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Psychotherapy case formulation for patients with aggressive behaviours in clinical settings: an adaptation of the Multimodal Functional Model

Formułowanie przypadku dla pacjentów z zachowaniami agresywnymi kierowanych do psychoterapii w różnych warunkach pracy klinicznej: adaptacja Multimodalnego Modelu Funkcjonalnego

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Abstract

Aggressive behaviours are commonly observed in clinical settings, making it crucial to employ advanced assessment tools to accurately evaluate the likelihood of such behaviour. This article aims to present an assessment framework for developing a psychotherapy case formulation for patients with aggressive behaviours within the context of clinical setting. Recognising the disparities in the usage of aggression, as well as the comorbid nature of aggressive behaviours in patients with various psychopathologies, we propose an integrative framework that addresses these inconsistencies. The framework utilises the Hunter et al.'s (2008) Multimodal Functional Model as a foundation to which we integrated seven other models that are the I^3 Model, the Algebra of Aggression model, the General Aggression Model, the Social Information Processing model, the Response Evaluation and Decision model, the Integrative Cognitive Model, and the nosographic model of mental disorders according to DSM-5. All these models were integrated into a comprehensive and expanded version of the Hunter et al.'s multimodal functional analysis worksheet, which combines the bio-psycho-social modalities of behaviour analysis in five factors that are instigation, vulnerability, reinforcement, habit strength, and inhibition. Additionally, case study example is provided to illustrate the development of a case formulation, which serves as a foundation for establishing therapeutic goals and implementing appropriate interventions. By incorporating a comprehensive understanding of aggression and utilising an adaptation of the multimodal functional analysis worksheet, this approach provides clinicians with a robust foundation for formulating effective therapeutic strategies.

Keywords: aggressive behaviours, clinical assessment, multimodal functional analysis, case formulation, therapeutic interventions

Streszczenie

Zachowania agresywne są powszechnie obserwowane w warunkach klinicznych, co sprawia, że kluczowe jest stosowanie zaawansowanych narzędzi w celu dokładnej oceny prawdopodobieństwa wystąpienia takich zachowań. Niniejszy artykuł ma na celu przedstawienie ram służących do formułowania przypadku dla pacjentów z zachowaniami agresywnymi kierowanych do psychoterapii w różnych warunkach pracy klinicznej. Uznając rozbieżności w stosowaniu agresji, a także współwystępowanie zachowań agresywnych u pacjentów z różnymi psychopatologiami, proponujemy integracyjne ramy, które odnoszą się do tych niespójności. Ramy te wykorzystują Multimodalny Model Funkcjonalny Huntera i wsp. (2008) jako podstawę, do której włączamy siedem innych modeli: Model I^3, model Algebry Agresji, Ogólny Model Agresji, model Przetwarzania Informacji Społecznych, model Oceny Reakcji i Decyzji, Integracyjny Model Poznawczy oraz model zaburzeń psychicznych według DSM-5. Wszystkie te modele zostały zintegrowane w kompleksowej i rozszerzonej wersji multimodalnego arkusza analizy funkcjonalnej Huntera i wsp., który wyróżnia biopsychospołeczne modalności analizy zachowania w zakresie pięciu czynników: podżeganie, podatność, wzmocnienie, siła nawyku i hamowanie. Dodatkowo przedstawiono przykład studium przypadku, aby zilustrować proces formułowania przypadku służącego jako podstawa do ustalenia celów terapeutycznych i wdrożenia odpowiednich interwencji. Uwzględniając kompleksowe rozumienie agresji i wykorzystując adaptację multimodalnego arkusza analizy funkcjonalnej, podejście to zapewnia klinicystom solidne podstawy do formułowania skutecznych strategii terapeutycznych.

Słowa kluczowe: zachowania agresywne, ocena kliniczna, multimodalna analiza funkcjonalna, formułowanie przypadku, interwencje terapeutyczne

AGGRESSIVE BEHAVIOUR IN CLINICAL SETTINGS

Aggressive behaviour is much more common in clinical settings than in the general population. According to an epidemiological study conducted in the U.S. population, the overall prevalence of inappropriate, intense, or poorly controlled anger was 7.8% (Okuda et al., 2015). In comparison, among 3,800 psychiatric outpatients, nearly one-quarter across current Axis I diagnoses endorsed at least moderate levels of overt aggression during the preceding week whereas in patients with any personality disorder, this ratio amounts to almost 36% (Genovese et al., 2017). Among 522 patients of 84 acute psychiatric units, the prevalence of aggressive behaviours during the first two weeks of admission varies from 20% to 51% for physical and verbal aggression respectively (Caruso et al., 2021). When it comes to personality disorders, 65% of inpatients with borderline personality disorder report having engaged in aggressive actions in their lives in the form of physical, verbal, or psychological aggression (Zanarini et al., 2017). Regarding the data in the community, patients' violent behaviours ranged from 10% to 36% in the weeks prior to the psychiatric hospital admission, 16% to 23% during the stay (Choe et al., 2008), while 25% of patients committed violent acts during the 20 weeks following discharge from the psychiatric hospital (Doyle et al., 2012). In brief, the association between mental illness and aggression seem to be confirmed (Noffsinger and Resnick, 1999) and justified a type of aggression called medically motivated aggression, which is defined as motor behaviour performed with the intent to cause injury and motivated by a disease process (American Psychiatric Association, 2013; Serper and Sokol, 2017). Moreover, aggressive behaviours may occur also in clinical settings such as psychotherapy in private practice and can be understood as an inappropriate behavioural response caused by psychological distress, a triggering and/or reinforcing condition, a psychological and/or cognitive vulnerability and the complex interactions between these factors. Given the high prevalence rates of aggressive behaviour in both inpatient and outpatient populations, it is of utmost importance to have advanced assessment tools and constructs to accurately determine the probability of such behaviour and identify their associated factors.

Hence, the assessment of these behaviours pose several challenges to the clinician. First, as a source of social stigma, these behaviours are rarely reported by the client. Conversely, when they are the very reason for the consultation or referral, the clinician may be led to underestimate or overestimate the importance of these behaviours leading to a false negative or false positive in his conclusions that may have negative consequences on the therapeutic follow-up (e.g. not protecting the client and his family, discharging the client prematurely) (Kaision et al., 2001). Another difficulty for the clinician is to conceptualise the client's aggressiveness in the absence of a framework to guide the assessment of aggression in a systematic and comprehensive manner. While there are instruments for assessing dangerousness in people with severe mental disorders (Hodgins et al., 2003; Micciolo et al., 2021), risk of recidivism in correctional settings (Desmarais et al., 2016; Olver et al., 2022), and severe behavioural disorders in people with intellectual disabilities or autism spectrum disorders (Hastings et al., 2021; Hemmings et al., 2008; Hill et al., 2014), these methods are not always adapted to the clientele seen in private office, outpatient clinics, and hospitals. Knowing when and how to assess aggressive behaviours is essential to avoid the negative consequences of not conducting an assessment or of conducting it hastily, and not planning interventions that address each of the possible causes of aggression and thus maximise the chances of therapeutic success. Therefore, the purpose of this article is to propose an assessment framework for developing a psychotherapy case formulation for clients with aggressive behaviours in clinical settings. Case formulation is defined as a hypothesis or hypotheses about the causal, precipitating and maintaining factors of the client's psychological, interpersonal and behavioural problems, and helps to organize the multiple pieces of information about the client and guide treatment planning (Eells, 2007). This article does not aim to present a methodology for violence risk assessment and management, and the reader is referred to existing reviews on the subject (i.e. Kivisto, 2016).

AGGRESSION FROM SOCIAL AND CLINICAL PERSPECTIVES

Aggression is an equivocal construct as "no single kind of behaviour can be called 'aggressive' nor is there any single process which represents 'aggression'" (Johnson, 1972, p. 8). Moreover, the way clinicians use it is often quite different from the way scientists use it. The clinician will be more attentive to the causes and consequences of the client's aggressive behaviours as well as to the meaning of the events that trigger them. For the scientist, being able to classify individuals as aggressive vs. non-aggressive is essential for conducting studies on aggression. To define aggressiveness, it is necessary to be able to find the criteria that define it, which poses a challenge. Most psychologists focus on the intent behind the action (Allen and Anderson, 2017; Megargee, 2009). According to a prevalent definition in social psychology literature, aggression refers to any behaviour whose intent is to cause injury to another person who is motivated to avoid that injury (Anderson and Bushman, 2002). Importantly the victim must be motivated to avoid injury (Allen and Anderson, 2017), which eliminates masochism, suicide and assisted suicide, even though these behaviours may have links and share psychological mechanisms with aggression. One of the problems with this definition is that it excludes self-aggression and object destruction which are prevalent in some mental disorders (American Psychiatric Association, 2013).

