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Operational definitions and measurement of externalizing behavior problems: An integrative review including research models and clinical diagnostic systems

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Abstract

Measurement of externalizing disorders such as antisocial disorders, attention-deficit/hyperactivity disorder or borderline disorder have relevant implications for the daily lives of people with these disorders. While the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD) have provided the diagnostic framework for decades, recent dimensional frameworks question the categorical approach of psychopathology, inherent in traditional nosotaxies. Tests and instruments develop under the DSM or ICD framework preferentially adopt this categorical approach, providing diagnostic labels. In contrast, dimensional measurement instruments provide an individualized profile for the domains that comprise the externalizing spectrum, but are less widely used in practice. Current paper aims to review the operational definitions of externalizing disorders defined under these different frameworks, revise the different measurement alternatives existing, and provide an integrative operational definition. First, an analysis of the operational definition of externalizing disorders among the DSM/ICD diagnostic systems and the recent Hierarchical Taxonomy of Psychopathology (HiTOP) model is carried out. Then, in order to analyze the coverage of operational definitions found, a description of measurement instruments among each conceptualization is provided. Three phases in the development of the ICD and DSM diagnosis systems can be observed with direct implications for measurement. ICD and DSM versions have progressively introduced systematicity, providing more detailed descriptions of diagnostic criteria and categories that ease the measurement instrument

development. However, it is questioned whether the DSM/ICD systems adequately modelize externalizing disorders, and therefore their measurement. More recent theoretical approaches, such as the HiTOP model seek to overcome some of the criticism raised towards the classification systems. Nevertheless, several issues concerning this model raise mesasurement challenges. A revision of the instruments underneath each approach shows incomplete coverage of externalizing disorders among the existing instruments. Efforts to bring nosotaxies together with other theoretical models of psychopathology and personality are still needed. The integrative operational definition of externalizing disorders provided may help to gather clinical practice and research.

Core Tip: Diagnostic and Statistical Manual of Mental Disorders and the International Classification of Diseases have evolved as a clinical tool but with several limitations associated to the operational definition for measuring externalizing disorders. Approaches such a Hierarchical Taxonomy of Psychopathology improve the conceptualization giving a general framework for psychopathology, although providing a more complex solution for clinicians. Present review shows a lack of measurement instruments integrating new theoretical advances and clinical utility.

INTRODUCTION

The measurement of mental disorders, like any other construct, is a complex process. In addition, unlike other psychological constructs, the measurement of mental disorders can have important implications for the daily lives of people with these disorders and their relatives. Mental disorders in the externalizing spectrum [*e.g.,* antisocial disorders, attention-deficit/hyperactivity disorder (ADHD), borderline disorder] are characterized by problematic behaviors that involve the self and especially interpersonal functioning[1,2]. Thus, these disorders can impact the educational development of young people[3,4] work activity[5], and even cause problems with serious legal consequences[6,7]. Thus, the correct diagnosis of these disorders will not only allow for adequate therapeutic planning but may also affect the living conditions of those affected. In this regard, and as established by the Standards for Educational and Psychological Measurement[8], the development of appropriate measurement instruments for these disorders requires a careful process of design, application, and interpretation of their scores.

Various tests have been developed for measuring externalizing disorders and associated problem behaviors based on various operational definitions. In this respect, the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD) have been the main theoretical bases for the development of a wide variety of these measurement instruments[9,10]. However, these nosotaxies have been updated in successive editions of these manuals, leading to changes in the diagnostic criteria used to operationalize externalizing disorders. In addition, another set of tests widely used as diagnostic tools was developed outside these classifications[11,12]. One example is the Wender-Utah Scale (WURS), which uses the operational definition of ADHD based on the Wender-Utah criteria[13,14].

In parallel to the above, new theoretical approaches have emerged in recent years that address the conceptualization and classification of these disorders from a dimensional approach. Some of these models focus on personality disorders (PDs), including externalizing disorders, such as the Alternative Model of PDs (AMPD)[15] and the ICD-11 personality model[16]. Other models include PDs and other psychopathological disorders within the externalizing spectrum. These include the Hierarchical Taxonomy of Psychopathology (HiTOP) model[17] or the conceptualization of externalizing behaviors proposed in the Minnesota Multiphasic Personality Inventory (MMPI)[18]. The variety of theoretical approaches to externalizing disorders implies a multitude of operational definitions for these disorders.

Therefore, the tests used to measure them use different content. That is, each operational definition generates a test that is conceptually different from the rest, and it is necessary to reflect on the extent to which tests with different operational definitions are measuring the same mental disorders, thus allowing for a comparison of their results and applicability.

In the field of measurement, it is necessary to differentiate tests that measure externalizing disorders to obtain a diagnostic label from those aimed at obtaining a dimensional psychopathological profile. The former is most commonly theoretically based on the DSM or ICD and preferentially adopts a categorical approach. That is, they use scoring systems that allow differentiation between the presence or absence of a disorder [*e.g.*, Structured Clinical Interview for DSM (SCID)[19-21], Composite International Diagnostic Interview (CIDI)[22]] or in three or four categories according to the severity of the disorder [23,24]. Due to the parsimony and utility of categorical measures, these have been the most widely used in both research and clinical settings, being considered particularly suitable for decision-making in a multitude of contexts (*e.g.*, social, judicial, and clinical). In addition, for such instruments, it is desirable to estimate their reliability through test-retest procedures and to provide evidence of validity based on expert judgment, as well as on the sensitivity and specificity of the scores.

In contrast, dimensional measurement instruments provide an individualized profile for the domains that comprise the externalizing spectrum. Examples of these tests are the Adult Self Report (ASR)[25]; the MMPI-2[18] and the Personality Assessment Inventory (PAI)[26,27]. These profiles are determined by applying a set of items that assess facets, traits, or behaviors on dimensional scales and whose combination of scores provides the possible presence of one or other disorders. This scoring system has become more relevant in recent years due to the possibility of carrying out transdiagnostic interventions [28]. However, these dimensional instruments are less widely used in practice. This is due, on the one hand, to the difficulties in generating a diagnostic label from these instruments, while on the other hand, fewer instruments are available within these approaches, with the majority only used for assessing personality traits.

Given the issues associated with the operational definition and scoring systems of the tests, a review of the specialized literature advocates the benefit of using dimensional models, as they more adequately capture the nature of the disorders[29-31]. However, it should not be forgotten that, to date, clinical practice is strongly associated with using categorical diagnoses. In this sense, some authors propose the need to adopt a hybrid conception, according to which it is possible to use tests with dimensional scores but indicating cutoffs that allow for identifying the presence or absence of a disorder[32-34]. While this approach can be practical and useful, when applying such instruments we should not overlook the impact on measuring the disorder in terms of content validity. With this in mind, this paper aims to review the theoretical frameworks underpinning the operational definitions used in the design of tests that assess externalizing disorders along with the most frequently used tests and their various implications. Finally, a proposed operational definition for a test is presented that integrates different theoretical perspectives, with the aim of achieving conceptual equivalence.

