

**Report of the ACBS Task Force on the Strategies and
Tactics of Contextual Behavioral Science Research**

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Executive Summary

Throughout its history the strategy and tactics of contextual behavioral science (CBS) research have had distinctive features as compared to traditional behavioral science approaches. Continued progress in CBS research can be facilitated by greater clarity about how its strategy and tactics can be brought to bear on current challenges. The present white paper is the result of a 2 1/2-year long process designed to foster consensus among representative producers and consumers of CBS research about the best strategic pathway forward. The Task Force agreed that CBS research should be multilevel, process-based, multidimensional, prosocial, and pragmatic, and provided 33 recommendations to the CBS community arranged across these characteristics. In effect, this report provides a detailed research agenda designed to maximize the impact of CBS as a field. Scientists and practitioners are encouraged to mount this ambitious agenda.

Report of the ACBS Task Force on the Strategies and Tactics of Contextual Behavioral Science Research

The Association for Contextual Behavioral Science (ACBS) Task Force on the Strategies and Tactics of Contextual Behavioral Science Research was created by the ACBS Board in Fall 2018. The Board took this action at the recommendation of the ACBS Publications Committee, which believed that the association, the field, and potential authors of the *Journal of Contextual Behavioral Science* (JCBS) could benefit from a clear statement of the nature and needs of the Contextual Behavioral Science (CBS) research program. After the Board decided to create the Task Force, input was sought from the ACBS community on the charge and the Task Force composition. Task Force members were appointed by then ACBS President Louise Hayes, in consultation with Steven C. Hayes, who was appointed as the chair of the Task Force. Task Force members were selected to represent both excellence and diverse views, as defined by backgrounds, professions, regions, and research areas.

The Task Force was given three major tasks:

- Create a white paper on a progressive research strategy for contextual behavioral research.
- Create a research quality checklist for contextual behavioral research.
- Recommend steps in the open science effort consistent with CBS sensitivities and strategy.

The Task Force met for two days in Dublin immediately following the ACBS World Conference in the Summer of 2019. During that meeting, the Task Force made the strategic decision to focus first on the overall strategy issue in the form of a white paper, and to apply

what we developed to the issues of research standards. We agreed to consider a progressive CBS approach to open science issues after these first two steps had been taken. The open science subcommittee report will follow the present report in a separate document.

In the Dublin meeting, a five-part organization of key features of CBS research emerged. It was decided that contextual behavioral research should be multi-level, multi-dimensional, process-based, prosocial, and practical. Recommendations would be developed consistent with each of these features. Sub-committees were created to address each proposed feature. After a series of sub-committee meetings, a detailed outline of the report was developed and shared with the ACBS membership in January 2020. Input from the membership was then shared with the Task Force.

The plan at the time was to meet in person at the ACBS World Conference in New Orleans in 2020, in order to specify details of the report. Because of the COVID-19 pandemic, the Task Force subcommittees met virtually to determine the content of the report and created a draft that was shared with the entire Task Force and then the ACBS Board. Over the next several months, drafts were circulated within the Task Force, and a final report was produced in Spring of 2021. This report was then approved by the Board.

Preamble and Purpose

Approaching behavioral science from a functional and contextual viewpoint is as old as scientific psychology itself. Discussing and developing these approaches under the rubric of “Contextual Behavioral Science” (CBS) began only with the establishment of the ACBS in 2005. The origins of the CBS approach however are evident in functionalism, pragmatism, behaviorism, and related intellectual traditions, as the impact of the Darwinian revolution was

felt in the earliest days of psychology as a discipline. In more modern times, evidence-based approaches to intervention science such as behavior therapy, applied behavior analysis, and many parts of the cognitive behavioral tradition have embraced functional analytic and contextual behavioral thinking. In the basic area, wings of contextualistic thinking in animal learning, behavior analysis, social learning, ethology, interbehaviorism, cultural evolution, and so on have arguably been part of a contextual behavioral science tradition for many years.

Over the last decade and a half, CBS began to take form as a specific and modern face of this functional contextual tradition, with a specified philosophy of science, a broad set of research topics, characteristic methodological approaches, and an expansive long-term scientific goal: creating a behavioral science more adequate to the challenge of the human condition (Hayes, Barnes-Holmes, & Wilson, 2012; Vilaradaga, Hayes, Levin, & Muto, 2009). While CBS has been spurred on by the establishment of ACBS, and later, the *Journal of Contextual Behavioral Science*, it is worth noting that CBS is an intellectual and practical tradition that goes well beyond any single association, journal, or research area.

With increasing speed, contextual behavioral science in its modern form has made substantive scientific and practical progress in basic and applied areas (see Zettle, Hayes, Barnes-Holmes, & Biglan, 2016 for a recent summary). While initially largely focused on Acceptance and Commitment Therapy and Training (ACT; Hayes, Strosahl, & Wilson, 1999; see Gloster, Walder, Levin, Twohig, & Karekla, 2020 for a recent meta-analysis of meta-analyses of ACT), on Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), and behavioral principles more broadly, CBS research and practice have expanded to include a wide variety of concepts and methods relevant to both research and intervention. For example, CBS research, scholarship, and practice now readily incorporates applied evolutionary science

approaches such as Prosocial (Atkins, Wilson, & Hayes, 2019). A wide variety of functional approaches to psychotherapy such as Compassion Focused Therapy (Gilbert, 2010), or Functional Analytic Psychotherapy (Kohlenberg & Tsai, 2007), have long had a comfortable home in CBS. The same is true of applied educational approaches drawn from RFT (e.g., Dixon et al., 2017) or more generic approaches to evidence-based intervention science such as process-based therapy (Hofmann & Hayes, 2018). This is not an exhaustive list. A myriad of issues, topics, and methods linked by philosophical foundations and analytic strategies live under the CBS umbrella.

The analytic approach adopted by CBS is grounded in functional contextual philosophical assumptions (Biglan & Hayes, 1996; Hayes & Brownstein, 1986), which maintain that actions, public and private, can only be understood in terms of the situational and historical contexts in which they occur. In other words, analyses of relationships among behaviors broadly defined (e.g., overt actions, thoughts, feelings) or patterns of behaviors (e.g., personality traits, temperaments, repertoires) are considered incomplete without the inclusion of contextual variables that predict psychological actions or action patterns, and the relationships among them. The focus on context in CBS is driven by pragmatic concerns, as any analysis of behavior can only be practically useful in accomplishing prediction and influence as a unified goal if it specifies directly manipulable contexts to allow for experimental investigation and applied intervention.

CBS encompasses a specific scientific strategy, emphasizing the experimental analysis of principles and processes that are precise in their analytic application, cumulatively broad in the range of phenomena they encompass, and coherent with data and principles drawn from related levels of analysis. CBS proceeds from a publicly stated goal of seeking analyses that afford the

prediction and influence of the behavior of whole organisms, interacting in and with a context that is considered historically and situationally, with precision, scope, and depth. The focus of CBS research is thus on the development of principles and processes that are functionally defined and that apply across the full range of behavioral complexity.

At this point, CBS research is expanding rapidly and is gaining attention in the behavioral science community writ large. Since CBS research includes a wide variety of topics, it difficult to characterize its growth broadly speaking but one can do so by focusing on specific areas that are relatively well developed within this tradition. For example, as of March 2021, there were over 165 meta-analyses or structured reviews of ACT, acceptance-based behavioral therapy, and the like; and over 465 published randomized controlled trials (RCTs) of ACT (see bit.ly/ACTmetas and bit.ly/ACTRCTs). A similar proliferation of research has been observed in terms of basic science applications. For example, analyses of Relational Frame Theory (RFT), a CBS-consistent theory of language and cognition, reveal growth in scholarly publications and impact of RFT (Dymond, May, Munnely, & Hoon, 2010; Dymond & May, 2018; O'Connor, Farrell, Munnely, & McHugh, 2017). JCBS is now well established and the number of authors and research laboratories publishing in JCBS is expanding.