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Among the definitions found in mental health literature, aggression stems from the frustration that the individual feels in fulfilling his or her needs (Gorton and Partridge, 1982). Aggression is a form of inner drive that can serve as a motivator or that allows for survival (Varcarolis and Halter, 2010), but also part of an escalating cycle of violence in which two interacting parties have conflict (Shaver and Mikulincer, 2011). Also an aggressive patient is the one who expresses an urge that is uncertain of control (Kaision et al., 2001). These definitions might be less specific but useful in mental health as they place more emphasis on other negative affects than anger, and on concepts such as reaction following frustration of needs, internal force that may be adaptive or maladaptive depending on self-control, and the role that the environment plays in aggression. Also, the aggression crisis includes several stages prior to the aggressive behaviours and the sequence of events is crucial in the continuation of the aggressive escalation.

Aggression can escalate in various ways and social psychological concepts distinguish between forms and types of aggression. Forms of aggression refer to the modality of response, either physical (e.g. hitting, kicking), verbal (e.g. insulting, threatening), relational (e.g. causing harm to another person by damaging their social relationships or making them feel excluded and rejected), and postural (e.g. threatening gesture, invading someone's personal space) (Allen and Anderson, 2017). Violence, on the other hand, is defined as an extreme form of aggression whose purpose is to cause severe physical injury (Allen and Anderson, 2017). The types of aggression refer to their function or purpose (Bailey and Ostrov, 2008). All forms of aggression can vary in the purpose for which they are used (Allen and Anderson, 2017). A distinction is made between hostile aggression (also known as angry, affective, revengeful, impulsive and reactive aggression) and instrumental aggression (also known as premeditated or proactive aggression) (Berkowitz, 1993). Hostile aggression is motivated by the desire to harm the other, usually characterised by anger and impulsivity, whereas instrumental aggression is motivated by a goal other than the desire to hurt the other (e.g. money, social status, coercion, dominance, protect reputation, sex), and is usually characterized by calm, calculated behaviour (Allen and Anderson, 2017; Berkowitz, 1993). Injury to the other is a means to this end. These two types of aggression differ in the source of the events that motivate them. While hostile aggression is related to intrinsic instigations (i.e. motivation from within the person), instrumental aggression is related to extrinsic instigations (i.e. external reinforcers) (Megargee, 2009). Types are better conceived as characteristics that vary along a continuum describing the extent to which: 1) the affect is hostile or cold; 2) the goal is to hurt the victim or benefit the aggressor; 3) the behaviour is automatic or reflexive or that consequences are considered; and 4) the behaviour follows a provocation or is initiated by the aggressor (Allen and Anderson, 2017).

There are several other dichotomies in the literature that help to understand different aspects of aggression (Allen and Anderson, 2017). While direct aggression is seen when the victim is physically present, the attack is direct on the person, indirect aggression is seen when the victim is physically absent, the attack is deflected (e.g. attacking someone's reputation). Displaced aggression occurs when an innocent target becomes the victim, and provoked displaced aggression occurs when the innocent target is guilty of a minor offense/offense and the severity of the aggression is disproportionate to the offense. Aggression is active when the person engages in hurtful behaviour while aggression is said to be passive when the person fails to do helpful behaviour. Another dichotomy distinguishes between undercontrolled aggression characterized by a lack of control and inhibition over aggressive gestures, and over-controlled aggression characterised by a rigid and excessive inhibition over aggressive behaviours that can lead to an accumulation of aggressive instigations being released in a violent episode, after which the individual returns to his typical pattern of hyper-control (Megargee, 2009). The type of aggression and the context are significant factors when considering gender and sex differences. For instance, men tend to exhibit higher levels of aggression than women under neutral conditions, but this difference diminishes in the presence of provocation (Bettencourt et al., 2006). Additionally, concerning physical aggression, men consistently show a greater propensity than women across various cultures, with this tendency peaking between the ages of 20 and 30 (Archer, 2004). Similarly, anger exhibits an inverse relationship with age (Okuda et al., 2015). As individuals age, they are more likely to report fewer negative emotions, experience reduced levels of anger, and become more adept at regulating it (Okuda et al., 2015).

Considering the vast knowledge from social and clinical field, we propose a framework for assessing aggressiveness in clinical settings and expanding the multimodal functional analysis worksheet.

MODELS OF AGGRESSION

There are several models of aggression in different fields. We have chosen eight dominant models from the fields of applied psychology, social psychology and psychiatry. We will present them briefly in order to highlight their contribution to the understanding of aggressive behaviour in clinically assessed clients. To bring out their particularities, we will present them in order, so as to build a theoretical framework for case formulation in which each model adds causal factors and complements the previous one. The Hunter et al. (2008) Multimodal Functional Model (MFM) will serve as our foundation, as it is the only model designed specifically for case formulation in psychiatric care. The MFM (Hunter et al., 2008) represents a functional analysis model of behaviour within a multimodal, biopsychosocial framework. This model is intended as a clinical approach

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that goes beyond diagnosis and the resulting prescription of treatment, focusing instead on the multiple causes of behaviour. By identifying the causes of behaviour, it is possible to develop hypotheses that will lead to specific, concrete interventions. The model identifies three categories of factors contributing to aggressive behaviour. Firstly, instigating factors are those that increase the likelihood that the behaviour will occur. These factors therefore precede the behaviour and are divided into two subcategories according to the temporal relationship they have with the behaviour. Trigger stimuli, also known as primary events, are those that immediately precede the behaviour and whose influence can trigger it. They are necessary, but sometimes not sufficient. In addition to these factors are the so-called setting stimuli or secondary events, which increase the likelihood that the behaviour will occur in the presence of the trigger. They do not directly produce the behaviour, as their influence is not sufficient to trigger it, but they do increase the likelihood of its occurrence when combined with the triggering factors. The MFM proposes a category of so-called vulnerabilities or tertiary influences, which are the source of the first two instigating influences. These are the vulnerabilities of the environment and the individual, i.e. relatively stable conditions that can be activated or involved according to circumstances, and which are ongoing challenges or deficits that interact with primary and secondary stimuli that increase the probability of the expression of the behaviour. Finally, the last category of factors concerns the consequences or functions of behaviour, known as reinforcements, and are conceived as operant learning in which behaviour has a communicative or problem-solving function in relation to the demands of the environment. The positive or negative reinforcements maintain the behaviour. It is important to remember that all these factors are conceived in various modalities of influences contributing to behaviour, so as to capture all the information concerning the physical and social environment, as well as that concerning the individual in his or her psychological, neuropsychological and biomedical spheres, with the aim of obtaining the most global vision possible of behavioural influences, a vision specific to case formulation. This model (Hunter et al., 2008) of the person, once constructed, does not represent a single episode of action, but rather a general description of the possible causes of behaviour on which we, as clinicians, must act.

Although designed for research purposes, Finkel and Hall's (2018) I^3 Model is similar to the MFM. The I^3 Model proposes three categories of processes to explain and predict aggressive behaviour. Instigation and impellance processes correspond to the MFM's instigating and contributing factors (Hunter et al., 2008), respectively. Indeed, according to the I^3 Model, instigation encompasses immediate environmental stimuli that normally afford an aggressive response, while impellance encompasses situational or dispositional qualities that influence how strongly the instigator produces a tendency to enact that response. Model I^3's contribution to case formulation is undoubtedly its 3rd category, inhibition processes, which encompasses situational or dispositional qualities that influence how strongly the tendency is overridden rather than enacted.

