

## Assessing the utility of the Clinical Behavioral Case Conceptualization categories: A contextual behavioral based formulation model

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### ABSTRACT

Case conceptualization is a basic assessment tool in evidence-based clinical practice. Over the years, an extensive number of case conceptualizations have been developed; however, only a small number of those models met high-quality criteria in terms of validity and reliability. The Clinical Behavioral Case Conceptualization (CBCC) has shown good content and construct validity, as well as some preliminary evidence in treatment utility. Nonetheless, a further examination of CBCC categories' utility in identifying key explanatory processes by therapists is needed. Three independent raters assessed 171-case conceptualizations to establish whether CBCC descriptive (problem description) and explanatory categories (predisposition, precipitants acquisition, and maintenance) facilitate organizing and explaining clinical cases. Reviewers' consensus on the contribution of each category to clinical conceptualization was calculated by the Light's Kappa index. Findings indicated that CBCC descriptive and explanatory categories were significantly useful, with the exception of the precipitants category. In addition, acquisition and maintenance were the main categories that reviewers found as helpful in explaining clinical cases in the sample studied. We discuss CBCC utility for designing and establishing behaviorally oriented interventions and present methodological recommendations for future research on CBCC quality and ecological validity.

Psychological treatments are based on a comprehensive assessment of problems and factors interfering with clients' behavioral health. Clinical case conceptualization (i.e., case formulation) is a tool that organizes clients' information with the aim of defining clinical targets, identifying explanatory factors, and developing interventions (Caycedo et al., 2008). Case formulation has been associated with factors linked to positive treatment outcomes (Christon et al., 2015; Ellis et al., 2013; Jameson et al., 2007; Layne et al., 2014; Oddli & Halvorsen, 2014) such as treatment adherence, therapeutic relationship, and quality of clinical assessment (Chatoor & Kurpnick, 2001; Collyer et al., 2020; Flückiger et al., 2018). A recent study in the utility of Cognitive Behavior Therapy (CBT) case conceptualization for depressive clients showed that clinicians' competence in conducting case formulations significantly enhanced treatment outcomes (Easden & Fletcher, 2020).

A small number of studies have evaluated the quality (reliability and validity) of behaviorally oriented case conceptualizations (Bucci et al., 2016; Easden & Kazantzis, 2018; Finn et al., 2014). Hurl et al. (2016)

meta-analysis assessed treatment utility of functional analysis, finding that interventions based on functional analysis produced higher significant effect sizes than treatments lacking functional assessment. Even though most studies were conducted with populations presenting developmental disabilities, some studies addressed clinical problems in neurotypical population. Findings supported the treatment utility of functional assessment and the importance of exploring the validity and reliability of behaviorally driven case conceptualizations in typical clinical settings.

As such, several case conceptualization models have been developed and extensively disseminated within typical clinical contexts (Bucci et al., 2016). In a CBT framework, a good number of models have evaluated their reliability and validity; however, some methodological aspects limit the scope of these findings, particularly, issues on the data analysis (i.e., statistical methods, lack of power analysis) and procedures (i.e., developing case formulations by a group of clinicians) performed to evaluate case conceptualizations quality (Easden & Kazantzis, 2018).

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Further, inconclusive results relative to treatment and training utility of case conceptualization for evidence-based practice have been also found (Easden & Kazantzis, 2018; Rainforth & Laurenson, 2013).

Hayes et al. (1987) stated that clinical scientists had failed to prove treatment utility of their methods as research in this area had not enough information on the connection between assessments and treatment outcomes. They associated these problems with the lack of evidence on the independent effect of pre-intervention evaluations on treatment as well as the underdevelopment of theory-driven therapies. Thirty years later, clinicians are still struggling with estimating the utility and quality of their assessment methods. For example, a systematic review that evaluated the quality of published case conceptualization found that most of these formats did not perform robust statistical analyses to examine their validity and reliability (Bucci et al., 2016). The majority of those models focused on evaluating content and construct validity, few assessed reliability, and none of them tested treatment utility. In addition, case conceptualizations analyzed had moderate to strong evidence on the descriptive aspects but not in the inferential (explanatory) mechanisms included in them. This could have prevented researchers from determining the crucial factors to explain clinical problems and conducting studies on predictive validity which is a fundamental step to demonstrate treatment utility (Bucci et al., 2016).

