimal targets for this sort of research. There's just not enough clear signal for us to really identify biological targets or biological links. But also, in turn, the progress with regard to biologically informed interventions has been extremely slow as well.

So how does HiTOP help all that? I think we would expect biological factors to operate at different levels at that high top hierarchy. Back to the importance of thinking about these things hierarchically. There's probably some broad general risk that influences higher order psychopathology, like we were just talking about, in terms of things like general factors or superspectra. But there's also likely other factors that confer specific, more narrow risk to the individual spectra, maybe something like narrow internalizing or fear forms of psychopathology or even more narrow symptoms like mood instability. I think the HiTOP model really allows us to start thinking about optimizing our clinical targets with regard to psychopathology, but also considering at which level of the hierarchy we're going to get, for lack of a better term, the biggest bang for our buck.

John Bellone 42:49

Clearly a work in progress and lots of places to go with it. I want to pivot a bit and compare and contrast HiTOP to another model, the NIMH research domain criteria, RDoC. We've talked about this several times on NavNeuro. Can you just talk through the similarities and differences between HiTOP and RDoC?

Robert Latzman 43:10

Yeah. So we've been thinking a whole lot about this. I think that considering the way in which HiTOP and RDoC, and I should also say, the other NIH initiatives that have followed from RDoC as well - so I'm talking specifically about the NIAAA Addictions Neuroclinical Assessment, as well as the NIDA Phenotyping Battery. I think all of those initiatives. But RDoC most saliently provides a really nice way to interface HiTOP with RDoC. We've been really excited about considering the way in which

HiTOP can serve as a complement to what RDoC as well as these other NIH initiatives have provided and are also advancing.

So a place to start is to think about RDoC. RDoC doesn't really explicitly deal with the organization of the clinical phenotype. RDoC talks about various domains and within the RDoC matrix they also talk about various units of analysis across which we could and should consider and integrate in terms of bootstrapping, and I think that's their term, a model of psychopathology from it. What's not clear from RDoC is how do we organize the clinical phenotype to do all that? That is, RDoC doesn't tell us a lot about what brings people into the clinic. Where we see HiTOP coming in to complement RDoC is to provide an organization of the clinical phenotype that we can then interface with RDoC in, again, for lack of a better term, a mutually beneficial marriage. I think this can be done in a number of different ways. So, for example, my lab and my colleagues and many others have started thinking about RDoC processes or process constructs as dispositional traits. If you think about them as dispositional traits, you can think about them as traits with neurobiological as well as psychological reference. What I mean by that is, in terms of biological as well as psychological reference, is that there, we can think about how do we best assess these dispositional traits across RDoC units of analysis? And if you can think about it from that perspective, that provides a simpler integration between RDoC and HiTOP. Dispositional traits can be viewed on a continuum for psychopathology. Modeling traits across units of analysis, reflecting RDoC processes, can potentially serve as intermediaries between neurobiological systems with regard to the more basic side of things and then hierarchical dimensions of psychopathology. But stay tuned. We are just finishing up a comprehensive review paper laying out the interfaces and points of intersection between the two different models. So hopefully in the next few weeks, we'll have that up as a preprint.

Ryan Van Patten 46:20

Wow. Yeah, that'd be great. I love hearing about the integration of HiTOP and RDoC. Both models have so much to offer. Something I found when explaining RDoC in particular to students and comparing and contrasting it to the DSM model is to bring it home - they ask, "Well, so what does research in RDoC look like? How is it different from research in the DSM?" I would typically say, “The conventional research", as you had mentioned Rob, "is these case control studies where you get a DSM diagnosis, you make sure that a certain number of people meet the criteria, typically you're excluding comorbid conditions, which is a whole problem in itself, and comparing, "normals" to people with, for example, PTSD, across whatever factors you're interested in - symptomatology, response to intervention, could be

biomarkers, other biological markers." So if that is a prototypical, traditional DSM study, what is one example of a study that uses HiTOP/RDOC? Recruitment, study design? How would it be different?

Robert Latzman 47:29
Yeah, I think that's a really important question. It's a really important question because, I think the lion's share of clinical research is really being conducted using these traditional case control designs, like you're saying. Participants are put into these two different groups and you compare. There are a lot of concerns with that. You mentioned this idea of comorbidity. What brings people into a clinic? They're not these pure categories that people are studying in the labs. The other thing that it does, however, is it really limits our ability to say much about it from a discriminant validity perspective. That is, what's different about patients with these sorts of symptoms than patients with those sorts of symptoms? And what we know from structural models of psychopathology is there's a lot that's that that's similar, right? There's a lot of common variants across different forms of psychopathology, going back to the conversation we just had before about general liability of psychopathology.