The second and final applied psychology model among our list is Megargee's (2009) "Algebra of Aggression" (AA) model. This AA model also conceives of two main categories of factors: instigation and inhibition. Like the MFM (Hunter et al., 2008), the AA model (Megargee, 2009) distinguishes between situational and personal factors, and among the personal factors, it defines intrinsic (mostly personal instigation) and extrinsic motivations (consequences or functions of behaviour). Complementing the I^3 Model (Finkel and Hall, 2018), the AA model (Megargee, 2009) distinguishes between situational and personal inhibitions. The contribution of the AA model (Megargee, 2009) to case formulation is twofold. Firstly, it adds a category of factors that promote the emergence of aggressive behaviour: habit strength, which refer to the extent to which aggressive behaviour has been reinforced in the past. This factor adds a historical component to the analysis, and in this sense, like the MFM (Hunter et al., 2008), the AA model (Megargee, 2009) is specific to case formulation because it goes beyond the description of an aggressive episode to describe the general factors that explain the client's aggressive predisposition. Another contribution of the AA model (Megargee, 2009) is his conception of the decision-making process that leads to aggressive behaviour. The AA model conceptualises the different forces at work – those that motivate us to act aggressively and those that deter us from aggressive behaviour – balancing against each other in a multitude of implicit and explicit choices, enabling the reaction potential which is the net strength of any given response to be enacted according to a logic of order relationships between two sets of factors: if the set of factors motivating aggression is greater than that discouraging it, the aggressive behaviour will

Modalities	Instigation	Vulnerability	Reinforcement	Habit strength	Inhibition
Environmental					
Psychological					
Neuropsychological					
Biomedical					
Psychiatric					

Tab. 1. Multimodal functional analysis worksheet adapted from Hunter et al. (2008), Finkel and Hall (2018) and Megargee's (2009)

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be the one with the greatest potential to be emitted. From these last three models (i.e. MFM, I^3 and AA), it is possible to construct a complete multimodal functional analysis worksheet that can be used for case formulation. Tab. 1 represents these factors: instigation, vulnerability, reinforcement, habit strength and inhibition across biopsychosocial modalities. The following four models are derived from research and enrich the description of causes within each category of factors.

Anderson and Bushman's (2002) General Aggression Model (GAM) is a metatheory that synthesises several domain-specific models of aggression. At the heart of the model is the person's current internal state, in which cognitive, affective and arousal factors interact. The internal state is conceived as ongoing psychological phenomena that are activated according to inputs from the situation and the person. The literature review of the various situational and personal influences is comprehensive, and in this sense enriches our understanding of the possible causes of aggression. However, we believe that GAM's (Anderson and Bushman, 2002) contribution to case formulation lies mainly in its rich description of the personal factors at the source of the internal state likely to lead to aggressive behaviour. These include personality traits, attitudes, scripts and beliefs. Another contribution of GAM (Anderson and Bushman, 2002) is the description of the appraisal and decision processes resulting from the situation and person input effects on the internal state whose outcomes determine the final action of the episode. At this stage, there are several complex processes ranging from automatic to controlled processes. Immediate appraisal is an automatic inference about the situation or the individual whom we are interacting with. Depending on the circumstances and the person's internal state, the result of his or her spontaneous appraisal may lead to impulsive behaviour of an aggressive or non-aggressive nature. There is also a second type of process, called reappraisal, which is effortful and controlled, and whose function is to revisit the initial assessment and modify it, or not, according to the analysis cycles that follow, in order to obtain more information to understand both the internal state and the current situation.

The next two models offer a detailed description of the cognitive processes taking place in a given social situation: Crick and Dodge's (1994) Social Information Processing (SIP) model, and Fontaine and Dodge's (2006) Response Evaluation and Decision (RED) model. In both models, processes are viewed as sequential in information processing, but can also occur rapidly and in parallel. In the SIP model (Crick and Dodge, 1994), cognitive processes are heuristically conceived as a chain of cognitive events from the encoding and interpretation of social cues to the enactment of aggressive behaviour. Following interpretation, the model describes a step whose function is the selection of a goal that the person wishes to obtain from his or her behaviour in the current situation. This goal provides access to possible responses in memory, which are then evaluated according to several criteria in a subsequent step known as response decision. The RED model (Fontaine and Dodge, 2006) is based on the SIP model but focuses more directly on the response decision step. In detail, the RED model (Fontaine and Dodge, 2006) describes five sub-steps involving cognitive processes that refine the choice of responses and lead to response selection. These processes begin with the application of a primary acceptability threshold, allowing responses that are deemed appropriate and applicable to the situation to proceed to the next step. This is followed by complex evaluation processes of response options in terms of response efficacy and valuation, outcome expectancy and valuation. These evaluative processes involve self-concept, values attached to the response and its consequences, moral judgment and beliefs about behaviours and the potential victim. Finally, at the response comparison step, there is competition between response options, leading to the selection of a given response. Unlike the AA model (Megargee, 2009), where decision-making is conceived in terms of order relationships between two sets of factors in opposition, the RED model (Fontaine and Dodge, 2006) conceives response selection as a summation of weights or scores associated with each competing response that it has been possible to assign and accumulate through the decision steps. Finally at any step, according to RED model (Fontaine and Dodge, 2006), it is possible to conceive of a person making an impulsive decision, which corresponds to skipping one or more evaluation steps to go straight to enacting the response.

The last cognitive model, Wilkowski and Robinson's (2008) Integrative Cognitive Model (ICM) of trait anger, takes up the notion of opposing forces by contrasting the factors that promote the enactment of an aggressive behaviour with those that reduce their influences. Among the facilitating factors, the ICM (Wilkowski and Robinson, 2008) describes the hostile interpretation bias in a given situation. This bias is said to be immediate and predetermined in aggressive people. This interpretation would draw attention to hostile cues in the situation, and encourage the rumination of hostile thoughts, increasing the state of anger and the risk of acting out. In addition to these processes, there are effortful control processes. These would reduce the influence of the first factors, and their use would be specific to non-aggressive people. These effortful control processes are reappraisal, self-distraction to redirect attention away from hostile cues and, finally, suppression to reduce the anger response and associated behavioural manifestation.

Finally, the last model that is essential to complete our case formulation is the nosographic model of mental disorders, some of which have a more specific relationship with aggression. We have chosen the DSM-5 model (American Psychiatric Association, 2013), but the equivalent could be conceived with the ICD-11. It is possible to place the causal factors of all these models in the adapted version of the multimodal functional analysis worksheet. Tab. 1 is the result of this effort. Given that the eight models were not designed in relation to this worksheet, it is possible

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that certain choices remain debatable. However, the ultimate aim of this worksheet is not theoretical but practical, and in this sense, it achieves its goal if it enables clinicians to gain an overview of the possible causes in their client's case formulation. Tab. 2 summarises the main concepts of each model in line with the proposed multimodal functional analysis grid.

AGGRESSION ASSESSMENT IN CLINICAL SETTINGS

There are three main reasons in the clinical setting for conducting a systematic assessment of client aggression: 1) when the reason for consultation is directly or indirectly related to aggression; 2) when there are indications of aggression during the assessment; and 3) if the client presents with a diagnosis for which aggression is an essential or associated symptom. Rather than proposing a fixed assessment protocol applicable to all clients, we propose an assessment approach that is part of a retrospective assessment process (Megargee, 2009) designed as an iterative process in which the data collected lead to working inferences and hypotheses that are tested by the collection of new data that confirm, refute, or add to new inferences and hypotheses (Hunsley and Lee, 2014). In support of this approach, we propose an assessment framework based on the MFM (Hunter et al., 2008), to which we have added categories of factors from the seven other models which we have presented earlier. This approach significantly broadens the potential applications of the case formulation method, extending its utility beyond specific psychiatric care settings for which MFM was originally intended.

In the proposed framework, the presence of the client's aggressive behaviour is conceived as a product of the interaction between the individual and his or her environment. After assessing the client's motive for seeking help, the assessment looks at all the factors that may promotes or inhibit the aggressive behaviour. As seen earlier while reviewing the models of aggression, the factors that promote aggression are the instigation, the vulnerability, the reinforcement, and the habit strength. All the factors that deter us from acting aggressively are grouped in the category inhibition. More details and examples for each category of factors will be given in the following sections. The purpose of assessing all these factors is to complete the adapted multimodal functional analysis worksheet (see Tab. 1) in order to identify all possible causes of the client's aggressive behaviours in the bio-psycho-social modalities, and to design intervention goals for each in order to optimise therapeutic success. Once completed, this worksheet facilitates case formulation insofar as working hypotheses will be designed for the causal factors of each modality.

The five modalities are found in the rows on the left of the grid, while the five factors that influence aggression are found in the columns at the top of the grid. The modalities are as follows:

- According to Hunter et al. (2008), the environmental modality encompasses the physical environment in which the person evolves such as noisy, uncomfortable, poor and disadvantaged neighbourhood. It also includes the social environment corresponding to the people that the patient is in contact with, the number of people, the changes in personnel, the approach of these people. It could also correspond to what the patient does during the day, his work/activity program, and his treatment schedule if they are hospitalised.
- In accordance with Hunter et al.'s (2008) affective and personality modalities, we include in the psychological modality personality traits, affect, mood, and motivations. Complementarily, we also include all sociocognitive and personality factors derived from models of aggression and the scientific literature on factors related to aggression.
- The neuropsychological modality refers to all neuropsychological abilities or disabilities, including perception, attention, memory, reasoning, motor control and executive functions. Unlike Hunter et al. (2008) who divide these abilities into cognitive, perceptual, motoric, social/coping skills, and communication skills, we have opted to group all these abilities into a single modality in order to simplify the grid.
- In accord with Hunter et al. (2008), the biomedical modality refers to biological factors and physical health problems.