The Clinical Behavioral Case Conceptualization (CBCC) is a behaviorally oriented case formulation designed to organize clients' clinical information and guide treatment plans based on contextual behavioral science principles (Muñoz-Martínez & Novoa-Gómez, 2011). CBCC includes the following three sections: informational boxes, descriptive and explanatory categories/hypotheses, and treatment plan. In the first section, the CBCC includes informational boxes in which clinicians introduce clients' information on problems, history, areas of growth, and strengths collected through traditional assessment methods (e.g., clinical interviews, self-records, or clinical scales; see Table 1). The second section contains five categories (see Table 2) in which data from the first section is organized in relational statements (functional hypotheses) to describe and explain clients' difficulties based on contextual behavioral principles (see Hayes, 2016). The third section provides a space in which clinicians formulate interventions based on the descriptive and explanatory categories identified in the second section.

Muñoz-Martínez and Novoa-Gómez (2011) provided evidence on CBCC construct validity by evaluating its content, face, and criterion validity. First, they examined the content and face validity of the CBCC model through inviting 19 clinicians (Ph.D., Masters' in clinical

**Table 1**  
Informational boxes of the CBCC.

Components	Description
Reasons for seeking help	Behaviors and circumstances associated with clients' clinical concerns.
Description of behavioral problems	Information on clients' behavioral problems and domains affected by those difficulties.
Historical analysis	Descriptive information on historical aspects such as social, biological, and genetic factors associated with the development of clients' problems.
Biological predispositions	Biological and health conditions that may influence clients' current functioning.
Contexts	Physical, social, and cultural settings in which clients interact. Include structural and functional characteristics of those environments.
Competencies	Information on clients' effective behavior based on social criteria. Socio-emotional, academic, verbal, and self-control competencies may be included in this section.
Self-knowledge competencies	Information on clients' ability to identify factors controlling their own behavior, which may include self-as context and self-discrimination repertoires.
Supporting factors	Description of health-promoting behaviors and contexts.
Impairment level	Evaluation of problem severity and impact on social and personal functioning.

**Table 2**  
CBCC categories.

Categories	Definition	Hypothetical Case Illustration
<b>Descriptive Problem description</b>	Conceptual and functional descriptions of clients' problems that include measurement parameters (i.e. frequency, duration).	Avoidance of interpersonal conflicts, in which they frequently shut down, change the topic, accept others comments, leave the situation, etc., when predicting others may make demands, enquire them, or provide negative feedback.
<b>Explanatory Precipitants<sup>a</sup></b>	Factors that exacerbate or "trigger" clients' problems (Eells, Kendjelic, & Lucas, 1998)	They remember a specific episode of bullying in which they felt highly emotionally overwhelmed when they were 10-years old.
<b>Predispositions</b>	Vulnerability factors that increase the probability of developing behavioral problems. However, these are not direct causes or learning processes (Eells et al., 1998; Graña, 2005).	They grew up in a low SES neighborhood, in which people tended to be aggressive for no reasons. They experienced bullying during their childhood and their caregivers were unaware of that situation.
<b>Acquisition</b>	Learning and developmental processes that are associated with the onset of clinical problems (Eells et al., 1998; Graña, 2005).	The experience of bullying shaped an avoidant repertoire to cope with conflicts that involves withdrawing circumstances or places in which they predict that conflicts can happen.
<b>Maintenance</b>	Contextual-behavioral processes that explain clinical problems (Muñoz-Martínez & Novoa-Gómez, 2011).	Behavioral pattern maintained by negative reinforcement. When they emitted avoidant behaviors, the contact with aversive stimuli is interrupted, increasing the probability of behaving similarly in the future.