OPERATIONAL DEFINITIONS FOR MEASURING EXTERNALIZING BEHAVIORS

The specialized literature review reveals the existence of multiple and diverse theoretical frameworks that have helped to develop tests to measure externalizing disorders or problem behaviors. The analysis of operational definitions allows us to differentiate between those that use the criteria specified in the DSM and ICD diagnostic classification systems and another set of tests that use operational definitions based on other psychopathological models. In addition, the analysis of these definitions allows a better contextualization of the utility and relevance of each measurement instrument. The main theoretical frameworks used, and their operational definitions are discussed below.

Operational definitions based on the DSM/ICD classification systems

The DSM/ICD classification systems have generated versions with varying degrees of modification in their diagnostic criteria. From the first versions of these nosotaxies in the 1950s to the current DSM-5 and ICD-11, it is possible to identify three main stages concerning the definition of mental disorders, which have affected the operational definitions of the tests developed: (1) A first stage in which disorders were conceptualized through brief clinical or phenomenological descriptions (DSM-I and DSM-II, and ICD-6 to ICD-9); (2) A second stage that involved a paradigm shift, such that disorders are operationalized through the presence of a given number of diagnostic criteria (DSM-III to DSM-IV-TR, and ICD-10); and (3) Finally, a third stage characterized by the incorporation of diagnostic criteria and traits to be assessed in dimensional terms, particularly in PDs.

In the first stage, an analysis of the first versions of the ICD-6[10] and DSM-I[9] nosotaxies has revealed that the categories included in these diagnostic systems did not include operational definitions *per se.* ICD-6 aimed to serve as a statistical classification system rather than a diagnostic system, incorporating only the different categories and associated numerical codes, while the DSM-I provided brief clinical descriptions characterizing each disorder. The assessment and measurement of the disorders were based on the judgment of the clinician or researcher who relied on the descriptions

provided by DSM-I. Concerning the disorders, ICD-6 included 26 diagnostic categories, grouped into three major groups: Psychosis, psychoneurotic disorders, and disorders of character, behavior, and intelligence. These categories were maintained in the ICD-7 version[35], except for corrected errors. The descriptions provided in the DSM-I were based on psychodynamic etiologies resulting from the prevailing American trend at that time. In this sense, the DSM-I defined disorders as "reactions", emphasizing that the subject's maladaptation to environmental stressors could be the cause of the mental disorder.

The ICD-8[36] and DSM-II[37] versions introduced changes to increase their systematicity. Specifically, ICD-8 provided a glossary of descriptions of the diagnostic categories, and, as in DSM-II and ICD-9[38], the descriptions are incorporated directly into the diagnostic categories. Including these descriptions favored the development of instruments for measuring disorders, providing the first operational definitions. In addition, it should be noted that among the two nosotaxies, some categories were unified, which led to a convergence in the measurement of disorders using both classification systems.

In summary, this first stage comprises the versions ICD-6 (1948), DSM-I (1952), ICD-7 (1955), ICD-8 (1967), DSM-II (1968), ICD-9 (1975), characterized by the absence of a definition based on operational criteria. However, each new version shows a tendency toward greater categorization and specificity. This was evidenced by an increased specificity of the recognized mental disorders collected in multiple subdivisions of the disorder categories (*e.g.*, eight new alcoholic brain syndromes were defined). Moreover, the definition of mental illness was broadened to include not only the more severe extremes of psychopathology but also milder symptoms that might be observed in the general population and not exclusively in the clinical population.

The fact that measurement was left completely open to interpretation by the clinician limited the use of early versions of the nosotaxies for systematically measuring mental disorders. Criticism soon emerged against the absence of criteria, the use of diagnostic labels without an identity of concepts, and poor reliability of clinical judgment due to interpretative ambiguity arising from the narrow definitions [39-41]. It is not surprising, therefore, that measurement instruments for mental disorders in this early stage were scarce in the literature. A bibliographic search in the Pubmed and PsycInfo databases with the keyword "assessment", confined to the years corresponding to these editions of the classification systems (between 1948, year of publication of ICD-6, and 1980, year of publication of DSM-III), reveals, firstly, the non-existence of diagnostic instruments based on the first versions of the DSM and the ICD. The existing instruments at this stage (*e.g.*, Assessment of Personality[42]) offer measures framed within psychopathological models far removed from these nosotaxies. In the words of Mayes and Horwitz[43], large-scale clinical research based on these versions of diagnostic systems was impossible since the lack of reliable diagnostic categories in the manuals prevented replication by researchers.

The beginning of the second stage of establishing definitions of disorders from nosotaxies was marked by the publication of DSM-III[19]. This version constituted a shift in the psychiatric paradigm of classification systems[44] and thus in the definition of disorders. Advances in psychometrics were applied to psychiatric assessment, leading to a tendency towards quantifying disorders through tests, rating scales, and checklists, which became a standard in mental health research and practice. In turn, the declining use of psychodynamic paradigms led to the abandonment of psychodynamic terms and etiologies, which were difficult to measure psychometrically[45-47].

To a large extent, the operational definitions proposed in this second stage aimed to achieve reliable and valid diagnoses from a metric perspective. To this end, expert consensus was used to define the diagnostic criteria[48], which were used to operationally define the tests. However, it should be noted that the delimitation of diagnostic criteria followed a descriptive approach as opposed to biological or psychological models. Therefore, this conceptualization has been described as atheoretical, its aim being to describe signs or symptoms without proposing explanations or etiological models[45,49]. Furthermore, it is worth noting the polythetic nature of the criteria included in the diagnostic systems of this second stage. That is, the operational definition encompassed criteria in which no particular one was necessary but instead required a combination of various criteria from a defined set. Consequently, the measurement of disorders derived from this scoring system made it possible for two people to obtain the same diagnosis despite being phenotypically different based on their diagnostic criteria.

Another noteworthy aspect from a psychometric perspective is that, at this stage, the diagnostic criteria refer to a level of impairment or dysfunction of individuals. That is, thresholds are implicitly set for deciding whether the presence of a symptom generates significant distress and impairment for individuals and their context[50]. However, an individual assessment of each clinician and researcher was used to determine the level of impairment, and therefore it was open to interpretation and subject to ambiguity depending on who made the diagnosis. In any case, the inclusion of this assessment showed the need to differentiate between normal and pathological[51]. Consequently, on the one hand, measures of functioning began to emerge that sought to operationalize and measure the term dysfunctionality to support a clinical judgment of the level of impairment (*i.e.*, Health-Sickness Rating Scale, Global Assessment Scale). On the other hand, these scales - which initially appeared independently of the classification systems - were subsequently adopted by them. Thus, from DSM-III-R[52] onwards, the Global Assessment of Functioning Scale[53,54] and the Global Activity Evaluation Scale were incorporated as a measure of functioning in axis V of DSM-IV[55]. In the case of the ICD, dysfunc-

tionality was measured through the incorporation of the World Health Organization Short Disability Assessment Schedule[56], included in axis II of the Multiaxial Adult Version of the ICD-10 version[57]. On the other hand, symptoms were identified that caused clinically significant distress to individuals. However, they did not have a syndromic entity *per se,* leading to the emergence of the category "not otherwise specified".