The rise of CBS data also seems to be paralleled by the spread of CBS ideas in a range of domains. Several major shifts within behavioral science are in step with CBS sensitivities. For example, an increasing number of emerging conceptual, empirical, and practical developments emphasize the specification of core processes common across a range of approaches (Hayes, Hofmann, & Ciarrochi, 2020). Many CBS publications and media resources created for a public audience have gained significant popularity, and CBS expertise and research are now regularly featured in traditional media. CBS approaches have risen to the attention of policy makers such

as the World Health Organization (WHO), who have begun testing, promulgating, and validating CBS methods. Early successes (Tol et al., 2018) have already led to dissemination efforts linked to some of the most important problems humanity is facing worldwide. For example, WHO is currently disseminating CBS-based self-help to help deal with the COVID-19 pandemic (www.who.int/publications-detail/9789240003927) and recommends ACT as a validated treatment for chronic pain in adolescents (WHO, 2020).

Despite observed successes across various metrics, continued progress could be hampered by the poor fit between underlying assumptions that characterize CBS and dominant research standards based on more traditional behavioral science strategies. Several examples are apparent. For example, clinical research is often expected to focus on syndromal diagnostic categories that tend to underemphasize contextual and functional aspects of psychological suffering, while putting aside issues of psychological prosperity. Assessment tools and approaches are typically evaluated in terms of traditional psychometric theory and methods, which can be inappropriate for process-based or idiographic approaches for which intraindividual variability is a focus. Policy makers may restrict dissemination of intervention approaches to topographically defined packages that do not allow for person-specific investigation of functional relationships between context and behavior. Inductive research is often eschewed by mainstream behavioral science. Infrequent self-report measures dominate over high temporal density behavioral measures. Concepts and theories are hypothetico-deductive rather than functional and analytic. Treatment utility is de-emphasized. The link between basic and applied science is not given explicit attention. The list of such problems goes on and on.

CBS research cannot continue to progress toward its ultimate intellectual and practical purpose if it is held to standards that conflict with that very purpose. If CBS research is to make maximal impact, it is important for the community to be clear about its research strategy and to hold itself accountable for implementing high standards linked to its analytic assumptions. Thus, this white paper is the product of an attempt to foster consensus among representative producers and consumers of CBS research on our strategies and tactics and the standards these suggest in the current era of scientific work and practical development.

The Contextual Behavioral Science Approach

The CBS research tradition is characterized by a commitment to a specific, pragmatic analytic purpose and strategy: specifying increasingly organized statements of relations among events that permit the prediction and influence of any and all actions, public and private, of whole organisms interacting in and with a manipulable context considered historically and situationally, and to do so with precision, scope, and depth and in keeping with testable experience. This analytical purpose and affiliated strategy imply an approach that is linked to basic principles and processes, cutting across traditionally defined areas of study, and centered on the idiographic unit of interest, be it an individual, couple, family, small group, organization, or community (i.e., not a collective that differs from the unit of interest). Because principles and processes occur at a given level of analysis or organization, nested contextually within other levels of analysis, such an approach is inherently multi-level and longitudinal. In other words, CBS analyses seek pragmatically useful understanding of how levels of organization are nested into larger levels, and of how sequences of action and context, identified by appropriately temporally dense measurement strategies, interrelate over time.

While recognizing the importance of naturalistic and observational approaches, CBS research emphasizes analytic approaches that are tested by experimental manipulation, seeking an appreciation of the dynamic and complex nature of systems of influence, and processes of change. In part because of this appreciation, over-simplified and reductionistic approaches that override the multi-level and multi-dimensional nature of human complexity are rejected. Instead, high precision, high scope analyses are sought that demonstrably improve conceptual and treatment utility, and that integrate behavioral science findings and analyses into the broad family of life sciences. CBS considers itself to be a facet of a multi-dimensional and multi-level extended evolutionary approach. Adopting such an approach fosters consilience with other perspectives by placing CBS work underneath the umbrella of one of the most integrative and centrally important functionally and contextually oriented theories in all of the life sciences, evolutionary theory.

These abstract statements about science need to be tempered, however, by the recognition that science itself is a social enterprise. The Task Force recognizes the field's ethical responsibility to promote research strategies and applied methods that address the social and cultural contexts of human action, as well as issues of diversity, inclusion, bias, and privilege. CBS research acknowledges and aims to address bias due to gender, language, race, ethnicity, sexual orientation, identity, class, economics, country of origin, and the like. CBS analyses are applied to issues of resilience and prosperity, not just pathology. Successful implementation of the CBS scientific strategies and tactics thus requires the participation and empowerment of practitioners, researchers, and consumers of knowledge. In keeping with the egalitarian purpose of CBS, self-help, peer support, and low-cost forms of prevention and intervention across the full range of human functioning are a special focus.

The purpose of this paper is to describe the tactics and strategies of high-quality CBS research. The Task Force found that the key qualities of the CBS research and practice program could be summarized around five key features of the approach, namely, that effective CBS research is: (1) multi-level, (2) multi-dimensional, (3) process-based, (4) prosocial, and (5) practical. These are all concepts that are central to CBS thinking and an extended evolutionary model. This self-reflective nature of the report organization makes sense since the behavior of scientists themselves is part of the purview of a CBS perspective.

In each of the areas we cover in this report, we will periodically stop to state clearly the implications of our analysis for the goals, nature, and needs of CBS research. These are in essence recommendations for research that we believe will foster greater scientific progress as measured against CBS goals and reflect CBS sensibilities, at least in the intermediate term. We recognize that these recommendations may eventually become dated, and we encourage the ACBS Board to revisit them when that occurs. Each recommendation will be emboldened and numbered sequentially.

I. Contextual Behavioral Science is a Multi-Level Approach

All life phenomena are nested in increasingly complex levels of organization. The cell may be part of a multicellular organism; the action is part of a repertoire; the individual is part of a family, a community, and so on. Analysis of human behavior is thus multi-level, with the chosen level of analysis defined by its pragmatic purpose. For example, it is different to study the impact of social policy on society, versus the impact of social policy on the individual. Both are important and relevant, but they answer different questions and together provide a broader perspective. CBS research recognizes that each level of analysis has distinct features but focuses

on analyses with depth. That is, CBS research encourages the identification of principles and processes that can scale hierarchically across complex multi-level systems.

While a narrow focus at one level of analysis is useful at times, viewing other levels as irrelevant and failing to situate the event of interest into its broader multi-leveled context will limit scientific progress. The result may be an inability to influence the event of interest effectively (e.g., because the analysis is incomplete), or an inability to influence other levels in which the event is situated (e.g., behavioral science informing broader social policy). Parents are key to the success of children, for example, and they may benefit from professional support when dealing with behavioral difficulties (Gould, Tarbox, & Coyne, 2018; Fung et al., 2018). Failure to take into account multi-level contextual variables might also contribute to societal inequities, bias, or stigmatization. For example, IQ and similar aptitude tests are known for being ethno-centric, leading to inequities in college admissions with implications for wealth accumulation among ethnic minority populations. Conceptualizing behavior as influenced by multi-level contextual variables reduces misplaced blame, from recognition of historical trauma to institutionalized racism, and allows attention and manipulation of the factors that may predict and influence behavior.

Any given analytic focus should not diminish the relevance of other levels of analysis. For example, CBS approaches should resist extreme individualism, neurobiological reductionism, or the rejection of the individual as a way of emphasizing the importance of community. Clarity of focus of analysis and a broad appreciation of the multi-level nature of human functioning can usefully co-exist, and CBS requires a more integrated science that views events as situated in progressively larger ecosystems (Bronfenbrenner, 1979; Kantor, 1953). Further, although the explicit purpose of an analysis may be prediction and influence at a given

level, because phenomena are nested, change at one level has implications for all other levels. For example, intervening on culture-level variables will influence the behavior of smaller communities or individuals, and alterations in human behavior may alter gene expression through epigenetics that may over time lead to evolutionary changes in organism physiology, or changes in brain structure and function within the lifetime of the person.