<sup>a</sup> This category was eliminated from the CBCC as results indicated that it was not useful to formulate clinical cases.

psychologist, and other graduate students) to complete a case conceptualization of one of their clinical cases using the CBCC and to evaluate precision and comprehension of CBCC categories' definitions. Later, two independent raters assessed the absence or presence of CBCC categories in the case conceptualizations completed by the 19 clinicians so that they evaluated content and face validity of the most often utilized CBCC categories. They found moderate evidence of usability for predisposition and maintenance categories, fair for acquisition, and poor for precipitants. Once the CBCC categories met qualitative indicators of construct validity, an independent clinician conducted an experimental single-case design to test criterion validity. The therapist organized clinical information of three cases in CBCC informational boxes, and later, utilized descriptive and explanatory categories to explain clinical problems and develop an idiographic treatment plan. Positive outcomes were found after implementing treatments based on the processes included within the CBCC, providing preliminary data in the criterion validity of this case conceptualization model (Muñoz-Martínez & Novoa-Gómez, 2011).

Additionally, evidence conceptualizing clinical cases with the CBCC has shown treatment utility in clinical and health settings (Pulido-Castelblanco & Novoa-Gómez, 2014). The CBCC has also demonstrated positive effects on training young clinicians (Pulido-Castelblanco & Novoa-Gómez, 2014). Although these studies have contributed to demonstrating some validity aspects of the CBCC, information on the utility (clinical relevance) of CBCC categories and the explanatory factors included within this model is still need (Muñoz-Martínez &

Novoa-Gómez, 2011).

The current study analyzed the utility of CBCC categories to organize clinical information and identify key explanatory factors for diverse clinical presentations. We particularly explored the relevance of acquisition and maintenance subcategories in understanding clinical cases. Emphasis on identifying main processes within the acquisition and maintenance categories is based on the role of developmental (i.e., reinforcement history) and maintenance (e.g., reinforcement, rule-following) variables for modifying behavioral problems (Follette et al., 2000; Sturme et al., 2007). Results from this study could strengthen the evidence on the quality of contextual behavioral-based case conceptualizations and provide information regarding relevant explanatory processes for treatment planning.

## 1. Method

### 1.1. Unit of analysis and procedure

A retrospective research study was conducted following IRB standards for de-identified archival studies. Clinical records were recovered from a school clinic in a university in a Latinoamerican country. This program offers clinical training in three theoretical orientations: behavioral, systemic, and psychoanalytic. Clients are assigned to a therapist overseen by a supervisor who works exclusively from one of those theoretical orientations. Based on that, only clinical case formulations developed by behaviorally trained undergrads<sup>1</sup> and master's students were retrieved. Clients who attended this clinic granted permission for utilizing their information for research purposes in the clinic informed consent. Clients' clinical records were reviewed by the second author who transcribed case conceptualizations within a locked room at the clinic. To protect and secure clients' health information, a random code was assigned to each conceptualization, and clients' identifiable information was removed from transcriptions. We retrieved 310 clinical records ranging 3 years in the clinic. Files missing case formulations were excluded (N = 138), and a final sample of 171 clinical conceptualizations was analyzed.

Three masters' in clinical psychology who had at least 3 years of experience as clinicians and supervisors from a behaviorally oriented approach rated case conceptualizations. They were provided with a password-protected file containing clinical formulations and the following instruction: "Please evaluate CBCC categories based on the definitions specified in this file. After reading a case conceptualization, rate CBCC categories by assigning '1' when the category is absent, and '2' when it is present." Content of case formulations was also evaluated to determine the type of explanatory processes utilized by clinicians when explaining problems' acquisition and maintenance. When completing the assessment, raters deleted case conceptualizations and sent ratings over to the second author in a password-protected file via e-mail.

## 2. Materials

Case formulations were transcribed in a password-protected Microsoft Excel file, which also contained rating columns for CBCC categories. Raters were allowed to include additional columns for specifying acquisition and maintenance mechanisms when needed.

### 2.1. Data analysis

Light's (1971) kappa ( $\kappa$ ) was performed to evaluate CBCC reliability. This statistic averaged Cohen's kappa coefficients across three raters pairs. Light's kappa was performed utilizing R (statistical

software) *irr* package (Gamer et al., 2010), which provides  $\kappa$ 's index, z-scores, and p-values. Reliability was interpreted based on Landis and Koch's (1977) standards: poor (0.00–0.20), fair (0.21–0.40), moderate (0.41–0.60), substantial (0.61–0.80), and very good (0.81–1.00). Descriptive analysis of acquisition and maintenance explanatory processes was performed to identify the percentage with which those processes were utilized in clinical conceptualizations.