Finally, from a psychometric standpoint, it was also important to organize externalizing disorders into different sections. Thus, impulse control and substance use disorders were included in one group (Axis I), while PDs (narcissistic, histrionic, paranoid, borderline, and antisocial) were included in Axis II [52,58]. This separation of disorders has repercussions for the operational definition of the disorders, considering PDs as a different entity from other psychopathological disorders, thus using different terms to definition one or the other section. Axis I disorders were mainly defined based on symptoms or signs. In contrast, Axis II disorders were defined on the basis of traits, the latter being considered more stable psychopathological attributes. As a result of this approach, tests based on nosotaxies are also distinguished according to whether the items assess symptoms (psychopathology) or traits (personality).

While this conceptualization of externalizing disorders and behaviors has had many positive consequences for their measurement, it also has limitations in psychometric terms. The World Health Organization pointed out that the definitions proposed in the ICD-10 version did not provide sufficient information for a reliable implementation of the diagnoses in the clinical context[59]. Therefore, to improve diagnostic reliability, several guidelines were published providing definitions and instructions for establishing diagnoses (Clinical Descriptions and diagnostic guidelines[59] and Diagnostic Criteria for Research[60]). In addition, diagnostic interviews incorporated as items transcriptions of the diagnostic criteria for nosotaxies, including indications on the inclusion or exclusion of diagnoses.

Finally, it should be noted that despite attempts during this stage to unify criteria between the different nosotaxias emerging from the World Health Organization and American Psychological Association, some authors argue that only a very small proportion of these categories are similar[61]. Consequently, diagnostic tools derived from these classification systems may provide a clinical diagnosis with a similar label, albeit based on different operational definitions.

The third stage in the operational definitions of nosotaxias is found in the recent DSM-5[15] and ICD-11[16] versions. Here, the changes in the conceptualization of the disorders mark the beginning of a paradigm shift in the operational definitions of the disorders. On the one hand, both versions aim to improve the clinical utility of the diagnostic criteria and to ground existing etiological and neurobiological research in the definitions of disorders, thus providing a theoretical framework for their classification. Similarly, one of the main changes was to introduce emerging evidence in favor of dimensional models into the conceptualization of psychopathology. In this sense, changes have been made concerning substance use disorder that affect its operational definition, unifying the concepts of abuse and dependence. In addition, some diagnostic criteria have been eliminated, while new criteria have been incorporated. There has been a shift from a categorical to a dimensional diagnosis, where the addition of diagnostic criteria has repercussions for diagnosing the severity of dependence. Likewise, changes affecting the operational definition of ADHD have also been noted, primarily the need to present fewer symptoms to diagnose ADHD in adults.

However, the main changes observed in both nosotaxias are associated with PDs. Although the DSM-5 proposes a diagnostic approach that maintains the DSM-IV criteria to preserve continuity with clinical practice, it also includes in a final section (section III) an AMPD that defines two criteria for the identification of PD. Criterion A establishes the need to assess personality dysfunction, while criterion B assesses 25 facets and traits organized into five more general personality domains, providing the typology of that dysfunction. The assessment of the 25 facets allows delineating a dimensional psychopathological profile, and the identification of elevation in certain facets indicates the presence of a PD. In this section III, we shift from defining ten PDs to six, of which three could be framed within the externalizing dimension (namely, narcissistic, antisocial, and borderline, as well as a trait-specified PD in the manner of PD not otherwise specified). While section III of the DSM-5 specifies which facets would indicate the presence of a PD, it does not unequivocally state the pathology threshold for each of the facets assessed. The combined assessment of criterion A and criterion B establishes the presence of PD and profile typology, respectively.

ICD-11 also eliminates the categorical diagnoses of PD, incorporating a continuous measure based on the assessment of personality domains. Like the DSM-5's AMPD, ICD-11 PD is operationalized according to two measures: A measure of personality functioning (severity of personality dysfunction) and another measure characterized by five general traits or domains. The combination of these two measures establishes the presence of the disorder. From a metric perspective, the measure of personality functioning (criterion A: Level of personality functioning for DSM-5 and severity of personality dysfunction for ICD-11) aims at establishing a threshold to differentiate normality from psychopathology. According to DSM-5, criterion A is operationalized according to two broad dimensions: self (identity and self-direction) and interpersonal functioning (empathy and intimacy). ICD-11, on the other hand, incorporates a functioning criterion focusing on harm to others and occupational roles to establish the diagnosis of PD on a continuum of severity[16]. Including the functioning measure in both models is conceptually significant, implying that the presence of an extreme trait would not necessarily be

pathological if dysfunction is not identified.

Similarities are also found in the operational definition of traits/domains offered by the ICD and DSM dimensional personality models. Both models identify five major domains, of which they share four in common. While the AMPD defines the domains of negative affect, detachment, antagonism, disinhibition, and psychoticism, the ICD-11 defines the domains of negative affectivity, detachment, dissociality, dishinibition, and anankastia. However, there are also differences between the two systems. The AMPD operationalizes its dimensions into 25 facets and traits, the combination of which generates personality profiles defining the disorders. However, the ICD-11 considered that this information added unnecessary complexity to the classification[62], so the definition is operationalized at the level of dimensions but not facets. These differences have implications from a metric point of view. Thus, tests from the AMPD model offer a measure of the domains based on the 25 facets to define the disorders. In contrast, those tests that assess according to the ICD model offer only an interpretable measure of the domains. Consequently, the degree of operationalization for test design is greater when applying the DSM-5 AMPD model than the dimensional diagnostic model arising from the ICD-11.

Concerning these models, it should be noted that despite the distinction between the measurement of the level of functioning and the measurement of the traits/domains, the specialized literature has revealed the controversy generated by this distinction. On the one hand, some authors point to an overlap between these two criteria, assuming that assessing pathological traits and facets is an implicit measure of pathological functioning[63,64]. Indeed, psychometric studies based on factor analyses indicate that measures of criterion A and criterion B cluster into common factors when both measures are included in factor analysis[64,65]. On the other hand, this overlap is explained based on the high correlations between dysfunction and pathological traits. Along these lines, some authors argue that the four lower dimensions of criterion A (identity, self-direction, intimacy, and empathy) were conceptualized as indicators of the general dimension of dysfunction[66] and therefore, only one general measure could be used.

On the other hand, the empirical results show a distinction concerning how each criterion A subdimensions are grouped with certain criterion B domains. Specifically, measures of self-functioning are grouped with the negative affect and detachment domains, while measures of interpersonal functioning load on the same factors as measures from the disinhibition and antagonism[63,67,68] domains. Thus, the overlap could be a manifestation of how PTs are expressed and associated with a continuum of severity and how this severity could have a greater impact on an interpersonal or self domain[66,69].