Given the importance of mental disorders in the factors associated with aggressive behaviour in clients seen in clinical settings, and in a manner complementary to Hunter et al. (2008), we added a psychiatric modality that refers to the client's mental disorders that are likely to be associated with his or her aggressive behaviours.

REASONS FOR CONSULTATION

Before the completion of the adapted version of the multimodal functional analysis worksheet, the reason for consultation must be determined. It may be directly or indirectly related to aggression. When the reason is related to aggression, it often concerns a problem associated with anger, i.e. when the client complains of an anger management problem, anger outbursts, irritability, and self- and hetero-aggressive behaviour. However, the client often formulates his or her reason for consultation as being related to other problems that may be indirectly associated with aggression. Thus, anger is the first reason for consulting people who have an aggression problem, but there are also other reasons that can be linked to it: 1) negative affects (depression, stress, anxiety, mood swings); 2) relational hostility (fantasies of violence, interpersonal problems, conflict management); 3) suicidal ideation and self-mutilation; 4) past traumas; 5) somatic problems (e.g. type A personality) or mental disorders. The recent history that brought the person to consult can also give an idea of the severity

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Modalities	Instigation	Vulnerabilities	Reinforcement	Habit strength	Inhibition
Environmental	MFM: external stimulus conditions (primary and secondary instigating function) AA: situational instigations (environments, settings, situations, stimuli, contagion effects, external factors, opportunities) GAM: provocation, aggressive cues, frustrating agent, non-social aversive conditions, opportunities	MFM: environmental vulnerabilities influences	MFM: social reinforcement (function of behaviour)	AA: the extent to which a given response has been rewarded or punished in the past (environmental factors)	AA: situational factors that might inhibit behaviour
Psychological	MFM: internal stimulus conditions (primary and secondary instigating function) I^3: instigation and impellance AA: frustrated cognitive expectancies, desire to injure or harm the target (intrinsic motivation) GAM: threats to social needs	MFM: psychological vulnerabilities influences GAM: personality traits, attitudes, schemata, scripts, beliefs, values, immediate appraisal SIP: deficient or distorted social information processing and database of memories of past experiences RED: deficient or distorted response decision processes ICM: predisposition to hostile interpretation, ruminative attention	MFM: psychological reinforcement (function of behaviour) AA: wish for other desirable outcomes/goals that the aggressive act in question might achieve (extrinsic motivation) GAM: long-term abstract goals	AA: the extent to which a given response has been rewarded or punished in the past (personal factors)	I^3: inhibition AA: moral prohibition and pragmatic concerns RED: response valuation, outcome valuation GAM: reappraisal, self-regulation of behaviour (self-image, self-standard, sense of self-worth) vs. moral justification, dehumanisation, acute factors ICM: effortful control processes: reappraisal, self-distraction, suppression
Neuropsychological		MFM: neuropsychological vulnerabilities influences SIP: biological limited capabilities	MFM: neuropsychological reinforcement (function of behaviour)		
Biomedical	MFM: medical stimulus conditions (primary and secondary instigating function) AA: availability of alcohol GAM: various drugs	MFM: medical vulnerabilities influences AA: genetic predispositions, diseases or disorders of CNS, influence of hormones, physical illnesses, drugs, fatigue, stress, pain, generalised autonomic arousal GAM: genetic predispositions	MFM: medical reinforcement (function of behaviour)		AA: genetic predispositions, diseases or disorders of CNS, influence of hormones, physical illnesses, drugs, fatigue, stress, pain, generalized autonomic arousal GAM: acute factors
Psychiatric	Hunter: psychiatric stimulus conditions (primary and secondary instigating function)	MFM: psychiatric vulnerabilities influences DSM-5: mental disorders associated with aggression	MFM: psychiatric reinforcement		

Tab. 2. Summary of aggression models in line with the multimodal functional analysis worksheet

of the aggressive behaviours (e.g. consultation because of a relationship breakdown or services following violent acts).

DESCRIPTION OF AGGRESSIVE BEHAVIOURS AND THEIR HISTORY

Once the reason for consultation has been explored, the clinician must then assess the client's behaviours. The context in which the behaviours occur must first be addressed (Megargee, 2009). The context will determine whether the behaviours are appropriate to the circumstances (Hunter et al., 2008). Aggressive behaviours can also occur in specific contexts (e.g. workplace, marital relationship) or in many situations. To determine whether these behaviours are problematic, it is important to measure their frequency, intensity, duration and especially their impact (Hunter et al., 2008). The impact of these behaviours on the person and his or her entourage can be evaluated by determining whether the behaviours represent a danger, threaten safety, interfere with functioning, diminish quality of life, or cause suffering to the person or their entourage (Thibault et al., 2021). Aggressive behaviours will also need to be defined in a specific and operational manner to obtain a precise description that is understood by all (Hunter et al., 2008). To achieve this, it is recommended to ask the client to tell us the story of an episode, i.e. a description of the precipitating events, the emotions, the actions, and their consequences (Shea, 1998). In the history of the aggressive behaviours, we find the time of occurrence and the evolution of the behaviours which are important in the assessment, particularly in establishing the diagnosis (American Psychiatric Association, 2013) but also in assessing the strength of the aggressive habits (Megargee, 2009). An isolated aggressive behaviour with a recent history occurring in a specific context (e.g. conflict in a relationship) will have a weaker pattern than a pattern of aggressive behaviours over several years.

The assessment of aggressive behaviours can be conducted in an interview or with the help of instruments. Tab. 3 present a selection of those instruments. In the interview, the clinician can observe the client's reactions during exchanges, in role-playing situations, or ask the client to self-observe between meetings. When the client is cognitively challenged or uncooperative in the assessment, it is possible for the clinician to conduct a collateral interview with a relative who knows the client well. Diagnostic instruments do not specifically assess aggression. We need instruments designed specifically to assess aggression by questionnaire or rating scale. These instruments can be useful in determining whether the client's aggression presents as a pattern of behaviour or isolated behaviours. However, because these instruments are used in research and are not commercially available, normative data from validation studies (ideally in the client's language) should be consulted to interpret the client's results. Although quick and easy to administer, the questionnaires may suffer from client response bias. In addition to questionnaires, there are rating scales for aggressive behaviours that provide an objective assessment of the form and severity of the behaviours. They are usually completed by the clinician. However, it requires knowing

Instrument	Examples/scales	Source
Interview to explore context (specific vs. non specific), frequency, intensity, duration and impact as well as history of the behaviours	Story of an episode Observation or self-observation of the client's reactions Questions: Have you ever lost control of your anger? In what context? What (or who) makes you sometimes/usually angry (or other emotion)? What do you do when you are provoked?	Shea, 1998 Megargee, 2009
The Aggressive Questionnaire (AQ) measures the aggression trait	Physical Aggression (9 items), Verbal Aggression (5 items), Hostility (8 items), Anger (7 items)	Buss and Perry, 1992
The Reactive-Proactive Aggression Questionnaire (RPQ) measures two types of aggression	Proactive aggression (11 items) and Reactive aggression (12 items)	Raine et al., 2006
The State-Trait Anger Expression Inventory-2 (STAXI-2) measures both trait and state anger	Anger-Trait (15 items), Anger-State (10 items), Externalized Anger Expression (8 items), Internalized Anger Expression (8 items), Externalized Anger Control (8 items), Internalized Anger Control (8 items)	Spielberger, 1999
The Revised Conflict Tactics Scale (CTS2) measures spousal violence in the context of disagreements and conflict resolution	Negotiation (6 items), Psychological Aggression (8 items), Physical Aggression (12 items), Sexual Coercion (7 items)	Straus et al., 1996
The Abusive Behavior Inventory (ABI) measures spousal violence as being used to maintain domination over the spouse	Non-Physical Abuse (19 items) divided into 6 themes (emotional abuse, isolation, intimidation, threat, financial abuse, use of male stereotypical privileges), and Physical Abuse (11 items; no subcategory)	Shepard and Campbell, 1992
The Observable Behaviour Scale (OBS) is a rating scale that measures challenging behaviours that occurred within the last three months	Nine categories, four of which relate to aggression: Verbal Aggression, Aggression to Objects, Physical Gestures Against Self, and Physical Aggression to Others	Kelly et al., 2006
The Impact of Current Behavior Problems Scale (IMPAC) is a rating scale to measures the impact of the behaviours on the client and those around him	Five dimensions: Meaningful Relationships, Psychological Integrity, Access to Services, Physical Integrity, and Intervention	Thibault et al., 2021

Tab. 3. Selection of instruments and examples/scales to measure aggressive behaviours

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the client well and having observed him or her over a period of time or conducting an interview with someone close to the client.