## 3. Results

### 3.1. Categories reliability

Problems description (z-score = 3.63,  $p = 0.00$ ), predispositions (z-score = 6.07,  $p = 0.00$ ), acquisition (z-score = 7.27,  $p = 0.00$ ), and maintenance categories (z-score = 4.68,  $p = 0.00$ ) were substantially reliable CBCC (see Table 3). An examination of acquisition and maintenance subcategories provided evidence on what processes were key to explaining clinical targets by behaviorally oriented clinicians in this sample (see Table 3). For instance, raters agreed on the relevance of shaping and modeling processes to explain how people developed psychological problems. These were frequently mentioned in the case conceptualizations (see Fig. 1). Other acquisition processes such as instructional learning, derived relational learning, and classical conditioning were not consistently utilized in clinical formulations (see Table 3).

In line with a behaviorally oriented perspective, contingencies of reinforcement were substantially utilized ( $\kappa = 0.74$ ; z-score = 6.76;  $p = 0.00$ ) to explain the maintenance of psychological problems by clinicians (see Table 3). Although raters showed a substantial consensus on the use of motivational operations ( $\kappa = 0.66$ ; z-score = 0.06;  $p = 0.95$ ) and metacontingencies/macrocontingencies ( $\kappa = 0.71$ ; z-score = 0.14;  $p = 0.89$ ) as maintenance factors, kappa coefficients were not statistically significant. Clinicians likely used those processes less frequently than contingencies of reinforcement, reducing the chance of finding significant results in this study.

Contrary to the other explanatory categories, raters did not have a reliable consensus on the utility of precipitant factors (z-score = 0.85,  $p = 0.40$ ). A reason for this may relate to the small frequency with which they were present in case conceptualizations analyzed; fewer than 35% of them included precipitant factors.

**Table 3**  
CBCC Light's Kappa index.

Categories	z-scores	Light's Kappa
<b>Problem description</b>	<b>3.63</b>	<b>0.71<sup>a</sup></b>
<b>Predisposition</b>	<b>6.07</b>	<b>0.79<sup>a</sup></b>
<b>Precipitants</b>	<b>0.84</b>	<b>0.32</b>
<b>Acquisition</b>	<b>7.27</b>	<b>0.70<sup>a</sup></b>
<i>Modeling/Imitation</i>	3.73	0.78 <sup>a</sup>
<i>Shaping</i>	3.27	0.61 <sup>a</sup>
<i>Instructional learning</i>	0.64	0.68
<i>Derive relational learning</i>	0.35	0.36
<i>Classic conditioning</i>	0.20	0.20
<i>Others</i>	0.39	0.39
<b>Maintenance</b>	<b>4.68</b>	<b>0.77<sup>a</sup></b>
<i>Behavioral problems of others in their environment</i>	0.28	0.33
<i>Dysfunctional beliefs</i>	0.47	0.38
<i>Problematic relationships</i>	0.00	0.03
<i>Emotional dysregulation</i>	−0.00	−0.00
<i>Skill deficits</i>	0.19	0.27
<i>Lack of social support</i>	−0.00	−
<i>Health conditions associated with distress</i>	−0.00	−
<i>Contingencies of reinforcement</i>	6.76	0.74 <sup>a</sup>
<i>Rule-following/Relational responding coherence</i>	0.89	0.58
<i>Motivational operations</i>	0.06	0.66
<i>Poor sources of reinforcement</i>	0.29	0.29
<i>Metacontingencies/Macrocontingencies</i>	0.14	0.71

<sup>a</sup>  $p < 0.001$ ; — Invalid information (not enough data points).

<sup>1</sup> In Colombia, psychology undergrads should enroll in a six-months clinical practicum in which they should see individual clients.