Operational definition of externalizing behavior proposed by HiTOP

The delineation of diagnoses based on diagnostic systems has raised several criticisms[30,70]. Such criticisms include the possibility that the high comorbidity observed between some disorders could reflect, from a metric point of view, a lack of specificity in the diagnostic criteria. This lack of specificity could impact tests based on these classification systems. In addition, the low diagnostic reliability of various diagnostic categories has been highlighted along with the arbitrary nature of the thresholds established to determine a behavior or pathological trait[71,72]. These criticisms are coupled with neurobiological evidence showing that psychopathology is not distinct from normality[30,73,74].

Consequently, other models and taxonomies are emerging that address psychopathology in a cohesive manner, encompassing externalizing personality and behavioral disorders. Possibly one of the most widely supported theoretical models is the HiTOP[17]. This model has introduced several changes: (1) It proposes a hierarchical structure of psychopathology; (2) It adopts a dimensional definition of symptoms, facets, and disorders; and (3) It integrates personality and psychopathology into a single model. The implications of these changes concerning test design are discussed below.

First, the HiTOP[17] defines a general psychopathology framework through a hierarchical structure. Thus, the model specifies (at the lowest level) a set of symptoms and components (*e.g.,* hostility, inattention). These are grouped into syndromes and disorders at the middle level of the hierarchy (*e.g.,* substance use disorder, antisocial PD) and, in turn, are organized into higher structures or spectra (*e.g.,* externalizing spectrum, internalizing spectrum) - that encompass disorders with a common etiology. Finally, at the top level of the hierarchy, a general psychopathology factor (p-factor) is defined that groups the remaining spectra (internalizing, externalizing, and thought disorder)[17]. This hierarchical structure aims to reflect the possibility that different disorders may have common etiological factors[73,75-77]. Therefore, the definition of higher levels is intended to provide an explanatory framework for the co-occurrence of disorders by grouping those disorders with higher co-occurrence into a single factor.

This conceptual advantage poses, however, some challenges in relation to the development of instruments within this approach. On the one hand, the grouping of lower-level facets and symptoms into general factors through a bottom-up approach has been developed on the basis of existing structural evidence in the literature, such as that obtained regarding the AMPD. This evidence, however, is inconsistent[78,79] with certain facets being interstitial (located in more than one domain) and others located in the wrong domain (facets with factor loadings in domains not defined in the models). Moreover, these inconsistent findings have also been noted in other parts of the model[80,81] making it difficult to translate them into a unified operational definition. Moreover, it is also important

to note that the hierarchical structure of the HiTOP implicitly assumes that higher-level latent factors (*e.g.*, internalizing) are the cause of covariation between lower-level symptoms (*e.g.*, fatigue, anhedonia), but the model is unable to represent direct relationships between lower-order elements (*e.g.*, fatigue may lead directly to anhedonia)[82]. These relationships, for example, are better captured through newly emerging network models[83,84]. Finally, it is important to determine at which level of the hierarchy operationalization occurs so that assessment of different components of the same level shows equivalent specificity or generality[85].

The second element of HiTOP with implications for the measurement of disorders is related to the conceptualization of disorders as a continuum from normality to pathology and defines a set of dimensions at all levels of the hierarchy. This dimensionality at the lower levels allows us to account for the variability of patients within the same disorder[30,86] and simultaneously aims to solve the problem of arbitrariness in the pathological thresholds. From a measurement perspective, adopting a dimensional approach increases the reliability of the measure and is shown to be a better model for explaining and predicting the chronicity of disorders[82]. However, this element also poses some measurement challenges. On the one hand, such a model is intended to be applied in the clinical setting and thus should facilitate clinicians' decision-making regarding administration of treatments or determining the time of discharge. On the other hand, for these decision-making processes, there is still a need to establish cutoff points to assist clinicians. According to the authors of the model, while diagnosis is oriented toward profiling the severity of a patient's symptoms, these thresholds can be established according to empirical evidence[28]. Although these cutoff points have begun to be defined for some parts of the model[87] many other parts still lack such guidance. Another alternative for interpreting HiTOP-compliant measure scores is to use normative data that transforms a patient's score into standardized scores[28]. However, it should be noted that many studies have been conducted with community samples, thus excluding those scores that fall within the pathological range. When interpreting a patient's score, this could be problematic.

The third relevant aspect of HiTOP for the operational definition of disorders concerns the integration of available structural evidence on psychopathology and personality[28,86,88-90]. Thus, personality and conduct disorders would fall under the same explanatory framework, eliminating the differentiation between personality and psychopathology. However, this aspect could be problematic, considering the time frame used for assessing symptoms and signs[90]. While personality facets (*e.g.,* Callousness) are conceptualized as stable characteristics and traditionally include broad assessment timeframes, behaviors or symptoms are understood as evidence of a person's one-off state (*e.g.,* Substance use, assessed with a shorter timeframe). Grouping personality facets and behaviors in the same model is challenging when assessing different time frames. This is especially relevant as different spectrums of the HiTOP taxonomy would be operationally defined to a greater extent by symptoms, while for others this is traits or a combination of both[85].

Concerning the structure of the externalizing spectrum, the HiTOP model, in its original version[17] proposes a definition according to two separate dimensions: Antagonistic externalizing and disinhibited externalizing. While the former includes aggressive traits and behaviors (especially in interpersonal contexts), disinhibited externalizing groups together traits and behaviors that manifest difficulty in controlling impulses. The operationalization of the externalizing spectrum in these two dimensions is supported by the replication of this structure in several previous models, albeit with different descriptive labels[91-93]. In addition, after the publication of HiTOP, this structure has received support from factor analyses and meta-analyses[89,94]. Furthermore, according to the model, taken together, these two dimensions - externalizing antagonism and disinhibition - contribute toward explaining antisocial and aggressive behavior[90].

The authors proposing HiTOP have worked along two lines concerning measurement. On the one hand, they have provided a list of previously available instruments that offer a HiTOP-compatible measure[17,85]. Within the externalizing spectrum, the Externalizing Spectrum Inventory (ESI)[74] stands out among the recommended instruments, as this instrument provides the most comprehensive - although not complete - measure of the two dimensions of the externalizing spectrum. On the other hand, the Measures Development Workgroup of the HiTOP is currently developing instruments specifically designed according to the model. Unfortunately, no measure is yet available, although Mullins-Sweatt *et al*[90] reviewed the externalizing facets that serve as an operational definition for a proposed externalizing spectrum measurement instrument.