INSTIGATIONS

Instigations are those influences that increase the likelihood that an aggressive behaviour will occur. The MFM (Hunter et al., 2008) and the I^3 Model (Finkel and Hall, 2018) distinguish instigating stimuli according to their primary and secondary function and concede that one stimulus (secondary) can increase the effect or strength of influence of another (primary) on the client's response. For the clinician, this distinction is important, as it opens the possibility of intervening on one or other of the stimuli to reduce the risk of aggressive action. All aggressive models distinguish between instigations from the environment and those from the individual. However, the MFM (Hunter et al., 2008) defines several modalities in each. Examples of primary and secondary instigation stimuli that precede or increase the likelihood that an aggressive behaviour will occur can be a task demand in a harsh ton combined with an unsupportive environment (social environmental) or a loud noise combined with a place crowded with people (physical environment) (Hunter et al., 2008). In a convergent manner, situational instigations refer to external conditions that facilitate aggressive behaviours (Megargee, 2009; Serper and Sokol, 2017). Consequently, the clinician attempts to clarify what systems the individual lives in, what their social and physical environment are, and whether these conditions facilitate their client's aggression (Megargee, 2009). This information can be useful if we consider that the contagion effect of aggression can occur via the media, but also through peer groups (Megargee, 2009). Environmental factors moderate the relationship between personality factors and aggression in that anyone can become aggressive when provoked and threatened (Finkel and Hall, 2018; Megargee, 2009). External or situational factors that might promote aggressive behaviour are numerous and include provocation, aggressive cues (e.g. weapon), frustrating agent, non-social aversive conditions, poor social support network, financial problem, poverty, unstable housing, being in a bar between 2:00 and 4:00 AM, having access to alcohol, the potential victim or a weapon (Anderson and Bushman, 2002; Megargee, 2009). These are all bad influences and sources of stress (Megargee, 2009). The assessment of situational instigating factors may involve visiting or simply asking about the client's living and working environment (physical and social), and the culture of the groups in which they live, and their current life situation (Megargee, 2009). The clinician can also take a history of the circumstances of past aggressive behaviours and determine if they are like current or future situations (Megargee, 2009). Finally, the clinician can assess whether there are pressures at work, conflicts in the couple, or an unhealthy dependent relationship with parents. The ABC (antecedent, behaviour, consequence) worksheet and the self-observation worksheet can complement the information gathered in the interview to help identify situational instigations in all modalities of the environment.

Instigations come also from the person. Examples of primary and secondary psychological conditions can be a strong frustration following a mistake during a cognitive task combined with a sleep deprivation (Hunter et al., 2008). Instigations are described as intrinsic when they refer to all factors that make a person angry or hostile and whose motivation comes from within (Berkowitz, 1993; Megargee, 2009). Internal motivation is essentially the desire to hurt or harm (the self or other). These factors may have several psychological sources such frustrated cognitive expectancies (Megargee, 2009), anxiety and anger (Hunter et al., 2008) or any negative affects (Berkowitz, 1993). Many feelings in the client can be experienced intensely and lead to aggressive behaviours such as feeling that one has failed in one's ideals, that another person has failed to protect one, that one is misunderstood, that one is a victim of injustice, or that one is not good enough to be loved. In the GAM (Anderson and Bushman, 2002), threats to social needs can impact on the person's internal state by increasing angry affects as well as hostile thoughts and high arousal level, which can energise dominant action tendencies. In the person's neuropsychological or biomedical/psychiatric modalities, the instigation of anger or aggression may come from a symptom (e.g. irritability, headache, hallucination) that could have cognitive (e.g. low tolerance to frustration) (Hunter et al., 2008), physiological (e.g. central nervous system – CNS disorder)

Instrument	Examples/scales	Source
Interview to explore an instrinsic and extrinsic instigating factors of an aggressive episode as well as the history of reinforcements (habit strength)	Question: Give me an example of an episode. What happened before the aggressive behaviour? What happened after? Was it often like that in the past?	Shea, 1998
Interview to explore the physical or social environment, or visiting the environment when relevant	Question: Can you describe your environment at work? The people? The physical place? What it looks like?	Megargee, 2009
ABC worksheet	Observation or self-observation of the client in his or her natural environment focusing on the events preceding behaviour and consequences	Griffiths et al., 1998
Aggression for Ecological Momentary Assessment Research: The Aggression-ES-A is a day-to-day assessment of aggression status for 1 to 3 weeks	Three dimensions: aggression, stress, and context (activity, people)	Murray et al., 2022

Tab. 4. Selection of instruments and examples/scales to measure instigating factors

(Megargee, 2009) or psychiatric (e.g. schizophrenia) (Hunter et al., 2008) sources. In addition to the interview and questions about the context of the behaviours (Megargee, 2009), there are intrinsic instigations instruments that allow information to be sought in a systematic way. Tab. 4 present a selection of instruments to measure instigating factors. One such instrument is the ABC worksheet, which records the events preceding and following the behaviour that is the focus of the observations (Hunter et al., 2008). However, the ABC worksheet requires observation of the client in his or her natural environment, which is not always possible. In such cases, an interview with a relative or a clinical team member may be used to supplement the observations (Hunter et al., 2008). Unlike trait measures, which are typical behavioural measures taken retrospectively, state measures have the advantage of being taken on a day-to-day basis and in a natural situation (Murray et al., 2022). These measures are useful for identifying intrinsic instigating factors. In a simpler way, if the client is motivated, we can ask them to observe themself with a worksheet that they fill at each incident that we have taken the time to define with them (Persons and Tompkins, 2007). When this is the case, we take the time to define the target behaviour with the client so that they know what to observe, we explain the different elements of the worksheet, and we can also complete it with the client during the next meeting. In this way, we obtain important information on the events, thoughts and emotions that can act as instigating factors (Beck, 1976).

VULNERABILITY

The client's vulnerabilities and those of his environment play an important role in case formulation. Firstly, these factors often help explain the person's inappropriate reactions to inputs from the environment (Hunter et al., 2008). As a tertiary influence in the forces that motivate aggressive action, they are at the source of all instigators and thus represent an important target in therapeutic efforts (Hunter et al., 2008). In addition, they open a wide range of knowledge from the scientific literature on the sociocognitive and personality factors associated with aggression. Examples of environmental vulnerabilities include being in custody, having a stressful and unsupportive work environment, or having a rejecting spouse. All these conditions can suddenly become factors that increase as setting stimuli the likelihood of an aggressive reaction (e.g. an unsupportive spouse who arrives late for an appointment), or even trigger such a reaction (e.g. the same late spouse who made a critical comment). In the psychological modality, it could be having an insecure attachment style that leads the person to react aggressively during moments of separation experienced as abandonment. Examples of vulnerabilities in the neuropsychological modality are numerous as they make the person vulnerable to stress and reduce his or her ability to adapt and communicate to his or her environment in several ways. They include cognitive impairments, limited communication skills, mental retardation. All these deficits have the potential to contribute to setting and trigger stimuli (e.g. a client with a low tolerance to frustration may suddenly become angry when his or her request is denied). In the biomedical modality, vulnerabilities can be genetic predisposition (e.g. temperament), CNS disorder (e.g. tumour), hormonal influence (e.g. testosterone, adrenaline), or physical illness (e.g. encephalitis, pain) (Megargee, 2009). Studies in social psychology have documented several personality factors associated with aggression, which have subsequently been incorporated into theoretical models. Among the individual inputs associated with aggression, the GAM (Anderson and Bushman, 2002) mentions high but unstable self-esteem, the belief that one can successfully carry out aggressive actions (i.e. self-efficacy) and that these actions will lead to desired consequences (i.e. outcome efficacy), positive attitudes towards violence, values that promote violence as a method of repairing an affront to one's personal honour, long-term goals involving the use of violence as a means to an end or learned scripts that guide the way one interprets events and behaves in a situation. As sociocognitive and psychological vulnerabilities, all these factors can influence a person's internal state in a given situation, leading to an immediate appraisal of the situation as hostile and requiring an aggressive response. In the SIP model (Crick and Dodge, 1994), we find the equivalent in terms of influences coming from the person. These influences are described in terms of database of memories of past experiences, latent mental structures and working models of social interaction. All these personality factors will influence the way the individual processes social information. For example, the reactive aggressive person would have hostile schemas which they would apply heuristically to a social situation, leading them to interpret the other's intentions in a hostile way. Over time, this same person might develop the belief that it's acceptable to retaliate in social situations of conflict or provocation, because he or she interprets the intentions of others as deliberately hostile. In the RED model (Fontaine and Dodge, 2006), these personality factors impact on evaluative decision processes at every step of the response decision. For example, a reactive aggressive person may have a low threshold level during the first step, the function of which is to assess the level of acceptability of the response according to the situation. This can be explained by the fact that reactive aggressive individuals are impulsive and quickly choose an aggressive response among other options in their behavioural repertoire, without considering the information available in a given situation (Fontaine and Dodge, 2006; Slaby and Guerra, 1988). For their part, proactive aggressive people are more likely to display high self-efficacy for aggressive actions and to have expectations that these actions will result in positive consequences (Anderson and Bushman, 2002; Fontaine and Dodge, 2006). It is possible to assess the factors associated with the social information processing by a qualitative analysis of a social situation presented to the client in a form of