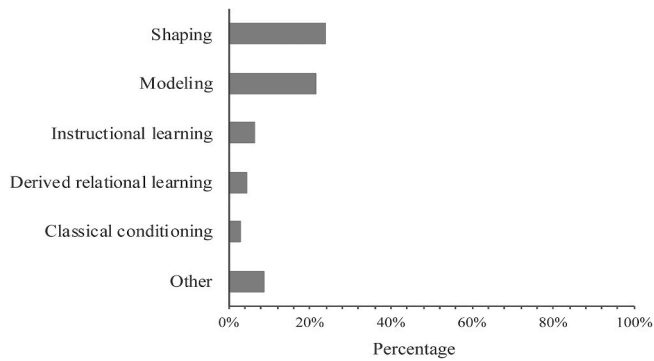


Fig. 1. Percentage of acquisition processes per total number of case conceptualizations.

3.2. Descriptive analysis of explanatory processes

The frequency with which explanatory processes utilized in the case conceptualizations was averaged. Acquisition processes were part of 59% of the case conceptualizations analyzed. On average, shaping (23.8%) and modeling (21.6%) were the learning processes more frequently mentioned when conceptualizing the development of psychological problems in this sample (see Fig. 1). Fewer than 15 of the 171 case formulations included other learning processes such as instructional learning, derived relational learning, and classical conditioning.

Maintenance processes were observed by at least one rater in 82% of the clinical conceptualizations. Contingencies of reinforcement were the main explanatory mechanism claimed in the majority of case formulations (58.1%). Rule-following (8.8%) and irrational beliefs (7.6%) were the third and fourth processes invoked; however, these mechanisms were included in fewer than 10% of case conceptualizations (see Fig. 2).

4. Discussion

Four out of the five categories in the Clinical Behavioral Case Conceptualization were evaluated as substantially useful to formulate clinical cases based on a contextual behavioral approach. Description of problems, predispositions, acquisition, and maintenance processes were consistently identified by raters within case conceptualizations in this study. However, the precipitants category was not consistently observed by the evaluators. The lower rate of precipitant factors in the case conceptualizations analyzed may be associated with behavioral orientation emphasis on current maintenance factors to explain behavioral problems. Therefore, problems’ historical triggers are not crucial to

explain why psychological problems persist or to plan interventions. In this regard, Sturme et al. (2007) stated “behavioral case formulation involves rejecting large amounts of information, such as history and independent variables that cannot be manipulated or that do not have a large impact on the behavior of interest” (p. 19). Current findings are consistent with preliminary studies with the CBCC that showed moderate evidence on the consistency of predispositions and maintenance processes and poor reliability for precipitants (Muñoz-Martínez & Novoa-Gómez, 2011). The small number of case conceptualizations that include precipitants factors and the low agreement among raters support the decision of taking this category out of the list of CBCC explanatory categories.

Problems descriptions were consistently found within case conceptualizations using the CBCC model. Although current analyses did not examine the content of problem descriptions, anecdotally, most formulations conceptualized clients’ difficulties in functional terms. The following two examples illustrate typical problem descriptions on the records retrieved: (a) “Client presents a behavioral excess of health-seeking behaviors (i.e., visiting doctors, making herself sick) maintained by escaping of responsibilities and finding family members attention,” and (b) “An avoidant behavioral pattern is observed in social circumstances in which the client can be criticized or negatively evaluated about her interpersonal performance.” In this order, clinical conceptualizations in this sample described clients’ problems in a relational way, linking behavioral difficulties to contextual factors. It has been hypothesized that behaviorally oriented conceptualizations would promote a functional conceptualization of psychological difficulties (Hayes & Follette, 1992). Future studies may provide precise information about CBCC’s ability to support therapists in conceptualizing clinical problems in a functional fashion rather than a syndromal or topographic manner.

Contingencies of reinforcement were one of the most relevant maintenance processes included by case conceptualizations in this study. This supports CBCC as a behaviorally oriented model as it is consistent with core explanatory processes in the contextual behavioral science in which social, physical, and verbal contexts are fundamental to understand and explain individuals’ behavior (see Delprato & Midgley, 1992; Hayes et al., 2012).