So what would a HiTOP study look like? Well, I think the recommendation would be to first familiarize yourself with this HiTOP structure. That is, thinking about things hierarchically, thinking about broad dimensions, and then more specific subspectra and subfactors. Think about incorporating measures that tap these dimensions, preferably assessing multiple HiTOP spectra or subspectra simultaneously. Because what that would allow, again, us to investigate discriminant validity. One of my pet peeves is this case control design showing that diagnostic group X is worse at whatever thing it may be, than an asymptomatic, perfectly healthy control group. I'm not sure what that tells us about that diagnosis. It might tell us something about psychopathology broadly speaking, maybe, I'm not sure I'm even convinced of that, but it probably doesn't tell us a whole lot necessarily about the diagnostic group that you think you're studying. So definitely avoiding case control designs is part of this. I think, whenever possible, capturing general levels of the hierarchy, higher, more broad levels, as well as more specific subspectra or syndrome level is going to be really important.

In terms of how do we do that? So, what's the recommendation? How do we do that? One of the questions I think that HiTOP-involved folks get a lot is, "Okay, so HiTOP. But how do you HiTOP?"

John Bellone 50:21
[laughs]

Ryan Van Patten 50:21
[laughs]

Robert Latzman 50:21
And then I always say, “It's like riding a bike. Once you start, you'll remember.”

Ryan Van Patten 50:28
[laughs]

Robert Latzman 50:28
No, the "How to HiTOP?" question is a really important one. I think that for a lot of us, we don't have to shift a whole lot to design studies in HiTOP conformant ways. There are a lot of existing instruments out there that people are already using in research settings that are HiTOP conformance. That is, they get at both broad dimensions of psychopathology, for example, externalizing, but also allow for more narrow subdimensions at the same time. So I can measure externalizing, but if I'm interested in the differentiation between disinhibited externalizing, like substance use sort of behaviors, and antagonistic externalizing, more antisocial behavior or aggression, I can use instruments that allow me to tap both. I think those would be HiTOP conforming instruments.

John Bellone 51:27
Do you have some specific examples of those instruments that you prefer for this purpose?

Robert Latzman 51:33
Sure. I was avoiding it. If you noticed how vague [I was] because I was avoiding. [laughs]

John Bellone 51:36
[laughs] I know. We're going to hold you to it, though.

Robert Latzman 51:40

I see that. [laughs] I mean, to make it simple - so I'm trained originally as a child, adolescent, clinical neuropsychologist. So let's go to that world because I think we can all agree on the Achenbach suite of instruments.

John Bellone 51:54

I was going to say, Rob, though, seriously, if you're not comfortable saying it, don't worry about it.

Robert Latzman 51:58

No, that's fine.

John Bellone 52:00

For our listeners, I think, to know exactly what you're talking about.

Robert Latzman 52:02

Yeah, no. I think the Achenbach suite of instruments. So that is the Child Behavior Checklist, which is a self-report measure of child/adolescent psychopathology. I'm sorry, it's not a self-report measure, strike that. The Child Behavior Checklist is a parent-report measure of child/adolescent psychopathology. The Youth Self-Report is the child self-report version of that instrument. But to use the Achenbach system as an example, the Achenbach system has broad factors or scales - there's an externalizing scale, there's an internalizing scale, for example. But there are also subscales that fall within externalizing, for example. You can separate rule breaking behavior from aggressive behavior, which, again, is a plug and play HiTOP conformance approach. That is, considering broad spectrum externalizing, but also more specific subspectra like rule breaking behaviors versus aggression. I should say, because the follow up question should be, “Well, how does rule breaking behavior and aggression situate within HiTOP?” Yeah, good question. [laughs]

John Bellone 53:23

[laughs]

Ryan Van Patten 53:24

You're doing our job for us.