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Instrument	Examples/scales	Source
Psychological test such as Rorschach, Thematic Apperception Test and the Weschler Adult Intelligence Scale as well as therapist-client relationship	Comparing the client's performance on tests that vary in terms of external structure, ambiguity, relational content, and emotional stimulation	Bram and Peebles, 2014
MMPI-2	Scales R, DIS, ANG, TPA, AGG	Nichols, 2011
Faux Pas Test measures mentalisation	Ten faux pas stories and ten control stories followed by questions about detection of the faux pas, understanding of what is inappropriate, character intent/motivation, belief, and empathy	Stone et al., 1998
The Experiences in Close Relationships questionnaire (ECR) assesses attachment representations in adulthood	18 items measuring the avoidance dimension and 18 items measuring the anxiety dimension	Brennan et al., 1998
Inventory of Personality Organization (IPO) assesses the level of personality	57 items divided into three scales: Identity Diffusion (21 items), Primitive Defense (16 items), and Reality Testing (20 items)	Lenzenweger et al., 2001
Basic Empathy Scale (BES) measures empathy	20 items divided into two scales: cognitive empathy (9 items) and affective empathy (11 items)	Jolliffe and Farrington, 2006 Whiteside and Lynam, 2001
UPPS Impulsive Behavior Scale (UPPS) measures all four dimensions	Four dimensions: Negative urgency, Lack of premeditation, Lack of perseverance, Sensation seeking	Whiteside and Lynam, 2001
Levenson Self-Report Psychopathy scale (LSRP) measures psychopathy	26 items divided into two scales: primary psychopathy (factor 1) characterised by selfishness and manipulation and secondary psychopathy (factor 2) characterised by a more behavioural aspect such as impulsivity and poor control	Levenson et al., 1995
Social Information Processing-Attribution and Emotional Response Questionnaire (SIP-AEQ) measures hostile intent attribution bias	Eight scenarios with questions about the character's intentions: direct hostile, indirect hostile, instrumental, accidental, followed by questions about the likelihood of feeling anger and embarrassment if the situation had happened to us	Coccaro et al., 2009
Ambiguous Intentions Hostility Questionnaire (AIHQ) measures hostile social cognitive biases	Five hypothetical, negative situations with ambiguous causes	Combs et al., 2007
The Beliefs Questionnaire measures beliefs related to aggression	Five beliefs: legitimacy of aggression, aggression increases self-esteem, aggression helps avoid negative self-image, victims deserve to be attacked, and victims do not suffer	Slaby and Guerra, 1988
Qualitative analysis of social information processing	The client is presented with a problem then with specific questions assessing the social information processing stages: 1) What is the problem? 2) If you had to solve this problem, what would your goal be? 3) Would you need more information? If so, which ones? 4) What are all the solutions you can think of to solve this problem? 5) What is the best solution? 6) What are all the things that could happen if you do this?	Slaby and Guerra, 1988
Qualitative analysis of response decision processes	The client is presented with a vignette then with specific questions assessing response decision step of social information processing: 1) Is this way of acting relevant to this kind of situation? (general relevance); 2) Am I the type of person that could possibly act this way? (internal congruence); 3) How capable am I of performing this response? (response efficacy); 4) How much do I like this way of acting? (response value); 5) What good/bad things will happen if I act this way? (positive and negative outcome expectancy); 6) How much do I like/dislike the good/bad things that will happen? (positive and negative outcome valuation); 7) Which way of acting do I like best and approve of the most? (response comparison); 8) Of all possible outcomes, which am I most hopeful will occur? (response comparison)	Fontaine and Dodge, 2006

Tab. 5. Selection of instruments and examples/scales to measure vulnerability factors

a vignette. Tab. 5 gives examples of questions that can be asked while the client is analysing the social situation presented in the vignette.

In addition to data from social psychology, several other personality factors studied in various fields of psychology can modulate a person's aggressive response. For example, poor mentalization skills may promote hostile interpretation bias and angry reactions or conversely, good mentalization skills can help the person consider non-hostile alternatives in social interactions and thus reduce aggressive reactions (McGauley et al., 2011). Other personality factors that can contribute to aggressive behaviours include attachment style (Dutton et al., 1994; Mayseless, 1991), borderline level of personality organization (Clarkin et al., 2007, 2006), empathy (van Langen et al., 2014), impulsivity (Gagnon and Rochat, 2017) and psychopathy (callous) (Patrick and Brislin, 2017; Reidy and Kearns, 2017).

The assessment of personality factors relevant for aggression from psychological tests may involve the Rorschach (R-PAS) (Meyer et al., 2011), the Thematic Apperception Test (TAT) (Murray, 1943) and the Weschler Adult Intelligence Scale – Fourth Edition (WAIS-IV) (Lichtenberger

and Kaufman, 2009) as well as therapist–client relationship data during testing. The three tests and the therapist–client relationship data provide information on the structure of mental functioning and the content of mental life (Bram and Peebles, 2014). They provide information about mental functions such as reality testing, reasoning, emotional regulation, experience of self and others (Bram and Peebles, 2014). Moreover, since these tests vary in terms of external structure, ambiguity, relational content, and emotional stimulation, comparing the client's performance on each provides information about which conditions promote or hinder the proper functioning of these mental functions (Bram and Peebles, 2014). Another psychological test that is particularly useful for assessing personality factors associated with aggression is the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) (Greene, 2011; Nichols, 2011). Several scales are relevant to aggressive behaviour. Emotional control is measured by the Repression (R) scale and behavioural control by the Disconstraint (DIS) scale. The state and trait of anger are measured by the Anger (ANG) and Type A Behavior (TPA) scales, the pressure to express (explode with) anger by the ANG1 subscale and the more controlled expression of anger by the ANG2 and TPA1 subscales. The chronic aggressive tendency with sadistic purpose and desire for revenge are measured by the TPA2 and Aggression (AGG) scales. Comparing the scores between these scales yields distinct profiles. The MMPI-3 is the more recent version of the MMPI family of instruments and there is less empirical support for its usefulness in measuring aggressive behaviour. However, there is evidence to support its earlier version, the MMPI-2-RF, for predicting violence behaviours in forensic psychiatric hospital, notably with the externalizing scales and the Anger Proneness scale (Tarescavage et al., 2016). Specific vulnerability factors related to personality functioning can be measured by questionnaires. Tab. 5 present a selection of those instruments.

Finally, as vulnerabilities in the psychiatric modality, we found mental disorders associated with aggression (American Psychiatric Association, 2013; Serper and Sokol, 2017). Schizophrenia is characterised by dysphoric mood (depression, anxiety, anger), hostility and aggression more frequent in young men with a history of violence, non-adherence to treatment, substance abuse, impulsivity. Bipolar I disorder is characterised by irritable mood, rapid mood changes (euphoria, dysphoria, irritability; criterion A), during which the client may become hostile and physically threatening, and during delirium, may become physically aggressive or suicidal. Aggression is associated with symptoms congruent with a motivation for violence, threat/control override delusion, command hallucinations, and beliefs about hallucinations. The aggression exhibited in these disorders may also be explained by comorbidity with substance abuse, antisocial personality, and cognitive deficits. In substance-related disorders, there are hallucinogen (phencyclidine or PCP) and stimulant (amphetamines and cocaine) disorders in which there is anger with threats or acting out of aggressive behaviour during intoxication. Intermittent explosive disorder is characterized by recurrent outbursts of behaviour representing a lack of aggressive impulse control in verbal/physical aggression toward objects, animals, and other people, without destruction of property or physical injury to animals/people, occurring on average twice a week over a three-month period (criterion A1) or three outbursts resulting in destruction of property or physical injury to animals/people occurring over a 12-month period (criterion A2).