INSTRUMENTS FOR MEASURING DISINHIBITED AND ANTAGONISTIC EXTERNALIZING DISORDERS

It has previously been shown that there are various ways of operationalizing the externalizing constructs associated with the problem behaviors that are central to this study, focusing on nosotaxias and HiTOP as the most valid classification systems. However, a specialized literature review shows that there are still more existing measurement instruments for externalizing problem behaviors. After reviewing these instruments, we would like to point out several aspects. First, many published tests and

scales do not clarify the underlying operational definitions. This inadequacy may be due to the authors' negligence or aspects associated with editorial policies. In either case, failure to specify operational definitions results in a lack of specificity regarding the measured constructs. Another aspect that the authors noted in their review was the inconsistent use between the application of the psychometric techniques and the evidence they intended to provide. For example, there is an indiscriminate use of the factor analysis technique (in its exploratory, confirmatory, or exploratory structural equation modeling variants) to determine the structure of an instrument without conceptually delimiting the underlying theoretical structure. Consequently, we have observed how authors eliminate items with factor loadings below a specific arbitrary threshold[95,96], correlate item errors to improve fit indexes[97-99], or establish cross-loading without reflecting on the impact on the test content validity[99]. Finally, we would like to warn that the availability of a large number of tests, as is currently observed, most likely results in atomization in the measurement of these constructs, which is counterproductive for making progress in acquiring knowledge of these mental disorders. Given this, efforts should focus on targeting fewer instruments that are rigorously developed and versatile in their applications.

The following is a brief description of various interviews and tests available in the specialized literature that allow the measurement of externalizing problem behaviors. The selected instruments listed respond to their impact concerning their use in scientific publications and their clinical interest. Moreover, considering the large amount of psychometric evidence available, the authors have chosen to describe only and exclusively those metric aspects most directly associated with their underlying operational definition.

Instruments with diagnostic targets developed from the DSM and ICD

Diagnostic interviews to assess different disorders: Instruments that make clinical diagnoses are usually based on the DSM and ICD nosotaxias. Therefore, these diagnostic classifications form the basis for the operational definitions of these tests. These instruments provide a categorical scoring system that determines the absence or presence of a disorder. They are usually structured or semi-structured interviews whose items largely reproduce the wording of the diagnostic criteria that appear in the above nosotaxias. These items are often accompanied by clarifications to assist clinicians in the scoring process.

For the most part, changes in the diagnostic criteria of the different versions of the ICD and DSM have been reflected in updated versions of these structured and semi-structured interviews through modifications to their items. Considering the diffusion in their administration, the main structured clinical interviews that measure mental disorders - and therefore include externalizing disorders associated with problem behaviors - are the SCID-5[20,21] the CIDI[22], the Mini International Neuropsychiatric Interview (MINI)[100], Psychiatric Research Interview for substance and mental disorders (PRISM)[101] and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN)[102]. However, there are differences between these interviews. The SCID, PRISM, and MINI interviews use the DSM diagnostic criteria to diagnose disorders, while CIDI and SCAN allow diagnosis from both nosotaxias. Moreover, there are also differences in the level of structuring of the interviews. This is why the skill level of those administering the interviews is relevant for obtaining reliable and valid diagnoses - the less structured the interview, the greater the need for interviewers to be adequately trained.

The SCID is an interview that highlights the distinction between the assessment of psychopathological disorders and PDs, publishing separate versions for both disorders[19-21]: SCID-I for DSM-IV Axis I disorders and SCID-II for DSM-IV Axis II. The changes introduced in the DSM-5 have been transferred to this diagnostic interview, developing the SCID-5-CV for psychopathological disorders and the SCID-PD for PDs. Concerning the disorders of concern in the present work, the SCID-5-CV is administered to assess substance use disorder and ADHD. The SCID-5-PD is administered to measure histrionic, narcissistic, borderline, and antisocial PD.

The CIDI[22] is an interview developed by the World Health Organization which has subsequently been updated[103,104], giving rise to the different versions of this structured interview. From a metric perspective, the latest version of this interview provides an evaluation according to DSM-IV and ICD-10 criteria. However, its items are not a translation of the diagnostic criteria of the nosotaxias. Among its distinctive features, it should be noted that this interview includes questions on general health followed by those associated with the diagnosis. These questions are designed to provide a screening tool that reduces the administration time of the instrument and limit interviewee fatigue, thus improving the validity of the information obtained. It also includes scales on clinical severity and impairment to determine whether the symptoms experienced by respondents produce clinically relevant distress.

The MINI is a structured interview aimed at screening for the presence of disorders[100]. It primarily focuses on measuring internalizing disorders. Among the externalizing antagonistic and disinhibiting disorders, the MINI plus version includes the assessment of substance use disorder, ADHD, and antisocial PD. The latest version of the MINI adapted to DSM-5 (MINI-7.0.2) does not include the assessment of ADHD. For measuring the disorders, the items of this interview are worded very similarly to the DSM-5 diagnostic criteria and its scoring system also reproduces that indicated in the DSM-5 for each disorder. Due to the lack of in-depth exploration of the possible presence of mental disorders, the MINI is considered primarily a screening interview.

The PRISM is a semi-structured interview designed to improve the reliability and diagnostic validity of psychiatric disorders in patients with substance use disorder[101]. This is because these patients mimic numerous symptoms present in other mental disorders[105]. Therefore, providing an instrument to identify when mental disorders are primary and induced by substance use was considered relevant. From a psychometric perspective, therefore, this interview aims to provide high specificity in diagnosing the disorders assessed. However, due to the detailed exploration involved in this interview, its duration is long. For this reason, computerized versions have been developed to reduce administration time. There is currently a version of the PRISM adapted to the DSM-5[106].

Substance use disorder specific assessment instruments: The assessment of substance use disorders based on the diagnostic systems is mainly achieved through the diagnostic interviews mentioned above. In addition to these, other diagnostic interviews and scales specific to substance use disorder have been shown to be useful for diagnosis.

The Substance Dependence Severity Scale (SDSS)[107,108] is a semi-structured diagnostic interview specifically used for substance use, whose items allow a diagnostic assessment according to DSM-IV and ICD-10 criteria. A Spanish version evaluates substance use disorder according to DSM-5[109,110]. This instrument consists of 16 items that operationalize the 11 diagnostic criteria proposed in the DSM-5. The items of the SDSS can be sectioned into two parts: A screening section and another section that assesses the severity of the substance use disorder. One of the characteristics of this interview is that, although it is guided by diagnostic criteria, it conducts the assessment using a time frame of the previous month, as opposed to the last 12 months used by the classification systems. This time frame is motivated by the search for the sensitivity of the scores to detect changes in patients[107,108]. To be congruent with making the diagnosis according to DSM criteria and to make the scores sensitive to changes in patients, a scoring system has been designed which is compatible with the DSM diagnostic procedure, which, in addition, provides a continuous score.