Robert Latzman 53:25

Yeah, no. Rule breaking behavior is largely situated where the substance use behaviors fall in HiTOP, which falls into disinhibited externalizing. You just don't see much substance use in kids. [laughs] So there's an example in kids. There are other examples and there are adult measures as well. So, I mean, the Achenbach system has adult measures for similar sorts of pieces. But there are other measures that have been developed to use an adult measure example. The Externalizing Spectrum Inventory, which was developed actually as a way of modeling the externalizing spectrum and out of that came an instrument provides for both a general externalizing unreliability scale, but also what they had called callous aggression versus disinhibition as two subdimensions that fall within that general externalizing. There's a publicly available, freely available instrument that can be used in a HiTOP conformant way. And there are others. The Inventory of Depression and Anxiety Symptoms, the IDAS, is another example of the more internalizing side of things. That's, again, a dimensionally conceptualized bottom-up - starting from the signs and symptoms and building a model that then turns into a measure - of measuring everything you want on the internalizing side of things. What's really nice about some of these instruments, and I'll use the IDAS as an example of this, is that you can get at specific symptom clusters or symptom subdimensions if you're interested in also linking that to what we know in the literature. So the BDI, there's also a general depression scale that correlates about 0.9 with the BDI. So you can have your cake and eat it too.

John Bellone 55:26

[laughs]

Ryan Van Patten 55:27

Yeah. I believe that your group, with a larger HiTOP group, is designing a new measure specifically to assess the entire model. Is that accurate?

Robert Latzman 55:36

That's correct.

Ryan Van Patten 55:37

Yeah. So be on the lookout for that.

Robert Latzman 55:41

Yeah. So that is in the works. I'm not part of the measurement development workgroup, but I can tell you that the way that's being organized is it's being organized around HiTOP spectra. So there's, I think, 38 or 40 members now, who have been dividing and conquering efforts to develop, again, working their way from symptoms up, not the other way around, an instrument that can assess HiTOP, if you will. I think the other part of that that becomes really important goes back to one of the original questions you'd asked earlier, which is that having the ability to assess at the symptom level across all of HiTOP will also then allow for us through an iterative, empirically driven manner to think about refining and revising the HiTOP model. Again, it was not meant to be put out there as the final story, it was a starting point.

John Bellone 56:52

You might not want to talk about it, which is fine, but do you have anything to say about the broad based measures that we have right now? MMPI, PAI for example?

Robert Latzman 57:00

Yeah, sure. So, there have been a few papers written from the HiTOP group that have discussed - and those are two good examples of them, so I'm glad you brought those two up, and maybe not some others - but both the PAI and the MMPI-RF specifically appears to have been developed and structured in a way that should allow for the assessment of various HiTOP spectra in different ways. The PAI is a really nice example because using PAI subscales you could actually not just get broad internalizing, but you could separate something like somatoform out, because the PAI has a somatoform subscale in there, too. At the same time, something like the PAI was developed to also link to the DSM. So I think efforts towards thinking about using those instruments, and maybe again, starting with the items and seeing what sort of moves up in terms of fitting a HiTOP structural model are going to be really important to really fully explicate HiTOP.

Ryan Van Patten 58:03

Yeah, the RF actually has a hierarchical organization with internalizing, externalizing, and thought disorder factors. So that's done very well.

Robert Latzman 58:12

Right. And the RF was developed in a way very consistent from an analytic perspective to how HiTOP is developed and is being thought about.

Ryan Van Patten 58:20

There's one different type of assessment that I wanted to touch on briefly, which would be structured inventories, such as the mini diagnostic inventory or SCID. My understanding is that there's a problem with these inventories if we're generalizing the HiTOP, which is that they use skip logic in order to expedite DSM diagnoses, but then you're losing a lot of information. You ask one question, based on the examinee's answer, you might then skip other questions about other important symptoms because your only concern is whether or not you're making this diagnosis. For the DSM model, that works great. But for HiTOP, you're just losing rich, clinical phenotypic information. Right?

Robert Latzman 59:03

I agree with you entirely. Yeah. I mean, this has been one of the big - well, there's probably a lot, but one of the big impediments to faster progress, I think, has been the use of skip logic in large epidemiological studies of mental illness, which I think is exactly what you're touching on. We just don't have large samples at this point. That's not entirely accurate. In general, we don't have large samples at this point with really fine grained symptom level data. Which is why, to come back full circle, the DSM diagnoses were used as placeholders in that original HiTOP figure, because that's where we are with these very large samples that allow for the factor analytic work that needs to be done and that requires large samples. My hope is that this starts changing and that we can start modeling these sort of hierarchical structures using symptom level data. I think there's a lot of hope with regard to that right now. There's a lot of hope based on assessment approaches, using things like computer adaptive testing to get at the symptom level data as well as being able to use efficient yet effective report based instruments that allow for getting a full range of symptomatology.