The multi-level nature of contextual behavioral science leads to several research recommendations.

Recommendation 1. CBS research should examine relevant variables across levels of analysis, facilitated by more cross-disciplinary research, and with the explicit aim of coherence across levels of analysis within a broad evolutionary science framework.

Basic behavioral and applied CBS research should be acutely sensitive to both content domains and contextual factors at a given level (e.g., interventions work for particular behaviors under particular conditions) and across levels: both “upward” (e.g., sociology) and “downward” (e.g., neuroscience). For example, research in clinical psychology may focus on the psychological level (understood within CBS to refer to behaving organisms intersecting with and in a historical and situational context), however, it should be sensitive to the fact that psychological events are also nested within a specific broader social and cultural context, and physiological, neurological, genetic and epigenetic substrates are nested within the individual.

Multi-level analysis may be facilitated by more cross-disciplinary research that allows for relevant contextual variables to be specified at various levels of analysis in terms of their impact

on variation and selective retention of life enhancing or life interfering adjustments. By embedding these multi-level analyses within a modern evolutionary-science framework, psychological dimensions can more readily link properly with findings at other levels of analysis (e.g., biophysiological, or sociocultural) without either reductionism or expansionism. The purpose is a more progressive, integrated biopsychosocial science with greater cooperation among various level of scientific research and practice.

Recommendation 2. CBS research needs more basic experimental research into sources of behavioral influence across levels of analysis.

Within CBS, there is a need for more basic behavioral research in which there is the direct manipulation of context and observation of behavior change across levels of analysis, selecting basic terms to define the principles that influence behavior on the basis of their precision, scope, and depth. For example, CBS cultural research can be usefully informed by laboratory-based experimental analyses of cultural practices linked to basic accounts, or by the experimental analysis of community change in its natural context.

Recommendation 3. CBS research needs middle-level terms to be examined for their utility in different contexts, and for them to be increasingly specified and tested in basic analytic terms that allow for the identification of multi-level influences on behavior.

CBS often makes use of terms for pragmatic purposes as a way of summarizing basic research and make it more practically applicable and understandable. These so-called “middle-level terms,” situated between basic analytic technical terms and more pragmatic or common language, need to be subjected to ongoing evaluation in terms of their utility specific to the contexts in which they are employed. In a progressive research program, they also need to be increasingly well-defined over time, via principles derived from basic research to facilitate identifying the multi-level contextual factors that influence them. For example, by specifying basic analytic features of constructs such as values, self-compassion, and the like, it may be easier to identify societal or individual-level factors that influence these actions. This need is especially acute when middle level terms are used that are arguably not yet well understood in terms of a technical functional analysis.

Recommendation 4. CBS research needs to carefully measure multi-level factors that for ethical or practical reasons cannot be manipulated.

Contextual factors that cannot be manipulated for ethical or practical reasons need to be adequately measured. For example, CBS research should include assessment of the social and cultural context of individuals (within groups, families, organizations). This leads naturally to an interest in diversity, including sex, gender identity, language, religious beliefs, and so on, as issues of central importance. Assessment should focus not just on the unique historical context of the individual, but on the sets of often implicit cultural rules for behavior operating at the group level that lead readily to oppression, inequity, and bias.

A failure to measure context is particularly problematic in randomized controlled trials (RCTs) and large group designs when these designs forego the identification of contextual factors influencing individual outcomes. Variables influencing outcomes may include sociocultural or psychological-level contextual variables (e.g., individual history, neurocognitive differences, social support systems) that influence treatment engagement or impact. Measuring and manipulating multi-level principles, and process research at one level of analysis can speak to the analysis of other levels. For example, empirically testing culturally modified forms of CBS interventions in diverse populations with adequate process measures in place can inform understanding of both the impact of psychological intervention methods, and key features of the social and cultural context in which psychological change occurs.

Recommendation 5. CBS research needs to emphasize more longitudinal measurement that situates a psychological event in a behavioral stream and the context in which that stream occurs.

CBS research should make greater use of longitudinal research with adequately dense measurements to identify sequences of action in context and specify how these sequences interrelate over time. This may be facilitated by mobile technologies that allow for data to be captured repeatedly and in real-time, sometimes with minimal burden to the participants and in the natural environment where important psychological events are occurring. This allows behavior to be better situated in a multi-level context, with observations nested within individuals within a historical and situational context.

Recommendation 6. CBS research needs to focus on analyses with depth that encourage the identification of principles and processes that can scale hierarchically across complex multi-level systems.

CBS research should identify principles that can scale hierarchically across multi-level systems, allowing for greater scientific coherence and impact. Scalable principles may increase the potential of CBS research to positively influence public health and solve global and social problems. Further, research that moves beyond the individual as the unit of analysis and engages more contextual research at the population level, may help inform public policy and maximize human potential. Research will also be needed to examine the impact of changes at the societal level, as well as lower levels of the multi-level system (e.g., impact of public policy on the individual).

II. Contextual Behavioral Science is a Process-Based Approach

The focus of CBS is on processes of behavioral change that allow psychological events to be predicted and influenced toward reaching desired analytic, prosocial, and practical goals. Processes of change are functionally important sequences of contextually embedded biopsychosocial events that can lead to positive or negative outcomes of importance. Processes of change can refer to concepts with different levels of precision, scope, or depth and might include:

- *Basic behavioral* processes, such as reinforcement, extinction, stimulus generalization, social learning, derived relational responding, and so forth.

- *Evolutionary processes* also belong in a multi-level, multi-dimensional contextual behavioral approach such as genetics, epigenetic regulation of gene expression, evolution of survival circuits, evolution of cultural practices, phenotypical development, and the like.
- *Therapeutic processes* of change, expressed largely in *middle-level terms* that orient analyses of behavior toward domains of importance such as “compassion,” “acceptance,” “group identity,” or “values.” Until fully adequate basic accounts of these middle-level terms are developed, it is recognized that these terms may be less precisely defined than basic behavioral processes from a CBS perspective. The middle-level terms commonly used in CBS arguably have some degree of basic support and at their best serve as shorthand summaries for sets of functional analyses. If these analyses are solid, the issue shifts from one of precision to accessibility. Over time middle-level terms should be understood in terms of empirical analyses linked to basic behavioral and evolutionary principles.

These different conceptualizations of processes of change may be considered multi-leveled and their utility may vary depending on analytical or practical purpose. For example, basic behavioral processes may not be best suited for communicating effectively and efficiently to those outside behavioral approaches, including funding stakeholders, non-behavioral colleagues, and even clients. Similarly, therapeutic change processes may be too imprecise to satisfy basic behavioral researchers, or even practitioners requiring more basic accounts (e.g., applied behavior analysts). Further, somewhat different sets of middle-level terms may be useful based on setting (e.g., clinical vs. educational vs. organizational), target audience (e.g., behavioral scientists vs. clients vs. policy makers), or analytic focus (e.g., the individual person vs. small groups). Thus, the CBS focus on processes of change fully recognizes that the field is

not progressing toward *the* final set of fully agreed upon processes of change, and a diversity of voices should be expected and embraced at any one time. However, CBS does aim to develop evidence-based processes that cut across packages, protocols, and problem areas (Rosen & Davison, 2003). Such a common language allows people working in different settings on different problems using different models or frameworks to communicate their results and insights.

Viewing CBS as a process-based approach leads to a series of research recommendations.

Recommendation 7. CBS research needs basic and applied behavioral research to identify processes of change.