Problems associated with substance use have also been assessed employing other instruments which, although based on the diagnostic criteria of nosotaxias, do not pursue a diagnostic purpose as such. One such instrument is the Severity Dependence Scale[11]. This brief 5-item self-administered scale provides a severity score for drug dependence and is designed to measure the psychological aspects of dependence experienced by drug users. To this end, its items focus on measuring compulsive drug use, the individual's worry and anxiety about their own drug use, and feelings of impaired control over their drug use. Thus, although its items are based on the diagnostic criteria for nosotaxias, not all diagnostic criteria are operationalized in this instrument. This scale has been studied by adapting it to different drugs, and studies have confirmed its psychometric properties in users of heroin, cocaine, and amphetamine[11] alcohol[111], marijuana[112,113] ketamine[114] and codeine[115]. The Short Alcohol Dependence Data Questionnaire[116] assesses the severity of alcohol use disorder through 15 self-administered items. These items focus on measuring drinking habits and the physical and mental effects of drinking. Another scale that allows an assessment of alcohol consumption is the Severity of Dependence Questionnaire (SADQ)[117]. The current form of the SADQ is a 20-item questionnaire that assesses physical signs of withdrawal, affective signs of withdrawal, craving, quantity, frequency of drinking, and the speed of recovery from withdrawal symptoms. The Alcohol Use Disorders Identification Test[118] is a specific screening test for detecting problematic alcohol use. Its items operationalize some of the diagnostic criteria for nosotaxies, and due to its simplicity, this instrument is widely used in clinical and research settings.

Specific ADHD assessment instruments: Most instruments that assess ADHD are based on the diagnostic criteria for nosotaxies. However, some differences between them are worth noting. The following describes the most commonly used instruments and their main characteristics under a psychometric approach.

The Adult ADHD Self Report Scale (ASRS)[119,120] is a screening scale that operationalizes the diagnostic criteria proposed in the DSM-IV through 18 items. It also offers three types of scores (inattention score, hyperactivity score, and total score) according to the clinical signs of ADHD. It is, therefore, a scale that largely reflects the diagnostic procedure based on nosotaxies. However, its items do not explore the presence of the disorder in depth, and it is thus considered more of a screening than a diagnostic instrument.

The Current Symptoms Scales[121] is an 18-item instrument that can be completed by an observer (CSS-OR) and/or self-administered (CSS-SR). The 18 items describe the DSM-IV diagnostic criteria included in the inattention and hyperactivity/impulsivity domains. In addition, this instrument differs from others in that it includes a scale to assess the intensity with which the symptoms interfere with the individual's functioning in various areas of their life (work, family life, or money management).

The Connors Adult ADHD Rating Scale (CAARS)[122] is available in different versions (large version: 66 items, short version: 26 items, and screening version: 30 items), with two main formats: One self-report and one observational (CAARS-SR and CAARS-OR, respectively). This scale uses items based on - but not exclusively guided by - diagnostic classifications. Thus, it offers more items to explore inattention, hyperactivity, impulsivity, or self-concept. In addition, an index of the probable presence of ADHD can be derived from its scores along with indicators of the inconsistency of responses.

The WURS[13,14] is a scale that retrospectively assesses ADHD symptoms in childhood. This scale has two versions (the original version with 61 items and the short version with 25 items). This scale generates scores for hyperactivity, attention deficit, and impulsivity, along with emotional lability and behavior problems. The contents of this scale are based on the Utah criteria. Thus, while the WURS does not assess the criteria for nosotaxies *per se*, its cutoff scores (36 and 46) have shown to be useful for diagnostic categorization.

Specific instruments for the assessment of personality domains: The shift towards the definition of disorders based on personality traits has led to the emergence of various instruments aligned with this theoretical premise. The present study will characterize psychometrically those instruments that assess the dimensions of the externalizing spectrum underpinning the disorders associated with behavior problems corresponding to the antagonism and disinhibition domains of the DSM-5 and aligned with the dissociality and disinhibition domains, respectively, of the ICD-11[123]. Furthermore, among the existing instruments, the present study will analyze those that are most widely used, such as the Personality Inventory for DSM-5-PID-5-[33] and the Personality Inventory for ICD-11 (PiCD)[124].

The PID-5[33,34] assesses 25 facets/traits proposed in the AMPD, including those for disinhibition and antagonism. The original version of this instrument includes 220 items. Subsequently, other reduced versions of 100 items (PID-5-SBF)[125] and 25 items[126] have been published. This latest version (PID-BF) only provides a score for the domains. This instrument has been adapted to numerous languages[127-133], with considerable psychometric evidence. Thus, the review conducted by Al-Dajani *et al*[134] showed, in terms of reliability, alpha values ranging between 0.72 and 0.96. Regarding test-retest reliability, values above 0.90 have been reported for all dimensions. In terms of validity evidence based on the relationship with other variables, it has been found that the structure of the PID-5 converges with the FFM model[135]. Correlations above 0.60 have been reported in the convergence between disinhibition and antagonism with their respective counterparts in the NEO-PI-R and NEO-PI-3[67,136-138]. Regarding the factor structure, most factor analyses show that the factor for externalizing divided into two sub-factors is congruent with the domains of externalizing and disinhibition. It should be noted that this instrument allows the identification of personality traits and facets, and some authors have subsequently analyzed the congruence of these profiles with the categorical diagnoses of nosotaxies[69,67,129,139].

The PiCD[124] has been developed to measure the dimensional personality model proposed by the ICD. The PiCD assesses the five domains proposed by ICD-11, including the three specific externalizing domains of dissociality, disinhibition, and anankastia traits. This instrument includes 60 items, so the five domains are assessed based on 12 items each. Psychometric studies of the PiCD have shown adequate internal consistency coefficients[124,139-143]. Concerning evidence of convergent validity, PiCD scores have shown significant relationships with their counterparts in other personality models [140-142,144]. In the case of the disinhibition and dissocial dimensions, high correlations have been found with their convergent scales but not with scores measuring anankastia[140]. Regarding the factor structure, some studies replicate the five proposed theoretical factors[62,124,145], while other authors point to an overlap between the disinhibition and anankastia factors[140,144]. Although PiCD proposes a primarily domain-based measure congruent with DSM-5, Bach *et al*[146] developed scoring algorithms for the ICD-11 facets based on the PID-5 dimensions, finding a good fit for the disinhibition, antagonism/dissocial, and anankastia dimensions. These results have subsequently been replicated in other studies[147,148].

Instruments for assessing the antagonism and disinhibition externalizing domains compatible with other psychopathological models

In addition to the instruments mentioned above, other tests and scales allow the assessment of the traits included in the externalizing antagonistic and disinhibition domains that do not adopt the DSM and ICD classifications as a basis for operational definition. The items of these instruments do not tend to reproduce the diagnostic criteria of nosotaxies. Rather, their items are organized for the measurement of traits and facets, usually on a severity scale, which is indicative of the presence of problem behaviors or disorders.

On the other hand, it should be noted that numerous instruments measure each of the antagonistic and disinhibited problem behaviors. However, in the present work, we will incorporate instruments that measure more than one of these problem behaviors or disorders. In this regard, it should be noted that, as Mullins-Sweatt *et al*[90] reported, an instrument is currently being developed to measure problem behaviors and disorders within the externalizing spectrum.