John Bellone 1:00:45

Do you think that we're at a place right now where we can use HiTOP clinically? Should we use it clinically?

Robert Latzman 1:00:53

Yes, yes, and yes. [laughs] Yeah. So one of the HiTOP workgroups is the clinical translation workgroup. And the clinical translation work group has been hard at work developing materials and ways in which clinics can implement HiTOP today. In fact, there are a number of different sites around the country as we - well, I'm not sure how "as we speak", given our current situation [laugh] - but there are a number of different sites around the country that are running HiTOP focused clinics, if you

will. I'd be happy to provide a link to HiTOP material. There's actually a HiTOP clinical translational website that provides a lot of that for clinicians who might be interested. But I think, just to summarize it, in short, we see HiTOP as a way of improving case conceptualization, and in a way that's more aligned with transdiagnostic treatments, while also specifying more narrow targets for intervention.

So, from a provider perspective, HiTOP can provide a flexible stepwise approach to assessment. It depends on your setting and the clinic setup, but you can provide an assessment that can begin with a brief screener of higher order spectra and then, based on time or needs of specific clinics or clinicians, that can then progress to more focused assessments that can help to characterize subfactors or syndromes or symptoms or traits. It also enables clinicians to target specific levels for assessment or for intervention. That flexibility, I think, and people in the clinical translational work have argued much more coherently than I am right now - that flexibility is especially important across settings that have different resources and have different needs. So I think we're ready to go in a lot of ways.

I also would argue that many clinicians are already doing this. I think that one of the concerns in terms of barriers to doing this sort of thing is, "Well, this is really different and different is scary. How are we going to get clinicians to actually think this way?" I think the majority of clinicians - and by clinicians, I'm talking about psychiatry, psychology and allied disciplines - are already thinking this way. So for example, there's a paper a few years ago by Michael First in World Psychiatry, it's a survey, but just the numbers. So [there were] about 2000 clinicians, mostly psychiatrists. When you ask them why they use DSM, the number one reason, 75% of respondents [said], "To meet administrative requirements".

John Bellone 1:04:02
That was my next question to you is what the impediments to implementation are, and that's one of them. There's also insurance reimbursement that I hear brought up.

Robert Latzman 1:04:11
Right, yeah. So insurance reimbursements can be another one. So, let's talk about insurance reimbursement briefly. So, reimbursement is typically tied to ICD codes. An ICD code typically needs to be submitted for an encounter for a clinician to then get paid. And, as anyone who's opened up a DSM knows - although I find students are always surprised that DSM codes have affiliate ICD codes, and it's the ICD

codes that are used for billing, not DSM - but every diagnosis has an ICD code. In addition to specific codes, every diagnostic grouping in ICD also has an unspecified category. Those are for cases that don't meet the diagnostic criteria for specific disorder or for whom clinicians choose not to provide a code. It's possible to use appropriate unspecified category codes corresponding to patients presenting symptoms for reimbursement within a HiTOP framework. In fact, the high top clinical translational work group, again, accessible on the website I'm happy to provide, has developed a publicly available HiTOP-ICD crosswalk to facilitate clinicians using HiTOP in practice.

I would also argue that, back this idea of clinicians already doing this, most clinicians are not treating diagnoses. What I mean by that is that clinicians are not choosing treatments based on the diagnostic code that's being submitted for reimbursement purposes. In fact, back to that World Psychiatry paper, one out of three say they use DSM for selecting treatment. So how are treatments being selected? Treatments are being selected based on signs and symptoms of what's actually bringing people into the clinic and where impairment is lying. And from that perspective, I think HiTOP provides an organization that could really allow for targeted interventions. I guess, I'll just say, again, this fits really, really nicely with the unified transdiagnostic model, which is treatment for emotional disorders coming out of David Barlow's group. This is what they're doing. They're thinking about these things. And I'm honestly not sure if they say it explicitly, but it's a very HiTOP conformant approach.