Basic behavioral research will always be needed for the practical development of CBS according to the reticulated model of scientific development that characterizes the CBS research strategy. Without this strong foundation, practical applications of CBS cannot develop properly. At the same time, applied research needs to identify, measure, and test functionally important pathways of change in their natural context. As such pathways are identified, more technical accounts of these pathways, which reside in basic behavioral and evolutionary science principles, will be needed to produce conceptual and practical progress with the kind of precision, scope, and depth expected of CBS research.

Recommendation 8. CBS research needs to identify and conceptualize intervention “kernels” using a range of basic, applied, experimental analog, and inductive research methods.

A strong program of research is needed to identify and conceptualize intervention “kernels” -- fundamental units of behavioral influence or treatment elements that are not usefully divisible, and when eliminated, render the intervention ineffective (Embry, 2004; Embry & Biglan, 2008). The identification of intervention kernels is important in order for evidence-based intervention to be linked to individualized process-based functional analysis. In other words, in order to meet applied needs in a personalized way, interventions must be based on needs, goals, deficits, and skills of the individual, rather than vague or general approaches, or mere technological collections.

It is unhelpful to allow applied psychological science to remain at the level of extensive intervention protocols, when the spirit of idiographic functional analysis linked to processes of change requires a more personalized approach. A wide variety of research methods need to be deployed to accomplish the analytic purpose of identifying intervention kernels. Intervention kernels can be identified in component analyses, dismantling studies, basic studies, and experimental analogs. The interactive and synergistic interplay of intervention components needs to be explored idiographically with appreciation for the complex networks involved. Inductive research, in which some manipulations of behavioral processes are conducted, and their effects are observed, might also be more effectively and consistently utilized. By deploying a wide range of methods, behavioral influence elements can be identified, analyzed, and manipulated in a more controlled way, and their effects tested on special problem areas or positive prosperity targets. The results of research of this kind can inform practical applications of how to improve behavioral change outcomes in a more efficient and effective manner. Concentrating on fundamental units (individual treatment components, rather than broad treatment packages) that

can be actively manipulated, may lead to unambiguous conclusions as to the active ingredient in behavior change.

Recommendation 9. CBS research needs more behavioral and biophysiological measures of processes of change.

Processes of change have often been measured using psychometrically filtered self-report measures, especially with more “middle-level” concepts. While self-report can be helpful, as functional analytic concepts, all processes of change should have better and more widely available behavioral and biophysiological measures, not merely self-report. Such measures will contribute to the more basic behavioral and evolutionary accounts of processes of change, which need to link concepts to context in order to be fully functional. These measures should ideally be created with the need for more high-density longitudinal research in mind, as is emphasized elsewhere in this report.

Recommendation 10. CBS researchers need to conduct RCTs in a way that fosters idiographic analyses of process of change.

In many areas of clinical research, RCTs examining treatment efficacy, or the superiority of one psychological treatment in relation to another, are weak methodologies to create the knowledge needed from a CBS point of view. Other emphases and research designs are necessary to efficiently learn how to improve interventions, titrate their effects, and match interventions to specific patient characteristics and situations. When randomized group

comparison designs are conducted, they should be modified to examine processes of change more thoroughly. Traditional mediational analysis has a role to play, but it should be expanded to focus more on the interactive, progressive, and non-linear nature of many change processes, to link them to component methods and contextual determinants, and to determine individual response. Research on process of change should consider deployment of high temporal density measures that allow greater precision in determining how key processes change and how these changes facilitate outcomes in a dynamic fashion.

Recommendation 11. CBS research acknowledges the need for adaptive clinical research methods to rigorously test treatment components.

Newer developments and innovations in trial design may increase scientific progress in intervention research by isolating the components of interest. Some examples of so-called adaptive designs (Pallmann et al., 2018) include Multiphase Optimization Strategy (MOST), Sequential Multiple Assignment Randomized Trials (SMART) and micro-randomization designs. MOST studies are designed to speed up the discovery of which components are active at which dose by setting up three a priori phases (screening, refining, and confirming), at the end of which decisions are made on how to adjust the intervention components before continuing and re-testing. SMART studies time-vary the sequence of intervention components to test how to best implement components for different situations and people. Micro-randomization refers to the randomization of different intervention components (as opposed to randomization of people to conditions) under various conditions, such that whenever the condition is triggered (e.g., after smoking among people trying to quit) intervention components (e.g., warnings vs. values

exercise) are randomly administered. These research designs have in common a scientifically pragmatic approach to isolating, titrating, and testing components for different people under different conditions. As such, these designs have the potential benefit of rendering information that is more clinically useful and contextually sensitive than traditional RCTs comparing averaged outcomes of treatment packages. It is recognized, however, that existing adaptive designs are just the beginning of the methodological innovation that will be needed to study how to create intentional change in a functionally and contextually sophisticated manner.

Recommendation 12. CBS research needs more idiographic and longitudinal, dynamic network-based research, especially in conjunction with high temporal density behavioral and biophysiological measures.

Findings of relations among psychological variables based on aggregated group data do not generalize precisely to each individual in that same group. In other words, analyses of *interindividual* variability do not yield the same findings as one obtains from analyses of *intraindividual* variability over time and across contexts. Because experience, learning, and behavior change are highly individual matters, research methods should involve observing them within people across time instead of using variability in between-person observation as a false proxy. There is a recognized need to shift from large sample size methodology, to study methods that instead include large numbers of observations within each individual over time, i.e., intensive longitudinal designs. Intensive longitudinal designs include single case experimental designs as an example, but also extend to complex network analyses. These designs appear to be well suited to the analysis of treatments in ways that are both process-focused and idiographic,

particularly given advancements in the use of mobile technologies (multimedia applications, wearable sensors) for ecological momentary assessment (EMA) and continuous real time monitoring. Intensive longitudinal designs are further supported by developments in statistical analyses such as dynamic system approaches, cross-lagged correlation analyses, and Simulation Modeling Analysis (Hayes et al., 2019).

Recommendation 13. CBS research needs more focus on the empirical evaluation of interventions and intervention components or kernels based on the degree to which they move processes of change.

The historically central task of producing an ever-increasing list of empirically supported treatments for designated syndromes is inconsistent with CBS. Rather than a sole focus on empirical tests of treatment protocols, applied CBS research should also identify and evaluate intervention components or kernels that move key empirically supported processes of therapeutic change. In the interests of parsimony, these processes should ideally cut across problem areas as they have been defined in DSM nomenclature and extend to the positive life changes sought by recipients of care. This suggests that the empirical support for intervention kernels, modules, and models cannot be limited to outcomes alone, even those that are long-term, but rather require evidence of active influence. An applied advantage of this approach is that idiographic impact on pathways of change provides the proximal evidence of intervention effectiveness to guide practitioners in a more immediate way. Capturing the temporal dynamics of processes of change over time will require frequent session by session, day to day, and preferably (when possible), more moment-to-moment assessment. Otherwise, therapists are unequipped to assess, track, and

customize treatment as needed based on identified processes of change linked to specific methods of intervention.

Recommendation 14. CBS research needs to develop alternatives to traditional psychometrics as *quality standards* for measures that are idiographically useful; sensitive to context; appropriate for repeated, frequent measurement; and that emphasize observable behavioral and biophysiological changes in addition to self-report.

While psychometrically refined instruments will continue to have utility for some purposes, this quality filter for assessment is not well-suited to intensive idiographic assessment and arguably contains an ergodic error (i.e., it improperly assumes equivalence between interindividual and intraindividual variability, invalidating the use of classical statistical methods; Molenaar, 2008). The use of broad self-report instruments also has limitations such as sensitivity to reporting biases, time required for completion, inadvertent combination of functionally distinct behavior patterns, and the indirect quality of the data that makes them a poor fit for the idiographic approaches needed to mount a successful CBS research program.

Global self-report measures used in current practice are also susceptible to cultural bias, and are often a poor fit to individual needs. Many psychological variables of interest in treatment development and implementation are highly variable and dynamic over time within individuals. However, global self-report measures are not often designed to detect this variation or situate it contextually. The optimal timeframe to measure changes in process, outcome, and the interactions between the two, has also not yet been established and may differ across contexts.