One of the instruments worthy of note is the Achenbach System of Empirically Based Assessment (ASEBA)[149]. This assessment system integrates instruments for measuring various behaviors, competencies, and interpersonal problems. Its objective is concerned with detecting problematic behaviors that can be the object of clinical intervention, although it distances itself from the use of diagnostic categories proposed in the nosotaxies. This assessment system can identify profiles concerning various behaviors, including those framed within the externalizing spectrum. Its scales include the ASR and the Adult Checklist[150,151], which report on adaptive and problematic behaviors, including drug use.

The MMPI was originally developed by Hathaway & McKinley[152,153], and the third version (MMPI-3)[154] has been recently published. In its three updates, this instrument retains the aim of providing assessors with a clinical profile that contributes to the characterization of individuals in a comprehensive manner. Therefore, its different versions include many scales that are organized to provide trait and behavioral scores while providing scores from high-order scales, including specific scores associated with the antagonism and disinhibition domains.

The PAI[26,27] is another instrument that assesses various personality traits and facets, including the disinhibition and antagonism domains. It is an instrument whose aim is not only to provide clinically relevant information for diagnosis but also useful information for planning the treatment of patients. In this sense, the authors selected those syndromes that, at the time of their development, had the greatest relevance in the nosology of psychopathology and usefulness in clinical practice. In turn, the operational definition of these syndromes was based on a review of the specialized literature to identify the most central components. Subsequent versions of the PAI have included new scales that currently measure a wide range of behaviors and traits that allow for establishing detailed profiles of the persons assessed.

Krueger *et al*[74] developed the ESI to test a comprehensive model of externalizing disorders. To this end, the authors reviewed the literature and focused on how certain disorders (*i.e.*, substance use disorders or antisocial behavior disorders) could have common etiological bases and, therefore, should be integrated into the same continuum. Under this premise, the authors developed the ESI to provide scores for personality and behavioral domains based not on phenotypic manifestations but on the underlying common structure of these domains. From here, to develop the items the authors adopted/modified items from existing measurement scales, and also designed items based on the DSM-IV-TR diagnostic criteria.

INTEGRATION PROPOSAL

For years, several authors have postulated the need for integrative models based on the classic DSM and ICD approaches combined with other empirical models that address the underlying bases of the different disorders[155,44]. This approach is, for example, followed by the AMPD or the ICD for PDs. While recognizing the value and interest of these efforts, it should not be overlooked that moving from a model with categories that determine the presence or absence of a disorder to one in which profiles are developed to identify traits and facets with normal/pathological functioning, implies a considerable leap. Consequently, many clinicians may be unable to determine which clinical and pharmacological interventions are most appropriate for their patients. Likewise, considering the nature of the disorders addressed in this paper, professionals in the judicial and educational fields (among others) must become familiar with these new approaches to make the right decisions. However, the existing empirical evidence[30,31,70] and the promising results obtained in clinical settings with transdiagnostic interventions[156,157] suggest the need to adopt these new models.

As our review has shown, while efforts have been made to bring nosotaxies together with other theoretical models of psychopathology and personality, these have not played a prominent role in practice. However, nowadays, with the major development of models such as HiTOP, we may be moving closer to achieving convergence between these approaches, and to this end, tests and scales may play a central role.

Our research group is currently developing an instrument to measure the variable 'Externalizing disorder in adulthood' with the aim of constructing a test to identify profiles along the Agreeableness-Antagonism and Conscientiousness-Disinhibition continuums. In addition, our objective is to develop items that constitute indicators that can be used to determine the presence (or absence) of externalizing disorders according to DSM-5. Thus, the framework underpinning the operational definition of the test will be the HiTOP model[17,90] and the DSM-5 diagnostic criteria[15] and in the latter case, integrating the proposals of the alternative personality model and the diagnostic criteria of section II.

Our proposal begins with the definition of 'Externalizing disorder in adulthood' as "a set of maladaptive and/or problematic behaviors and personality traits that manifest themselves through outwardly directed behaviors, which cause deterioration in social relationships and interfere with the normal functioning of the person who presents them and their environment". This construct, congruent with that stipulated in the HiTOP, presents a hierarchical structure that integrates two major dimensions: Antagonism and disinhibition, divided into facets and traits. The disorders to be integrated are antisocial, narcissistic, paranoid, borderline, histrionic, ADHD, and oppositional defiant disorder. Substance use disorder, intermittent explosive disorder, and conduct disorder are not included for several reasons: (1) Concerning substance use disorder, there is abundant specialized literature showing that although it falls within the antagonism and disinhibition domains, these always clearly form an independent factor[158,159]. This means that some of the existing scales[107-109] can currently be used for their without disrupting the assessment of these two domains; (2) Explosive-intermittent disorder is not included due to the difficulty in identifying clear diagnostic criteria. Specifically, the DSM-5 only offers a list of behaviors or problems that must be present, although it does not define any criteria to determine their presence/absence; and (3) Conduct disorder is not included due to the lack of

adaptation of the set of diagnostic criteria to the adult population.

The DSM-5 definitions of facets and traits and those proposed by Mullins-Sweatt *et al*[90] have been adopted to delineate the operational definition. However, as indicated, our proposal integrates facets and traits with the criteria specified in section II of the DSM-5. In this sense, the research team members have reviewed the specialized literature to reach the proposal shown in Table 1. This table shows, for example, that the diagnostic criteria for antisocial PD fall within the two dimensions of our model: Five of the seven criteria refer to facets of disinhibition, and two of them to antagonism. For example, criterion 6, "Consistent irresponsibility, manifested by repeated inability to maintain consistent work behavior or meet financial obligations" corresponds to "Irresponsibility". It is therefore proposed that in the final version of the test, within the items measuring this facet, there should be items whose content deals with this diagnostic criterion.

Establishing equivalence between facets/traits and diagnostic criteria provides a conceptually equivalent operational definition. Thus, the test resulting from this definition may be of interest to professionals in various fields. First, quantitative data can be obtained to locate people along different continuums of facets, dimensions, and the externalizing spectrum. From a research standpoint, it will be possible to verify the hierarchical structure of externalizing behavior problems in the adult population and to analyze, through statistical models, their relationships with other variables of interest. Second, regarding clinical application, professionals will be offered equivalence scores that will allow them to determine the presence/absence of a given diagnostic criterion and, taking into account the relevant diagnostic criteria, the existence (or not) of the corresponding PD. The operational definition provided in present manuscript is a preliminary approach that attempts to combine the theoretical advances, result of the most recent empirical research, with the clinical practice, based on the nosotaxies internationally used.

CONCLUSION

Present work highlights the importance of that measurement of externalizing spectrum disorders has for people's living conditions[3-7]. The development of measurement instruments for these disorders requires a careful process of design, application, and interpretation[8]. The bibliographic review undergone show that among the available instruments, there are those framed within categorical diagnostic systems (DSM and ICD); those arising from recent dimensional theoretical approaches (AMPD or HiTOP) and other instruments with operational definitions in specific theoretical frameworks. While categorical approaches provide useful tools to facilitate clinical decision-making, dimensional approaches have extensive empirical support as better capturing the nature of the disorders and allow greater understanding of psychopathological phenomena[28].