Ryan Van Patten 1:06:39

Yeah. I'm reminded of one example where we can use HiTOP that is illustrated in several of your papers, which is, often psychologists implement CBT of one variant or another as a treatment. And as it currently stands, we have CBT for major depression, and CBT for general anxiety disorder, CBT for social anxiety disorder, those three disorders, if we want to think of them as separate entities, all cluster in the internalizing spectrum. Similar treatment strategies tend to work for all three. So we could start rethinking our treatment manuals and approaches to treating distress as it relates to internalizing disorders, treating specific externalizing disorders, and it'll save time and will be more effective in our treatments.

Robert Latzman 1:07:31

I agree entirely. Yes.

Ryan Van Patten 1:07:33
So we've talked a lot about HiTOP related to DSM, ICD, and then clinical applicability of HiTOP right now. I'm not intimately familiar with the timeline of when DSM-6 may be released, but how might HiTOP inform the next iteration of the DSM?

Robert Latzman 1:07:54
Yeah, I think it's a really important question. So, first, the DSM-5 is currently in a revision, happening as we speak. So they have an open call, I think, still, for proposals to potential revisions for DSM-5. So one of the interesting and important changes moving from DSM-IV to DSM-5, was that the Roman numeral was replaced with an Arabic numeral [laughs].

Ryan Van Patten 1:08:20
[laughs] Big, big change.

John Bellone 1:08:22
[laughs]

Robert Latzman 1:08:22
[laughs] You joke, but I think that was substantial. It's still, every time I see a Roman numeral five, that V, it gets to me. It's like, no. But the reason being, and using the DSM words, is that it's a “living, breathing document.” So, theoretically, I guess maybe not theoretically, maybe really, we'll be seeing DSM 5.1 coming soon. You know, stay tuned. Yeah, that's not the coming attraction that everyone wants, right?

But I think the question of, “How does HiTOP inform the DSM?” is a really important one. And, like I said, from the outset, HiTOP was really developed to be very separate from DSM. And was developed in response to the various limitations that a categorical nosology presents, and as a way of overcoming those limitations both with regard to advancing research but also with regard to advancing clinical care. So that being said, I do think there are ways that HiTOP can interface with DSM or inform DSM moving forward. I'd start by saying that DSM-5 did begin to take steps toward quantitative nosology. One of the other really important moves from DSM-IV to 5 was the organization and grouping of chapters. DSM-5 changed a lot of that both in terms of the order of chapters and but also internally within which chapter different diagnoses were grouped. A lot of that was done in response to the need to group similar syndromes into diagnostic classes based on the data. So I think that's a really important step and very much consistent with starting to think about the fact

that some of these diagnoses - and I shouldn't say some, many of these diagnoses - covary systematically, not randomly. And that the diagnostic manual should reflect that systematic covariation.

In addition to that, don't get me wrong, at the time, it was really disappointing how this all went down. But DSM-5 in Section 3 did incorporate the alternative model for personality disorder. A trait based dimensional model that people are encouraged to consider and research and start thinking about how to integrate, along with a DSM copyrighted, publicly available instrument to assess that model. So I think those two are really important steps. And they give me hope.

So how do we move forward? I think many of the disorders in DSM-5 could be regrouped into classes that are consistent with HiTOP spectra. They could be conceptualized as part of a part of a hierarchy. Sort of, Ryan, like you were describing earlier, with regard to various sorts of internalizing syndromes. We can think about them all in a hierarchy with regard to these are distress based syndromes, these are fear based syndromes, all within internalizing hierarchy. DSM could group disorders in that way, which would be HiTOP consistent. In fact, you know, just a side note, the idea of grouping things like major depressive disorder, for example, generalized anxiety disorder, two disorders that fall within distress, even though one is considered an anxiety disorder and one is a mood disorder, that was considered in DSM-5. It wasn't adopted, but it was considered. I think there is hope to think that these sorts of conversations are happening at that table at least. I think another way we could think about this is that disorder criteria can be scored continuously. It's not my preferred approach to this. That being said, if we start scoring criteria continuously through using symptom counts and then adding in something like severity indicators, right - if you think about it, this is what DSM-5 has done with substance use disorders. Again, that's now incorporated into DSM-5, but that sort of approach could be more broadly applied. And this will provide a lot of benefits over categories and also potentially allow for something that looks a little bit more like a hierarchical structure. There would obviously be the heterogeneity of the diagnosis, that wouldn't go away, nor would the symptom overlap. But, again, we could be moving towards that direction.