For measures to be precise and sensitive, they will need to measure the behavior of interest or relevant biophysiological correlates frequently, as directly as possible, and in the time and situation of interest. Alternative approaches are needed to determine the quality of measures that are individualized and sensitive to context so as to track processes of change, treatment outcomes, and relevant therapeutic factors, like clinical competency and treatment fidelity in a way that is consistent with the functional roots of CBS.

For the purpose of intensive longitudinal study of processes of change, intervention kernels, and outcomes, measures will need to be brief for repeated use, nonintrusive and sensitive to change. This will require new approaches to instrument design and quality analysis that are unlike conventional psychometric instruments design.

Recommendation 15. CBS research needs to integrate research findings into underlying models of applied work.

Treatment models are necessary to simplify and organize the effort to link individual needs and goals, processes of change, and intervention kernels. Model development is an iterative process, but it needs to be held to account to conceptual and treatment utility. When research findings repeatedly show that interventions, treatment kernels, or processes of change are not leading to desired outcomes in ways that fit the model being deployed, the model and its underlying technology require revision or improvement. Advocates of any given process, intervention approach, or model should be open to discard these elements when alternatives are making more progress. Thus, no model or method should be considered a permanent aspect of CBS research and practice.

Recommendation 16. CBS research needs to study processes of change in different contexts to facilitate generalization or adaptation of principles and interventions and to examine their ability to scale across levels of analysis.

Much of the internationally published process and outcome research has taken place in Western societies. These results may not be representative of people from other cultures or subcultures. Furthermore, health care may be very differently organized in different countries, making generalizability of the procedures used problematic. For instance, in Western societies, mental healthcare may be much more available, with a much higher number of providers per user. Idiographic approaches utilizing a functional analysis, case conceptualization, and treatment delivery based on processes of change, would offer a solution and allow for generalization and scalability of principles and interventions across diverse groups, cultures, and countries. With greater process of change research in diverse populations and contexts, models can be developed and tested regarding how essential interventions can be adapted for use in broad societal and cultural contexts. The same point applies to modes of delivery. Intensive and direct delivery of services cannot alone meet the extent of human need for behavioral science. Technology (internet and mobile devices) supported by professionals, semi-professionals, caregivers, peers, or others may also be needed to deliver change interventions on a larger scale. Additional research is needed on how to implement behavioral science research in the most effective and efficient manner across diverse populations and contexts.

III. Contextual Behavioral Science is a Multi-Dimensional Approach

Human life is complex, involving biological, psychological and sociocultural levels of organization and multiple evolving dimensions within these levels. The flexibility of human language itself affords a myriad of possible distinctions, but CBS research seeks out distinctions that are heuristically useful rather than ontologically distinct. While recognizing that any approach is neither exhaustive nor exclusive of other possible variables, some level of organization of the many dimensions and domains of biopsychosocial variables is needed to support the development of an intervention science that is sensitive to the multi-dimensional nature of human functioning.

Many systems have been proposed for distinguishing dimensions of human functioning and the adaptability and change processes that influence them. Evolutionists such as Eva Jablonka distinguish genes, epigenes, behavior, and symbolic behavior (Jablonka & Lamb, 2006). It is commonplace for psychology as a field to distinguish sensation, perception, memory, learning, motor behavior, and so on. Skinner (1981) distinguished genetic, behavioral, and cultural evolution. Within behavioral psychology distinctions are also made between learned and unlearned behavior; operantly or classically conditioned behavior; symbolic behavior and behavior regulated by direct contingencies; and so on. The United States National Institute of Mental Health distinguishes among negative valence, positive valence, cognitive systems, systems for social processes, arousal/regulatory systems, sensorimotor systems in their “Research Domain Criteria” (Vaidyanathan et al., 2020). Elinor Ostrom’s core design principles, discussed later, may be conceptualized as dimensions of successful social organization (Ostrom, 1990).

From a CBS point of view, behavior at the psychological level refers to every situated action of the whole organism. However, distinguishing dimensions may be scientifically or pragmatically useful, depending on the specific analytic goal of prediction and influence. Again, that does not mean that such dimensions are ontologically distinct, but rather that they may be heuristically useful or organize scientific inquiry.

Existing research in processes of change has been linked to an extended evolutionary approach by considering variation, selection, retention, and contextual fit in a loose set of six psychological dimensions: affect, cognition, self, attention, motivation, and overt behavior, and considered in terms of their adaptive or maladaptive functions (Hayes et al., 2019). Each dimension is a potential target for change based on the processes of change engaged by psychological interventions. The following rough organization is reflected in the six dimensions of psychological flexibility as generally researched in CBS laboratories, but by stating them in a more general way the intent is to deliberately widen the field of view for the kinds of processes CBS research can usefully address within each of these dimensions. It should be noted that we have deliberately not provided specific definitions of these dimensions since we mean them only as an orientation and we recognize that the field itself needs to work empirically on how best to categorize and consider various psychological dimensions. Thus, these dimensions should themselves currently be treated as commonly used serviceable categories rather than fundamental distinctions within the continuous stream of psychological activities.

Affect. Affect is perhaps the most challenging dimension to define, and in clinical use, it often overlaps substantially with traditionally defined “symptoms.” For example, studies often formulate anxiety and depression as mediators of change in therapy (Kelly, Stout, Magill, Tonigan, & Pagano, 2010; Schmidt, Lange, Schöttle, Karow, Schimmelmann, & Lambert, 2018).

Considering affective outcomes of that kind to themselves be “processes of change” diminishes somewhat the value of a process focus, since it begs the question of what the functionally important pathways are to achieve those earlier outcome gains. For that reason, there should be a clear demarcation between affective outcomes and processes of change. Examples of affective processes of change that maintain such a demarcation are processes such as noticing affective responding; labeling, describing, or tacting these responses and their qualities; establishing emotional differentiation; learning from emotional responses; or regulation of emotional arousal. Traditional CBS concepts such as acceptance or experiential avoidance are primarily focused on this dimension.

Cognition. There is no simple separation between affect and cognition, but the distinction is heuristic and is reflected in CBS research. Language and higher cognition has been extensively studied in CBS under the rubric of relational framing. Cognitive measures offer guidance about what is being emphasized in the intervention and may orient toward the relative dominance of derived relations. The cognitive dimension is perhaps one of the most well studied and includes constructs such as knowledge, understanding, beliefs, automatic thoughts, problem-solving, symbolic reasoning, meta-cognition, and verbal descriptions of the consequences of behavior. Cognitive processes also differ in terms of how much they focus on the content of thought (e.g., dysfunctional beliefs) or the function of thought (e.g., the degree to which a thought influences behavior) and cognitive flexibility. Traditional CBS concepts such as cognitive fusion, defusion, or rule-based insensitivity are primarily focused on this dimension.

Attention. The attentional dimension includes actions that augment or diminish stimulus control. At the process level, this includes selective attention to task-relevant and irrelevant stimuli (often referred to as attentional bias), and the ability to maintain and shift focus (e.g.,

fixed attention, hypervigilance and scanning). This dimension includes the ability to focus on the present moment, which is central to concept of mindfulness and to the psychological flexibility model commonly researched in CBS laboratories and clinics.

Self. The dimension of “self” overlaps with the other dimensions but deserves special emphasis because of the breadth of application of this behavioral dimension. Much of existing CBS work on sense of self has been organized around the three-part model of self as content (i.e., verbal descriptions of the self; narratives about oneself or one’s history), self as process (i.e., ongoing awareness or knowledge of one’s internal experience), and self as context (i.e., deictic framing providing a consistent perspective or vantage point from which all events are experienced). Examples of processes of change in these areas include constructs like self-esteem, self-knowledge, and decentering, respectively. Basic relational skills such as perspective-taking impact self-processes such as self-compassion (“I here, see myself there suffering”); frames of distinction and hierarchy bear on the degree to which the person experiences themselves as distinct from, “more than,” or able to integrate and contain any specific experiences they may have or observe.