The current study provides additional information on the quality of behaviorally oriented case conceptualizations. Methodological procedures employed to evaluate the utility of CBCC categories allowed to control threats to internal validity. For instance, blinded raters controlled observer biases, and the analysis of case conceptualizations from real clinical cases increased ecological validity (Flinn et al., 2015). In addition, data analysis was performed through the Light’s kappa

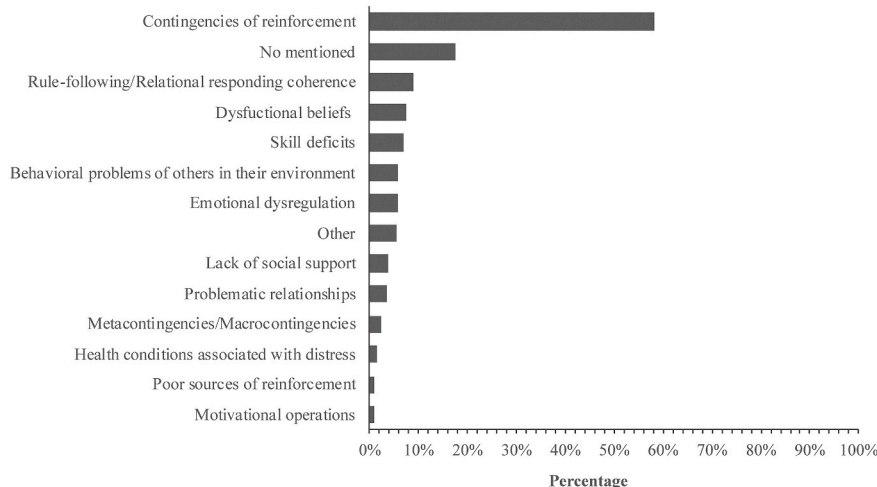


Fig. 2. Percentage of maintenance processes per total number of case conceptualizations.

coefficient, a well-supported statistical method for evaluating interrater agreement. These methodological actions likely reduced confirmation bias in this study, a threat frequently observed in case conceptualization research (Bucci et al., 2016; Kaholokulaa et al., 2013).

#### 4.1. Limitations

Though findings supported the utility of CBCC categories to identify explanatory factors of behavioral problems, additional studies are needed to improve its ecological validity. Evaluation of its utility in different applied contexts (e.g., health centers, private practice), cultures (i.e., other countries), and populations (e.g., minorities) by experienced practitioners would allow establishing the scope of this method on varies practitioners' contexts (Flinn et al., 2015). CBCC categories also require a further examination of their reliability to strengthen its quality. To this end, Flinn et al. (2015) recommended performing a strong statistical analysis of the agreement among different blind clinicians who develop case formulations of the same clients using the same model, in this case, CBCC categories. In addition, they strongly suggest providing multiples sources of information on clients' clinical presentations (e.g., videorecordings, clinical interviews) to raters to minimize confirmation bias (Flinn et al., 2015).

Treatment utility of the CBCC is another area of study as some researchers have questioned the value of case formulations for connecting clinical hypotheses and treatment outcomes (Caycedo et al., 2008; Ellis et al., 2013; Kaholokulaa et al., 2013; Layne et al., 2014). Others have wondered whether treatments based on case formulations grounded on psychological processes are more effective than those based on syndromal categories (Carey & Pilgrim, 2010; Hayes & Follette, 1992). Controlled experiments to link the use of the CBCC to treatment outcomes are the next step to determine how useful this clinical case conceptualization is for intervention science.

#### 5. Conclusion

This study shows strong evidence in the quality of the CBCC categories, particularly the utility of its categories to conceptualize clinical cases from a behavioral approach. While further research on treatment utility, reliability, and replicability of these findings is needed, CBCC categories provide a well-grounded frame to organize clients' information, explain clinical problems, and select treatments based on contextual behavioral principles.

#### Declaration of competing interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

We understand that the Corresponding Author, Amanda M. Muñoz-Martínez, is the sole contact for the Editorial process (including Editorial Manager and direct communications with the office). She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs. We confirm that we have provided a current, correct email address (amandamile@gmail.com; am.munozm@uniandes.edu.co) which is accessible by the Corresponding Author and which has been configured to accept email from the

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