Ryan Van Patten 1:13:11

Yeah. What you're describing for DSM-5 substance use disorders, what that looks like is a long list of potential symptoms and I believe if you have two to three, you have mild substance use disorder, four to five or so is moderate, and six or more, I might be a little off with the numbers, but that would be severe. So that's what you're advocating for?

Robert Latzman 1:13:31
Well, I don't know that I'm advocating for it. [laughs] I think that that sort of approach could demonstrate the integration of HiTOP principles.

Ryan Van Patten 1:13:42
Right.

Robert Latzman 1:13:43
I'm not sure that would be equivalent to HiTOP. I do think, and others have written a lot about this, this separation of symptoms and impairment is really important. It's something that DSM has always done. If you look at the way DSM is written, every single diagnosis is you have to meet X number of signs and symptoms in a checkbox sort of way, plus impairment. But more formal separation of symptoms and impairment would also seem to be a really nice sort of way forward. Again, however this is incorporated currently into DSM-5 in Section 3 with regards the alternative model of personality disorders.

Ryan Van Patten 1:14:26
Yep. One more HiTOP specific question. So, on NavNeuro, we are very interested in cognition. The DSM mental illness includes several cognitive disorders, most salient to John and me would be mild neurocognitive disorder and major neurocognitive disorder, but there are others. Looking toward the future, how do you see HiTOP incorporating and informing neuropsychologists' frequently diagnosed syndromes?

Robert Latzman 1:14:54
Yeah, so that's a really important question. I think you're touching on some of the gaps in the current HiTOP model. What I can say is that the consortium is aware of that, and is actively discussing how to fill in those gaps within the model. What will that look like? Well, it really will depend on where things move. And what do I mean by that? What I mean by that is that a lot of the data sets that HiTOP is based on in terms of the structural modeling don't include the sort of symptoms, the sort of cognitive impairments, at least direct measurement of them, that you're describing. So this is where it becomes tricky. You need large data sets that include a broad enough range of symptoms to start modeling. Other different factors are spectra within HiTOP. Thinking about how they are situated within the HiTOP model, and also the way in which they may interface with other spectra within the HiTOP model. I think cognitive disorders is a really nice example of part of DSM and also part of bread and butter of a lot of neuropsychologists, that is not explicitly and

clearly situated yet within HiTOP, but that is going to be coming down the pike. I would say, what I can add to that, additionally, is that HiTOP is well aware of the need to revise the model to supplement the model. And, in fact, HiTOP has a revisions workgroup whose sole charge is to consider how to integrate new data and new findings into this model moving forward.

John Bellone 1:16:56
Well, Rob, you didn't know this, but this has all been an interview of Ryan because he's looking for a research program. He would be the perfect one to add the cognitive piece to HiTOP. So…

Ryan Van Patten 1:17:09
[laughs]

Robert Latzman 1:17:09
Yeah, so. I mean, in all seriousness, I mean, yes.

John Bellone 1:17:13
Sandbagging him here. [laughs]

Robert Latzman 1:17:15
No, but part part is, it's a really important need. It's really important for a number of reasons, but that… [laughs] You're not going to include this because I'm going to go on a bit of a rant, which is what's really tricky integrating across assessment modalities, and from a factor analytic perspective. Right, so a lot of the cognitive literature and, in a lot of what my background is, in a lot of what I do is I collect a lot of these data. But how do you fit structural models when correlations between indicators that are believed to be indicators of the same construct correlate, I mean, I don't know, 0.2 if you're standing on your left foot and juggling on a good day, right? That's not enough shared variance to fit a model. So moving forward to think, this is a big interest of mine, how do we integrate across assessment modalities? Or using RDoC terms, units of analysis? Whether they be - I'm really interested in how do you bring neuroimaging data into the fold? Thinking about neurophysiology data plus task based data plus report based data, which, as we all know, they don't correlate very well, to say the least. So yes, that should be the frame of research. I'll say a lot of people have really strong feelings about that though. [laughs] So you know, it's a bit of a shark tank. [laughs]

Ryan Van Patten 1:18:51
Fair enough. Good to know ahead of time when making career decisions.

Robert Latzman 1:18:56
[laughs]

Ryan Van Patten 1:18:57
To drill down and clarify, talking about different assessment modalities, it's very relevant to neuropsychology where we use performance based tests of cognition as compared to self reported mood and other emotional symptoms.