Motivation. Motivation can refer to both unlearned and learned motivative operations. When combined with relational learning, a variety of verbal motivational issues arise such as autonomous motivation vs. compliance motivation, or the degree of outcome focus. The study of human needs, intensions, or aspirations are also examples. Traditional CBS concepts such as values, or natural versus arbitrary reinforcers are primarily focused on this dimension.

Overt behavior. This dimension includes overt behavioral dimensions such as impulsivity vs. behavioral inhibition (risk-taking vs. risk-aversion), behavioral excesses and deficits (activation vs. deactivation), as well as other aspects of behavioral self-regulation (e.g.,

goal setting). In a CBS approach, a central focus is the extent to which overt actions are matched to the demands of the situation. As a perspective grounded in a behavioral approach, in CBS, research on overt behavior is the “bottom line” of psychological investigations.

Dyadic, social and cultural level dimensions. Dimensions also exist at the dyadic and social/cultural level. The therapeutic relationship is an example of a dyadic relationship embedded in a sociocultural context. While some have posited the therapeutic relationship to be the central mediator of all forms of therapeutic change (Priebe & McCabe, 2008), research from CBS laboratories suggests that it is important in part because it embodies and fosters healthy processes of change (e.g., Gifford et al., 2011). For example, a therapist and client are likely to have a positive therapeutic relationship to the extent that the therapist models and helps the client to develop better affect regulation, cognitive flexibility, attentional focus, sense of self, healthy motivation, and overt behavioral competence.

Biophysiological level dimensions. A wide range biophysiological dimensions are important to CBS research, including genetics, epigenetics, neurobiological development, brain circuits, sensory systems, and the like. Examining physiological correlates of psychological dimensions (e.g., heart rate variability; cortisol; and so on) are key to testing the depth and integrative quality of behavioral science. Behaviors that impact biophysiological functioning such as diet, exercise, and sleep are also key targets for CBS research.

The multi-dimensional nature of CBS research as exemplified by this discussion leads to several research recommendations.

Recommendation 17. CBS research needs to track change in a multi-dimensional way, using functional analytic concepts with precision and good fit to the underlying analytic purposes of a particular research study.

There is a benefit to considering human functioning broadly, and thus there is a need to track functioning in a multi-dimensional way that considers the various dimensions of psychological events. It needs to be recognized however, that some change processes, such as cognitive flexibility, are fairly unidimensional while others are multi-dimensional. For example, psychological flexibility includes aspects of six different dimensions in its classic hexagon arrangement (defusion, acceptance, attention to the now, self-as context, values, and committed action). Mindfulness as typically defined (e.g., Kabat-Zinn, 2003) is also multidimensional and has elements of attention to the now, emotional openness, and non-judgment. Emotion regulation can involve cognitive aspects like reappraisal, affective aspects like non-reactivity, attentional aspects, such as broad and flexible attention in the presence of threatening stimuli, and overt behavioral responses such as outward expression of emotion. CBS research should continue to refine both the precision of concepts used, and the link between concepts and their practical or theoretical analytic purpose. For example, a multi-dimensional concept such as psychological flexibility needs to be shown to relate to the specific dimensions it is said to encompass in ways that foster treatment utility. The recent development of measures that target the various components of the hexagon model is an example within CBS research (e.g., McCracken, 2020). Early evidence suggests that the various components of psychological flexibility are functionally important to outcomes even in mainstream cognitive-behavioral programs (Åkerblom et al., 2021).

Recommendation 18. CBS research needs to assess the extent to which each identified dimension can be functionally measured, using multiple methods, and in a way that fosters successful functional analysis.

In a CBS approach, concepts are functional and contextually embedded. This suggests that a variety of assessment and analytic methods are needed to examine the conceptual and clinical utility of key concepts. Consider a concept like “reinforcement.” Merely assessing, say, reinforcer preference would never alone be considered adequate for an analysis of the role of reinforcement in a complex situation. It would also require experimental analysis using overt behavioral measures. In much the same way, a self-report of emotional openness is not an adequate assessment of acceptance skills. It may also be important to measure how emotionally evocative material disrupts task performance (e.g., Luciano et al., 2014); or how willing a person is to experience uncomfortable feelings (i.e., “tolerate distress”) in a controlled task (e.g., Gutiérrez, Luciano, Rodríguez, & Fink, 2004); and so on. Qualitative methods can be helpful in ensuring that new measures maintain contact with the contextual and experiential nature of psychological phenomena. As measures of functional and contextual concepts are developed, often using mixed methods, that need also to be vetted against the task of individual functional analysis of actual behavior in situations of importance.

Recommendation 19. CBS research needs to address how different dimensions can be measured in ways that are valid at the individual level.

As previously described, there are currently no well-crafted quality standards for idiographic assessment, and it is clear that traditional psychometric criteria are not enough. Advances in assessment research and theory are needed to assess contextually embedded patterns

of action within the individual over time along *different dimensions* of human psychological activity.

Recommendation 20. CBS research needs to assess the extent to which intervention outcomes are due to various change dimensions at the idiographic level.

Advances are needed to link identified processes to interventions and to do so at the level of the individual. Consider the area of statistical mediation. Mediation analysis at present is entirely embedded in a group comparison approach. Idiographic methods of identifying what mediates outcomes are still at the level of theory (e.g., Hayes et al., 2019). It is clear that traditional methods of mediation analysis are not fully adequate, but nor are simply noting and describing process and outcome changes at the level of the individual since these may covary for reasons that have nothing to do with the functional importance of processes of change. For example, if a person improves due to ACT, they may begin talking about ACT processes in different ways that are merely reflecting socialization to the model rather than actual functional relations. This is controlled for in traditional mediation by demanding that the “b” path (the relation of process to outcome) be significant after controlling for treatment. Said in another way, the process needs to relate to outcome even in the control group. This is an example of how well worked out controls that exist at the group comparison level do not yet have agreed upon parallels at the idiographic level. Advances in assessment research and theory are needed that are true to the functional contextual assumptions of CBS.

Recommendation 21. CBS research needs to assess the extent to which different dimensions link to and influence each other.

Processes of change are dynamic, progressive, and often non-linear. It is important to understand how the many aspects of a complex set of events interact over time. Because CBS research ultimately wishes to be held to account to prediction and influence as an analytic goal, “causal variables” will ultimately need to be found in the manipulable contextual/environmental determinants of relationships between various dimensions of responding (Hayes & Brownstein, 1986). Relating multiple dimensions and levels of action to manipulable contextual features will require advancements in measurement and analysis.

Recommendation 22. CBS research needs a more transdisciplinary approach.

The all-embracing nature of CBS research requires a more interdisciplinary approach. As previously described in the multi-level section, the psychological level of analysis is only one level, and it both impacts and is impacted by other levels of analysis. Thus, a more transdisciplinary approach is needed to adequately assess different dimensions of human responding and the depth of concepts across levels of analysis (i.e., coherence of psychological concepts with neuroscience, epigenetics, sociology, and so on).

IV. Contextual Behavioral Science is Prosocial in its Purpose

The rising levels of worldwide turmoil, authoritarianism, and global climate change and many similar problems cannot be addressed by the physical sciences alone. Selfishness, greed, and apathy stand in the way of human progress. To foster prosocial cultural transformation, behavioral science is needed. Humans have an evolved capacity for verbal behavior to help navigate and manipulate the environment, form social bonds to enable mutual cooperation and

complex collective action, and transmit cultural knowledge, skills, and traditions across time and generations. These capacities have enabled us as a species to not only survive but to thrive. However, these same capacities have led to social injustice within our society, atrocities and warfare between societies, and damage to our natural environment, including pollution, extinction of species, and climate change. With technological advancements, our capacities to produce greater achievements and to cause more massive destruction have both continued to increase in orders of magnitude. In spite of modernization, structural racism and violence and rising inequity between haves and have nots continue to be an everyday reality in many areas of the world.