Aggressive manifestations can also be found in several personality disorders. In narcissistic personality disorder, the person's sensitivity to injury from rejection/criticism/defeat, denial of feelings of entitlement to special treatment may make them feel humiliated and ashamed and react with contempt and rage. In obsessive-compulsive disorder, the person tends to become upset/angry in situations where they are unable to maintain control over their physical/interpersonal environment. In paranoid personality disorder, the person is quick to counterattack and react angrily to perceived insults (criterion A6). In antisocial personality disorder, the person exhibits irritability and aggression as indicated by repeated physical fights and assaults (Criterion A4). Finally, in borderline personality disorder, there is intense and inappropriate anger in the person or difficulty controlling anger (Criterion A8) directed at the individual who has not protected them from abandonment.

The assessment of mental disorders may involve structured interviews [e.g. Structured Clinical Interview for DSM-5 (SCID-5-CV and RV); SCID-5-The Personality Disorders Version (SCID-5-PD)] or questionnaires on the severity of psychological traits such as the Brief Symptom Inventory (BSI) (Derogatis, 1993) measuring nine symptomatic dimensions, the Personality Assessment Inventory (PAI) (Morey, 1991) measuring among others borderline personality traits, and the Alcohol Use Disorder Identification Test (AUDIT) (Saunders et al., 1993) measuring problematic use.

REINFORCEMENT

What's special about reinforcing factors is that they require those who interact with the client, including the clinician or intervention team, to recognize that they may be contributing to the client's aggressive behaviour. In other words, those around the client may be part of the client's problem. This is because some of the client's aggressive responses may be maintained by certain responses in the environment (Hunter et al., 2008). These include, of course, responses that positively reinforce (i.e. provide a stimulus that the client wants) or negatively reinforce (i.e. remove a stimulus that the client does not want, or wants to avoid) certain behaviours (Hunter et al., 2008). It's conceivable that this operant learning could occur in all modalities (Hunter et al., 2008). In this case, the behaviour is said to have a communicative or problem-solving function. The advantage of specifically analysing this category of factors is that it enables

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the client, with the help of his therapist, to choose more appropriate behaviours that can serve the same functions (Hunter et al., 2008). According to Hunter et al. (2008), even biomedical (e.g. pain) and psychiatric (e.g. hallucination) symptoms reflecting underlying neurobiological abnormalities can acquire functional features as they become associated with distinct reinforcing consequences (e.g. pain reduction following attention-getting).

In contrast to intrinsic motivation, extrinsic instigating factors refer to what the person wants to achieve by using aggression and concerns a motivation that comes from the outside (Megargee, 2009). Aggression is only the means because the person wants something other than to hurt the other person (Megargee, 2009). External motivation concerns the desire to obtain a favourable outcome from the aggression (Megargee, 2009). Sources of extrinsic motivation may be to obtain personal gains and satisfactions (e.g. acquisition of property or esteem enhancement), elimination of problems or obstacles (e.g. eliminating an enemy or a witness to a crime), achieving social goals (e.g. power, status) (Megargee, 2009). Psychologically, it may be to gain self-respect and respect from others, fantasies of omnipotence, a desire for admiration, or repair of a narcissistic injury. The assessment of extrinsic instigations requires several comprehensive strategies. The clinician should ask what the client got out of the aggression, but also how they felt afterwards, what they thought of themself (Shea, 1998). The ABC worksheet or the self-observation worksheet can also be used to record the events that follow the behaviour (Hunter et al., 2008). Finally, by focusing on the function of the behaviour during the assessment, it is important to also look for alternative behaviours in similar situations and opportunities to act non-aggressively to achieve the same gains (Hunter et al., 2008).

HABIT STRENGTH

The habit strength is measured by determining the extent to which the aggressive response has been rewarded or punished in the past (Megargee, 2009). In other words, did the client often get what they wanted by resorting to aggression? Reinforcement of aggressive responses increases the strength of their habit (Megargee, 2009). Reinforcement can vary depending on the type of aggression. Hostile aggression is reinforced by the pain or discomfort inflicted on the victim, whereas instrumental aggression is reinforced by the achievement of extrinsic goals (Megargee, 2009). These habits may have several possible sources such as direct reinforcement of the behaviour on the target of aggression or a surrogate in the psychological modality, or approval of the aggressive behaviour by family, a reference group or culture, and by observing a role model who successfully performs aggressive behaviour in the environmental modality (Megargee, 2009). These habits can be formed early in a child's development by observing domestic violence, watching media, or playing video games (Anderson and Bushman, 2002; Megargee, 2009). By observing role models, the child develops aggressive scripts that, once learned, can be used to guide aggressive behaviour in real situations in the future (Anderson and Bushman, 2002).

To assess the strength of the habit, one must look for reinforcement in the history of aggressive behaviour (Megargee, 2009). From the history of the problem, it is possible to infer the extent to which the aggressive behaviour is reinforced (were there any reinforcements in the history?) (Megargee, 2009). The clinician can also ask the client whether there have been reinforcements and for a long time. The longer the history of aggressive behaviour, the higher the habit strength of the aggressive responses and the greater the likelihood that the person will behave in a similar manner in the future (Megargee, 2009). Habit strength is the variable that best predicts aggression (Megargee, 2009). However, the fact that a person does not have a history of aggressive behaviour is not a guarantee that they will not act aggressively in the future, as is the case, for example, with over-controlled aggression (Megargee, 2009).

INHIBITION

Inhibitory factors refer to all the reasons that might inhibit aggressive behaviour toward a target (Finkel and Hall, 2018; Megargee, 2009). In the psychological modality, these reasons may be related to the person's value system and moral standards in the form of moral prohibitions (Anderson and Bushman, 2002; Megargee, 2009). For example, taboos or a moral conscience may indicate to the person that an aggressive action towards another person is wrong and cause them to feel guilt (Megargee, 2009). When the value system and moral standards are not as well integrated into the personality, a person may still be sensitive to feeling fear of punishment (Megargee, 2009). For practical purposes, this person may be afraid that aggressive behaviour will be followed by punishment or revenge or that it will not achieve its goal (Megargee, 2009). These personality factors related to moral judgment have an impact on evaluative decision processes during the response decision (Fontaine and Dodge, 2006). Moreover, how the person will experience aggression (i.e. guilt vs. fear of punishment) may be influenced by the level of personality organisation (i.e. neurotic vs. borderline) (Kernberg and Caligor, 2005). Conversely, there are factors that decrease inhibition. Among the psychological factors, we find a halt in the development of moral values and standards, a refusal to identify with the authoritarian parent ("the frustrating object") or an identification with the parent responsible for abuse, neglect, or lack of basic needs ("bad object") (Kernberg and Caligor, 2005). In the neuropsychological modality, depending on their level of development and physical integrity, several processes can increase or reduce a person's inhibition capacities. According to the model, aggressive people lack the ability to reappraise the situation or the other person in the situation (Anderson and Bushman, 2002), to redirect their attention

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Instrument	Examples/scales	Source
Interview to explore the social and personal factors that influence inhibition of aggression	Questions: Is there a provocative situation where you did not aggress? What was important for you at that time? How your parents/family/friends reacted to aggressive behaviours? How was the discipline at home? How were your relationships with your family members?	Megargee, 2009
NEO-PI personality questionnaire	Conscientiousness factor which includes self-discipline and duty	Costa and McCrae, 1992
Thematic Apperception Test (TAT) stories scored on the Social Cognition and Object Relations Scale (SCORS) and SCORS-G	Two scales related to inhibition: "Emotional Investment in Relationships" and "Emotional Investment in Values and Moral Standards"	Murray, 1943 Westen, 1991 Stein et al., 2011
Alcohol Use Disorder Identification Test (AUDIT) to measure an alcohol use disorder	Four dimensions: consumption, addiction, adverse reaction, consumption problem	Saunders et al., 1993

Tab. 6. Selection of instruments and examples/scales to measure inhibitory factors

away from hostile ruminations, or to suppress or reduce their reaction of anger and aggression (Wilkowski and Robinson, 2008). In the biomedical modality, physiological factors such as the use of disinhibiting substances (e.g. alcohol) also play a major role in the reduction of inhibition.