Robert Latzman 1:19:10
Yeah. So one of the things that we have attempted to do thinking about, "How to HiTOP?" it has to do with improving the reliability of our assessments. When you bring in task based data, there are significant reliability concerns. If you think about trying to integrate data into a meaningful way through something like a factor analytic approach or latent variable modeling approach, which is what I would argue is the preferred approach, your ability to do so is attenuated by the reliability of your assessment. This is what makes me a really bad neuropsychologist. I'm really skeptical of how we use neuropsych data in these sorts of ways. And have for myself and I've pushed others to try to go more towards computerized task based sort of measures. Why? Because you can leverage repeated observations. It's the principle of aggregation. You can do so in a way that theoretically gives you a reliability boost. Although, I'm sure you guys are well aware, especially if that's your interest, that recent paper on why self report and task based indicators of self control don't correlate. The conclusions of that paper, which I hesitate to say I agree fully with, is that task based measures are bad, period, and we just drop them. They don't entirely say that, but that's what the take home message is. I think there's more to the story. I think we have to think about these things from the perspective of how do we best model shared variance? What is that shared variance? And are there times where it's sort of a blind man and elephants sort of thing? If you know that analogy, right?

John Bellone 1:21:05
Are you seeing different pieces of the same structure?

Robert Latzman 1:21:08

Exactly. Right, exactly. So, if it's that, then the idea that we have very little shared variance makes some sense. But that's okay because we really need to fill in a fuller picture. But it gets tricky, right? Because there's so much - and from report based instruments, we try really hard to have as little noise as possible in our assessments. But from a cognitive or task based approach, the old measurements, sort of observation equals true variance plus error, you know, there's a lot of error. There's a lot of noise in that. That's sort of - I mean getting at this idea of integrating mood with cognitive tasks, right? How much of a cognitive task performance is based on mood and state versus? It gets really tricky.

John Bellone 1:21:59

Yeah. These are really good points. So we have a couple of bonus questions. I suspect you might have answered your first bonus question. We'll see if you have something else to say. But one of them is if you can improve one thing about the field of neuropsychology, what would that be? Maybe it's computerized testing for you? [laughs]

Robert Latzman 1:22:16

No, no. I mean, I think - can I give you two things?

John Bellone 1:22:19

Sure. Yeah. Just two, we won't allow three. [laughs]

Robert Latzman 1:22:20

All right, just two. [laugh] I think number one is that it's something that I was told when I first started seeing neuropsych patients in grad school. My supervisor was Dan Tranel, who was and is the director of the Benton Neuropsych Clinic at the University of Iowa. One of the things that Dan used to say is that you're a clinical psychologist first, and you're a clinical neuropsychologist second. I always thought it was just a cute phrase, but I think there's a lot to that. I think that intersects with my number two, so maybe it's 1 and 1a. Which is an appreciation for the way in which psychopathology, clinical symptomatology, intersects with what neuropsychologists are typically focused and interested on. I think that oftentimes, neuropsychology puts itself in a category and sometimes ignores basic clinical science, despite we've all heard the warnings about not doing that. But so I think really more of a focus on an integration of neuropsychology with clinical science, basic clinical science. Both from an understanding of the way in which neurological conditions are affecting people, but also from an assessment perspective. I think,

Ryan, this gets at some of the stuff you're really interested in. How does mood, how do those sorts of things influence the assessment data that we're collecting? Both with regard to shared variance and performance, that is what we're calling mood or calling the cognitive thing really has some shared variance to it, as well as to introducing unwelcome nuance variance. I think that becomes really important. The other piece I'd put is just from an intervention perspective. I think understanding psychopathology, clinical science more really helps to understand and think about when we send patients off to do whatever, we send families off to support this individual in this sort of way, it's a bigger picture we're talking about. So I think there's 1 and 1a, or 1 and 2.

Ryan Van Patten 1:24:44
Fair enough. Well, we have two bonus questions.

Robert Latzman 1:24:47
Oh no.

Ryan Van Patten 1:24:48
This is our very last question for you. Again, this is not specific to HiTOP necessarily, it's about the field of neuropsychology. What is one bit of advice you wish someone told you and your training or someone did tell you that really made a difference? Here we're looking for an actionable step that trainees can take that they might not have thought of that could improve their performance.