Contextual behavioral science cannot be conducted in a vacuum, blind to ethical and social values or its impact on society. At its most benign, the failure to consider the prosocial purposes of CBS research is a missed opportunity to use behavioral science to bring about positive social change for the world. At its worst, however, CBS can be misused to embolden or corrupt those with the most social capital, individually or systemically, unwittingly or by design, causing greater social suffering and oppression for the marginalized. Historical wars and genocides, present day world conflicts, and the global rise of authoritarianism (Berberoglu, 2020) only serve to highlight the importance and urgency of the application of science to promote the prosocial dimensions of human behaviors.

CBS research should be prosocial in its purpose. That simple statement leads to several recommendations.

Recommendation 23. CBS research needs to be explicit about its prosocial purpose and to seek scientific knowledge that fosters social justice.

Any organization or group with the goal to produce an account of human behavior that permits prediction and influence of that behavior defined in context must contend with understanding potential social influences on psychological actions. In turn, if the goals of that organization or group include the promotion of prosperity, thriving, health, and wellbeing, it must also be explicit about its interest in and study of social justice, equity, fairness, privilege, bias and other social dimensions of importance. Research on Elinor Ostrom's core design principles and the known psychosocial factors that can promote positive outcomes for social groups (e.g., group purpose and identity; fair distribution of responsibilities and benefits; fair and inclusive decision making; monitoring of agreed upon behaviors; graduated responses to helpful and unhelpful behaviors; fast and fair conflict resolution; authority of self-govern; collaborative relations with other groups) provides an example of the kind of work that is needed to achieve CBS' prosocial purpose. Applying such research to inequity issues is needed going forward.

Recommendation 24. CBS research needs to address diversity issues (gender; language; race, ethnicity; sexual orientation and identity, etc.) in treatment and process of change research.

Researchers should be aware that as no one is without bias, and thus assessment and intervention tools are likely to reflect the bias of those who participated in their creation. For example, process of change measures may be biased towards certain cultures or groups of individuals. Individual differences (e.g., sex, gender identity) need to be thoughtfully considered and assessed as potentially relevant contextual variables for understanding and conceptualizing processes of change. CBS researchers should actively pursue working in groups with diverse

backgrounds to prevent biases going unnoticed and detrimentally influencing outcome. Co-developing interventions with end-users and other key stakeholders also has the potential to reduce overapplication of the researcher's perspective on the problem or the process of change.

Recommendation 25. CBS research needs to focus on conditions that promote human cooperation.

Many of the most urgent human problems globally will require cooperation to solve. More CBS research is needed on the development of cooperation. There are complex dynamics between competition and cooperation, both between individuals within a group and between groups of individuals. Between-group competition does not necessarily mean between-group harm, nor does multi-level selection mean that people have to be locked in struggles with peoples with other belief systems or other cultures. Competitive sports or the Olympics is an example of managed competition that can foster cooperation. CBS research should contribute evidence-based approaches to creating environments that help balance cooperation and competition for the betterment of all.

Recommendation 26. CBS needs more research on variables that influence social networks for prosocial purposes.

There has been too much focus on individualism in psychological research, even arguably within the CBS tradition (Wilson & Coan, 2021). There is a need to expand the purview of CBS research to include the study of social networks. Prosocial behaviors have been studied

in the context of social networks by manipulating contextual variables and examining frequency of cooperative behaviors in various simulated situations and economic games, such as variants of Prisoner's Dilemma to study cooperative behaviors (e.g., Gloster, Rinner, & Meyer, 2020).

Research has suggested that dynamic social networks, where individuals can choose to alter the networks they are part of, tend to give rise to increased cooperative behaviors compared to static networks (Rand, Arbesman, & Christakis, 2011). An individual's prosocial behaviors may influence others' behaviors even outside one's social network, sometimes cascading over several links distally (Fowler & Christakis, 2010). Research of this kind highlights the importance of context in promoting prosocial behaviors and the complex mutual interactions between social network behaviors/characteristics and individual behaviors/characteristics. Integrating CBS research with social research from other disciplines (e.g., sociology) may lead to further progress in promoting prosocial behaviors. Research might expand into new areas, such as the application of RFT to examine the parameters of homophily or leveraging ACT or other CBS interventions to promote cascading prosocial behaviors.

Recommendation 27. CBS research needs to be considered within an extended evolutionary science framework for the purpose of fostering greater scientific consilience. At the same time CBS researchers need to encourage an expansion of evolutionary and cultural science research beyond observation and description to include studies of influence and change.

The contextual behavioral tradition views itself as being part of evolutionary science, organized with a multi-dimensional and multi-level extended evolutionary synthesis. CBS

research on prosocial behavior, processes of change, intervention components and models of change have been connected to adaptive selection and retention because of the consilience it provides for a functional and contextual approach. At the same time, however, CBS research can help evolutionary and cultural science research to expand from observation and description to studies of influence and change. This suggests that CBS research needs to consciously help build a more vigorous applied wing of evolutionary science itself.

Persons with a CBS orientation need to support evolutionary scientists in conducting intervention research that is true to their assumptions. Applied evolutionary science does exist, but it is a small field, and within that, the area of cultural change is very small. CBS research can help change that.

Cultural evolution is the domain of research that focuses on how culture changes over time, due to different individual transmission mechanisms and population-level effects. This approach often draws on models derived from population genetics, in which agents are recipients of cultural traits, but for cultural advancement to become a more central area of research more will be required. From a functional contextual point of view, a program of prosocial research can provide a base for applied cultural evolutionary studies. Because manipulation of variables so as to influence the domain of interest is central to a CBS approach, CBS research on cultural evolution should at times include tests of how ethically to change conditions so as to bring about prosocial cultural change. This experimental approach has not yet received enough attention within evolutionary studies.

As an example, RFT has been proposed as a way of understanding language processes within evolutionary science based on the cooperative nature of humans as social primates. A useful next step may be to examine how RFT can offer new ways of shaping prosocial human

cultural behavior. Currently, evolutionary and cultural scientists are making connections between language and cultural change and CBS research needs to further examine this issue.

V. Contextual Behavioral Science is a Pragmatic Approach

The pragmatic purpose of CBS research means that research standards and tactics should always be tempered by practicality and measured against the ultimately practical human purposes of behavioral science. In science, research questions are sometimes studied for their own sake with the hope that they will eventually lead to practical applications. However, CBS involves a parallel “reticulated” relationship between basic science and practical application. Specifically, from this perspective, the best basic science allows us to simultaneously understand, predict, and influence change in the real world, and the best applied program readily links to and aids in a fuller understanding and specification of basic principles. In this approach scientific progress is measured by the breadth and depth of its pragmatic outcomes. Thus, a defining feature of CBS research should be its practical focus. There are a number of practical considerations to take into account in introducing new developments in both research and practice.

Recommendation 28. CBS research needs to develop practical research and intervention tools, focused on functionally important processes of change, meaningful intervention goals, and user-friendly methodological and statistical approaches that meet its underlying assumptions.

In this report, we have emphasized the need to improve existing nomothetically-based group comparison research and RCTs from a CBS perspective. We recognize that these are the

current gold standard methods in applied intervention research (with grant funders and international guidelines for evidence-based practice). This is changing, however, with more emphasis on adaptive designs that are better suited to a CBS approach. As we have noted earlier, from a CBS perspective, it is important to not over-rely on RCTs when they fail to include intensive information on individual response, or on clusters of signs and symptoms linked to abstractions identified at the level of a collective. Thus, on purely practical grounds, we want to re-emphasize that from a functional perspective, we need to continue to develop methodological, intervention, and statistical tools that meet the underlying assumptions of CBS and are useful, available, easy to use, and inexpensive. Virtually every area of this report could and should be revisited with practicality in mind.