In the interview, the clinician can identify circumstances where the client may have been motivated to aggress but did not do so and attempt to identify the reason for this (Megargee, 2009). For example, the client was able to contain their aggressive impulses given the presence of internal conflict or fear of losing a relationship. To assess the integration of moral standards, the clinician can ask what aggressive behaviours the client finds acceptable or unacceptable and under what circumstances (Megargee, 2009). In addition, it is important to look for data in the personal and social history that suggest the development of socialization, understanding and adherence to moral values, sense of responsibility, discipline, and self-control. Even if the social environment in which the client grew up is characterised by negative and unstable relationships, finding a single relationship that was positively invested (e.g. a grandparent) may be instrumental in the ability to inhibit aggression. In sum, the clinician asks whether there was at least one positive relationship in the personal history that would have enabled the development of an ability to emotionally invest relationships and moral standards. Conversely, an absence of aggressive behaviour in the history of aggressive behaviour does not necessarily indicate the presence of inhibition, as this could also be explained by the lack of instigations in the client's past (Megargee, 2009). There are self-report or projective instruments for assessing inhibition factors and Tab. 6 present some of them.

In the environmental modality, poor socialisation, growing up in a society or culture that condones certain aggressive behaviours, and peer pressure can also contribute to reduced inhibition (environmental inhibition modality) (Megargee, 2009). Additionally, we can determine particular situational inhibiting factors which refer to constraining or deterring contexts, external conditions that inhibit aggressive behaviour (Megargee, 2009) such as being in the presence of loved ones or authority figures who disapprove of aggression. In the clinic, a client who has difficulty containing their anger when they do not feel understood may benefit from the presence of a spouse whose listening skills reduce aggressive impulses. Conversely, the absence of external constraints, an unstructured environment full of distractions, or living alone puts the person in an environment where there is nothing to restrain the person from acting out. Assessing situational inhibitions requires looking at the client's life situation (Megargee, 2009). The clinician should look for current or past situations that are associated with non-aggressive behaviours to determine if there are conditions that deter aggressive actions (Megargee, 2009).

CASE FORMULATION

The aggression assessment based on the above sections leads to case formulation and later to adjustment of appropriate psychological interventions. From all the information gathered during the assessment, the clinician can now fill out the adapted version of the multimodal functional analysis worksheet and develop a case formulation, that is a complete and clinically relevant conceptualization of the client's psychological functioning to explain their aggressive behaviours. The case formulation goes beyond observable symptoms by making conceptual connections between the different sources of data to construct hypotheses in narrative form about the client's instigation, inhibition, and vulnerability factors (Eells, 2007). To assist in this task, the clinician can use the multimodal functional analysis worksheet to **develop working hypotheses** for each of the identified possible causes based on his or her theoretical knowledge of personality, mental functioning, psychopathology, and aggression. Depending on each client's specific problem, the clinician may base his or her case formulation on different theoretical approaches. Case formulation in the cognitive-behavioural approach can be based on diathesis–stress theory, where the client's symptoms and problems are conceived as the activation of cognitions by stressors in the client's life, or on conditioning theories (Persons and Tompkins, 2007). Formulation includes functional analysis (e.g. maintenance factors) and structural assessment (e.g. dysfunctional cognitive patterns) of behaviour. Case formulation in the psychodynamic approach will rely primarily on the client's personal history and the clinician's inferences about the structural (e.g. affects, drives, defences, functions related to objects) and dynamic characteristics of the personality (e.g. the content of psychological functioning, the

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	Instigation	Vulnerability	Reinforcement	Habit strength	Inhibition
Environment	Being compared to her mother	Mother has experienced a significant loss in the past making her less available to the client			Calm and listening husband (increase inhibition)
Psychological	Incomprehension of his mother's attitude towards her Feeling that her mother never recognised her wrongs Feeling of being misunderstood in relationships	Past trauma in her relationship with her mother Mentalisation difficulties		Has not learned to express emotions in words	Fear of destroying her relationship (increase inhibition)
Neuropsychological		Preserved cognitive abilities			
Biomedical		Somatisation			
Psychiatric					

Tab. 7. Multimodal functional analysis worksheet of Mrs A.

latent meaning of aggressive behaviours, the unconscious motivations) (Messer and Wolitzky, 2007).

From the case formulation, the clinician is now able to establish therapeutic objectives and interventions to manage the behaviours or treat the person. For example, if the case formulation involves instigation factors, it will be appropriate to plan for better management of the environment to reduce/eliminate specific instigations and add external constraints if necessary (Hunter et al., 2008). If the causes involve vulnerability factors, several therapeutic options are possible such as mentalization treatment (Zajenkowska et al., 2021), self-control strategies such as intention implementation (Gagnon et al., 2019), social information processing training (Barlett and Anderson, 2011; Guerra and Slaby, 1990) or a combination of these interventions. A clinical case will be presented to illustrate the development of a case formulation in the assessment of aggressive behaviours.

CASE MRS. A.

Mrs. A. is 54 years old, married women and mother of two children. She works in a factory. The client has requested a consultation following the recommendations of her family doctor. She comes for a psychotherapy to better understand her emotions and to free herself from past traumas. She says she had a difficult relationship with her mother. She mentions that her difficulties have had a significant impact on her relationships with friends and husband. In fact, she says that she often has angry outburst during interpersonal conflicts. The following tests were administered: Aggressive Questionnaire, MMPI-2, TAT, WAIS-IV, and the SCID-5-PD.

The history of presenting problem reveals that the aggressive behaviours began in childhood and continued into adolescence. The client frequently argued with her mother and got into fights at school. Afterwards, the client's aggressiveness would have diminished, but even today, she still sometimes throws tantrums when she doesn't feel understood in her relationship. The client has difficulty understanding and expressing her emotions, especially those she feels in her relationship with her mother.

Test results indicated that the client did not have a personality disorder (SCID-5-PD) but had a moderate anger trait (AQ) and suffered from feelings of loneliness and somatic concerns (MMPI-2). Comparison of performance on two tests varying in structure, relational content, and emotional stimulation indicates that the client has good thinking, reasoning and intellectual performance when the tasks are structured and neutral (WAIS-IV), whereas she has significant difficulty making connections between events, feelings, and behaviours when the material is less structured with relational content and emotionally inducing (TAT).

Based on the information obtained at the interview and from the psychological test results, it was possible to complete the multimodal functional analysis worksheet (see Tab. 7). The worksheet, once completed, allows for the rapid identification of the instigators of her aggressive behaviours in terms of environmental and psychological characteristics. These instigators are linked to vulnerabilities that activate and maintain them. In addition, a vulnerability was also identified in the medical modality. No causal factors were identified in the psychiatric modality or among the reinforcers. However, the difficulty in expressing emotions in words may have acted as habit strength to maintain aggressive behaviours from a young age. Finally, several abilities that may serve to inhibit aggression were identified in the environmental and psychological inhibition modalities.

From the multimodal functional analysis, the following hypotheses and treatment recommendations could be formulated. The client is unable to free herself from her past trauma and is always looking for validation from those around her, which does not come. Part of the blockage comes from a difficulty in mentalising the reasons for her mother's attitude towards her. This mentalisation difficulty feeds her suffering and resentments in her relationship with her mother and her relationships in general, her frustration at not understanding her emotions and not being able to express them, her anger at not being understood and validated, and her disappointment at not having achieved her ambitions.

However, the client has the support of her husband who helps her feel understood. She is motivated to change to preserve her relationship. She has the intellectual capacity to undergo psychotherapy and make new connections to free herself from her trauma. She has the potential to achieve her goals. Individual therapy was recommended to the client with the goals of better understanding her past trauma, being able to talk about it, better recognising emotions and mental states in herself and others and learning to express her anger appropriately.

CONCLUSION

The purpose of this article was to propose an assessment framework integrating eight models relevant to conceptualised clients with aggressive behaviour in clinical setting. The proposed method comprises different assessment steps with their respective instruments from the assessment of the client's motif for seeking help to the environmental and personal conditions related to aggression. What is most important is that the assessment framework does not focus solely on the aggressive symptomatology, but rather on the in-depth analysis of the course. That is why aggressive behaviours and reactions are conceptualized as manifestations in five modalities, considering factors such as instigations, vulnerabilities, reinforcements, habit strengths, and inhibitions. This approach presents a broader picture of the context in which these manifestations occur. The proposed approach allows for the grouping of all possible causes of aggressive behaviours presented by a client in clinical settings, integrating them into a psychotherapy case formulation that serves as a basis for establishing therapeutic goals and interventions.

Conflict of interest

The authors do not report any financial or personal affiliations to persons or organisations that could adversely affect the content of or claim to have rights to this publication.

Author contributions

Original concept of study: JG. Writing of manuscript: JG. Critical review of manuscript: JG, AZ. Final approval of manuscript: JG, AZ.

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