Robert Latzman 1:25:10
I think that's a really important question. I think there are a few different ways to answer it. Let me tell you what those different ways are. And then I can answer it. I think it really depends on career trajectory and interests. And I think playing the long game is really important. Knowing where you want to end up. So the question that we all got asked when we interviewed for graduate school is, “Where do you want to be in 10 years?” And for most of us who went to scientifically oriented places, we all said the same thing. Right? [laughs] You're grinning because you know that's true. I think that's fine. But I think we also know what the job market looks like. I also think we know that outcomes vary widely. I think that we need to understand and give ourselves a break from a training perspective, but also from a mentoring perspective, that we can have positive outcomes regardless of the setting that that person winds up in. And from that perspective, I think it's really important to keep open doors. I say this all the time, it is one of the benefits I think people have in graduate school especially, you can keep lots of doors open. I think

the idea of keeping as many doors open as possible and only shutting doors when you have to is a really good approach to all this. Because you just don't know where you're going to end up and where you want to end up. I think that changes over time. That changes based on life circumstances and situations, etc, etc. So that's one thing. I think it depends on which career trajectory. Regardless, I think relationships really matter. I think networking really matters, I think relationships really matter. Because I think it helps. I think it helps put your tentacles out there. Figure out what you like and what you don't like. Knowing people from different places, you get to learn a little bit about those different things and really can think about where you see yourself. I think we often get lost. For those of us who are trained in scientifically oriented departments of psychology, we get lost in what that world looks like outside of that. Says the guy who works in that job now.

Ryan Van Patten 1:27:32
[laughs]

Robert Latzman 1:27:32
So I think that's one reason relationships matter. “Relationships matter” is my big advice. I'm not sure if someone told me, but someone should have told me, I think you really have to enjoy the ride. Like, I think you really have to get jazzed about this stuff. What I mean by this stuff is really the process, not necessarily the outcome. I think you need to enjoy the different pieces of it and the process of those different pieces. I mean, I joke with my students that I enjoy every step of a paper process. I enjoy all of it. I enjoy pressing the submit button when submitted.

Ryan Van Patten 1:28:15
[laughs] That's the best part.

Robert Latzman 1:28:16
Right. I mean, I enjoy getting the desk rejection, you know, 15 minutes later.

Ryan Van Patten 1:28:22
[laughs]

John Bellone 1:28:22
[laughs]

Robert Latzman 1:28:24

Yeah, that happened. Like, I'm pissed about it, don't get me wrong, I don't use appropriate words necessarily at the moment. But, like, it's all part of this process that I enjoy all of it. I enjoy being angry about reviewer number two, and then coming around to saying, "Okay, I sort of see where he or she's coming from." I enjoy that. I enjoy wondering whether or not the editor is going to send it back to reviewers and who I'm going to have to deal with. I enjoy guessing who a reviewer is, even though I'm pretty confident I typically have no idea. I like that stuff. I like the page proofs. I love seeing it put together in a way that looks fancy. So I think enjoying the ride is a really important part of it. I think relationships with people you enjoy working with is a huge part of that. So, yeah.

Ryan Van Patten 1:29:19

Yeah.

John Bellone 1:29:19

Couldn't agree more.

Ryan Van Patten 1:29:20

Some great advice. Thank you so much for the time, Rob, today to talk about HiTOP. I think it's a very important topic that I hope starts to become more well known in neuropsychology, in particular. So we're very grateful.

Robert Latzman 1:29:34

Yeah, no, thank you. Thank you guys so much for doing this. For bringing me in specifically, but also bringing HiTOP into this audience because I think the more people we can reach, the more important HiTOP becomes but also the more voices we get coming back to us and talking about points of omission or points that we're really not thinking about. And I think that really needs to be incorporated. I think one of the things that needs to be different about HiTOP is it has to be an open back and forth and working model. It can't be the sort of thing that's authoritative that comes upon from a high and there it is. So I really appreciate this venue and this opportunity.

Ryan Van Patten 1:30:21

Great.

John Bellone 1:30:21
It's our pleasure.

Transition Music 1:30:22

Ryan Van Patten 1:30:27
Well, that does it for our conversation with Rob. Don't forget to check out the visual depiction of the HiTOP model at navneuro.com/52. It will really drive home the framework that we discussed today. And, as always, join us next time as we continue to navigate the brain and behavior.

Exit Music 1:30:45

John Bellone 1:31:09
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Ryan Van Patten 1:31:21
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