On one hand, our review note that the different operational definitions used in these tests under the different frameworks, hinder the comparison of the findings and applicability. Regarding the definitions based on diagnostic classification systems, these have undergone an evolution throughout the different editions with three phases. While the first editions constituted mere statistical classification systems, later versions incorporated descriptions of diagnostic categories[9,10], providing the first operational definitions of psychological disorders in general and externalizing disorders in particular.

The development of measuring instruments for these disorders did not, therefore, truly flourish until diagnostic criteria were included on these taxonomies[43] on a second phase. The inclusion of these criteria lead to a tendency towards quantifying disorders through tests, rating scales, and checklists. In addition, the criterion of dysfunction to consider the presence of a disorder were incorporated into these taxonomies[50], which led to the development of new measures for the assessment of impairment[53-57]. However, while systematization in assessment increased, many of the instruments developed from this perspective have been criticized for lacking an etiological theoretical framework[45,49]. Also, the differentiation between Axis I (substance use and impulse control disorders) and Axis II (PDs) on these classification systems[52,58], caused that tests based on nosotaxies either assess symptoms (psycho-pathology) or traits (personality).

The assessment of disorders based on these categorical classifications in this second phase, has been criticized in a number of ways[30,70]. Criticisms included the observation of high rates of comorbidity - due to the lack of specificity of diagnostic criteria - and the arbitrary nature of the thresholds between normal and pathological behavior[71,72]. On the third phase of evolution of diagnostic classifications, latest versions of DSM and ICD had begun a shift towards a dimensional operationalization of mental disorders. The AMPD model included in DSM-5 Section III[15] and the ICD-11[16] constitute two first proposals for a dimensional classification of PDs. Again, it can be noted that the measurement of functioning play a relevant role on these proposals for defining the threshold that differentiate normality from pathology. However, empirical evidence show mixed results regarding the overlap when measuring functioning and pathological traits[64-69].

In addition to the operational definition of externalizing disorders provided in the different taxonomies, our review analyzed another recent dimensional model: The HiTOP model[17]. This recent dimensional model had provided an extended classification system that address all types of psycho-

Table 1 Relationship between diagnostic criteria (Diagnostic and Statistical Manual of Mental Disorders-5) and externalizing facets-dimensions

Externalizing disorders in adulthood			Internalizing
DSM-5 disorders (diagnostic criteria)	Disinhibition	Antagonism	
Antisocial [Personality disorder, diagnostic criteria section II (3/7)]	Non-compliance with standards (criterion 1)	Deception/fraud (criterion 2)	
	Impulsivity (criterion 3)	(Lack of) empathy (criterion 7)	
	Aggression (physical) (criterion 4)		
	Risk-taking (criterion 5)		
	Irresponsibility (criterion 6)		
Narcissistic personality disorder [Diagnostic criteria (5/9)]		Grandiosity (criteria 1, 2, 3, 5, 8, and 9)	
		Attention seeking (criterion 4)	
		Exploitation (criterion 6)	
		(Lack of) empathy (criterion 7)	
Paranoid personality disorder [Diagnostic criteria (4/7)]		Mistrust (criteria 1-4, and 7)	
		Hostility (criteria 5 and 6)	
Borderline personality disorder [Diagnostic criteria (5/9)]			Separation anxiety (criterion 1)
			Affective lability (criteria 2 and 6)
			Altered self-perception (criterion 3)
	Risk-taking (criterion 4)		
			Suicide (criterion 5)
			Depression (criterion 7)
		Hostility (criterion 8)	
			Dissociation (criterion 9)
Histrionic personality disorder [Diagnostic criteria (5/8)]		Attention seeking (criteria 1, 2, 4, and 6)	
			Affective lability (criterion 3)
			Superficiality (criterion 5)
			Suggestibility (criterion 7)
			Altered social perception (criterion 8)
ADHD [Inattention (5/9)]	Inattention (criteria a-i)		
Hyperactivity and impulsivity (5/9)	Hyperactivity (criteria a-f)		
	Impulsivity (criteria g-i)		
Oppositional defiant disorder [Diagnostic criteria (4/8)]		Hostility (criteria 1-3 and 8)	
		Rebellion (criteria 4-7)	

DSM: Diagnostic and Statistical Manual of Mental Disorders.

pathology. Regarding externalizing disorders, it provides a coherent theoretical background for explaining comorbidity through the definition of general factors - Antagonistic externalizing and Disinhibited externalizing, grouped in the Externalizing spectrum - that group co-occurring symptoms. This hierarchical structure however, is not clearly supported by empirical evidence[78-81], appear to ignore the direct relations between the lower level elements[82-84], and provide challenges on the operational definition under the different levels of the model. The dimensional conceptualization increases the reliability of the measure, although requires to establish empirical based cutoff points to

assist clinicians[82]. Finally, considering HiTOP model gather personality and conduct disorders, measuring sign and traits under the same instrument can pose differences on the time frame of assessment.

On the other hand, the review of existing instruments for measuring externalizing disorders have shown a large amount of test, resulting in an atomization in the measurement. This implies that researchers and practicioners should carefully revise the operational definition and target of each instrument to ensure a good choice of measurement instrument for a specific purpose, although our review show that this information may be of difficult access or not clear. Among the structured interviews developed under the classification systems, it is worth mentioning the SCID-5[20,21], the MINI[95], and the PRISM[96] under the DSM framework and the CIDI[22], and the SCAN[97] allowing diagnosis under both DSM and CIE taxonomies. Less structured interviews such as the PRISM or the CIDI, require interviewers to be adequately trained. Regarding instrument for assessing specific disorders, our review suggests the ASRS[119,120], the Current Symptoms Scales[121], the CAARS[122] within the DSM criteria and the WURS[13,14] based on the Utah criteria are the most frequent measurement instruments. On personality, due to the emergence of dimensional personality models, it can be found measurement instruments within dimensional frameworks such as the PID-5[33,34], the NEO-PI-R, NEO-P-3[67,136-138] and PiCD[124]. Other dimensional instruments targeted to measure antagonism and disinhibition include the ASEBA[149], MMPI[152-154], the PAI[26,27] and the ESI[74].

Present review show that the different instruments identified are either designed under a diagnostic taxonomy framework which allow a categorization of the respondents or under theoretical framework derived from research that delineate dimensional profiles. As our review suggests, efforts to bring nosotaxies together with other theoretical models have not played a prominent role in practice. We provide a preliminary operational definition that attempts to combine both approaches.

FOOTNOTES

Author contributions: Lozano OM, Sanchez-Garcia M, and Diaz-Batanero C contributed on the conception, design of study and acquisition of data; Torres-Rosado L, Lozano OM, Sanchez-Garcia M, and Diaz-Batanero C participated on the interpretation of data; Lozano OM, Sanchez-Garcia M, and Diaz-Batanero C drafted the manuscript; Torres-Rosado L, Lozano OM, and Fernández-Calderón F revised the manuscript critically for intellectual content; and all authors approved the final version of the manuscript submitted.

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