Ironically, this practical approach has the potential to speed research progress even at the nomothetic level. CBS research needs to develop an “idionomographic” approach that consciously links intensive idiographic analysis of individuals in the clinic or applied environment, to nomothetic generalizations that do not distort findings at the individual level. CSB research needs to help develop practical idionomographic alternatives to traditional nomothetic approaches that combine findings from sets of individuals into nomothetic generalizations (Hayes et al., 2019).

Until recently, statistical approaches were not available for single case design studies and idiographic complex networks. However, advances in statistics and research methods now allow such research to be conducted, even embedded into RCTs. Practical analytic tools are needed in this area so that the practice base can better facilitate research progress. Inexpensive and turnkey data collection and analysis tools would help speed this needed transition. CBS researchers need

to help practitioners with well-developed assessment solutions that foster practical progress of this kind.

As noted earlier, idiographic approaches require the use of more frequent, broader, and more contextually focused assessment methods. For example, time series analysis, complex network models, EMA, observation-oriented modeling (OOM), immediate therapy transcript scoring systems, and dynamical system models are needed to provide appropriate analytic tools for detecting individual patterns of change. With the new capacity to collect data in real-time, such as with mobile devices or automatic therapy transcript, recording and scoring these approaches are at our disposal more than ever and can support meeting the goal of identifying processes of change at the level of the individual. CBS researchers need to develop, test, and deploy these systems to CBS practitioners.

More widespread measures of processes in session are necessary and can facilitate evaluating a functional approach to understanding important processes. Examples of these could involve short self-report instruments, or coded behaviors within treatment. The latter approach has been used in Applied Behavior Analysis (ABA) for decades. Transcript analysis has yielded useful information on processes of change in CBS research (e.g., Hesser, et al., 2009) and machine learning approaches have begun to be applied to psychotherapy transcript analysis (Aafjes-van Doorn, K., Kamsteeg, C., Bate, J., & Aafjes, M., 2021). This advance will only become more and more efficient as transcription and coding technology becomes more convenient, automated, and rapid. This methodology will allow an analysis of interactional behaviors at the level of individuals first and that can then be generalized to groups.

Looking at processes of change for the individual requires understanding the context of their behavior. Environmental and sociocultural factors can influence the direction and impact of

treatment and vice versa. Practical assessments of these factors are needed that can be easily administered and valid for our purposes.

Recommendation 29. CBS research needs more cross-cultural focus and greater attention to biases or assumptions that may influence the research that is conducted and explication of its implications.

Practical solutions need to be developed for overcoming cross-cultural differences in the research enterprise and resulting relative deemphasis in integrating social and cultural issues into the CBS research program. Example challenges to be solved include language barriers facing non-English language researchers, or language barriers that are allowed to enter into systematic reviews, which often include only English language work thus over-emphasizing western cultures using primarily white middle-class individuals. Researchers need to be aware of their own biases and worldview and understanding the socio-political and cultural context of the behavior being studied. When conducting research, CBS researchers need to address community issues otherwise neglected in dominant research paradigms.

Idiographic approaches to diagnosis and treatment are relevant and likely to be useful when issues of diversity or minority are the focus (Fung & Lo, 2017). By bringing a bottom-up idiographic approach to the field of evidence-based therapy, both research and clinical goals are altered, and if the sociocultural context of the individual is given adequate attention and due weight at the individual and at the organizational level (Fung et al, 2012), better attention to these factors seems likely to follow. Researchers need to consider whether processes of change

are cross-cultural in nature or develop a model of how specific cultural variables interact with these change processes.

Recommendation 30. CBS research needs to maximize the external validity of research by including key stakeholders in the research enterprise.

The practical impact of research and even of research strategy needs to be strengthened. Practitioners and participants need more voice in determining the research questions that need to be addressed and outcomes that are valued (e.g., quality of life; social functioning). Stakeholder Steering Groups (SSGs) are a positive example and as a result they are becoming more widely required for inclusion in applications by large scale funders. We also need to ensure that research results that are effective in meeting human needs are adopted and used. For example, while set treatment protocols for specified syndromes has rigor at the level of research design, it is not practical in practice to meet the needs of diverse practitioners or their clients and may only apply to the narrow set of conditions in which it was studied, and the narrow range of syndromal outcome toward which it was targeted. Implementation science frameworks can be used to examine contextual adaptation in diverse real-world settings.

Recommendation 31. CBS research needs to focus on how best to train CBS researchers and practitioners.

In a CBS approach, scientists and practitioners are themselves subject to the same analysis as others. That is, an analysis of the manipulable contextual variables that influence key

repertoires involved in producing quality CBS research and providing quality CBS interventions. Practical and effective methods of creating quality CBS researcher and practitioners should therefore be a continuing focus. Because CBS methods are part of a wide variety of domains and disciplines, this recommendation needs to be scaled across a number of tools, such as in person trainings, degree programs, online courses, apps, websites, support groups, supervision structures, feedback systems, and the like.

Recommendation 32. CBS research needs to help ensure that research that meets human needs is promulgated and used.

It is not enough to do research; rather its value to the community requires promulgation and utilization. CBS research is needed to determine how best to disseminate behavioral science tools in ways that can actually improve peoples' lives. Many scientific developments and treatments never reach the general public or become integrated into professional practice or public policy. It is essential that we determine how best to increase access to evidence-based care, and particularly how to reach underserved populations. Several recommendations in this report help to serve this end. CBS researchers need to continue to work with key stakeholders to maximize the acceptability and utility of interventions, to examine the degree to which research reflects the values of end-users, and to identify and support processes that predict or influence effective utilization of scientific findings. Creative use of implementation science methodologies and the establishment of CBS research programs focused on the issue of promulgation and use are necessary to create the kind of cascading effects needed for scientific advances to benefit a significant number of human lives.

Concluding Remarks

Contextual behavioral science has roots that go back to the beginning of behavioral science and psychology. The recommendations presented in this report are a snapshot of research needs as the 20th century fades into memory and the remaining decades in the 21st century begin to loom large. CBS is not defined by a single theory, method, topic, discipline, or person. It is a communitarian knowledge development strategy based on a set of philosophical assumptions, an evolving set of research practices, and a growing body of applied methods that are relevant to nearly every area of human functioning. The goal of CBS is breathtakingly bold: creating a behavioral science more worthy of the challenge of the human condition. We cannot claim that goal has been met; we do not know if it ever will be. But bold journeys are best linked to bold goals. CBS research has a publicly stated purpose, and these recommendations are meant as means to facilitate accomplishing those goals. Thus, our final recommendation is this:

Recommendation 33. The CBS community should foster the recommendations of the ACBS Task Force on the Strategies and Tactics of Contextual Behavioral Science Research in their laboratories, classrooms, scientific reports, and applied agencies. ACBS should foster these recommendations in association policy, association conferences and committees, and in association publications such as the *Journal of Contextual Behavioral Science*. In due time, the CBS community should revisit, review, and refresh these recommendations as part of an ongoing process of attempting to create a behavioral science more worthy of the challenge of the human condition.

References

- Aafjes-van Doorn, K., Kamsteeg, C., Bate, J., & Aafjes, M. (2021) A scoping review of machine learning in psychotherapy research. *Psychotherapy Research, 31*(1), 92-116. doi: 10.1080/10503307.2020.1808729
- Atkins, P., Wilson, D. S., & Hayes, S. C. (2019). *Prosocial: Using evolutionary science to build productive, equitable, and collaborative groups*. Oakland, CA: Context Press / New Harbinger Publications.
- Åkerblom, S., Perrin, S., Rivano Fischer, M. *et al.* (2021). Predictors and mediators of outcome in cognitive behavioral therapy for chronic pain: the contributions of psychological flexibility. *Journal of Behavioral Medicine, 44*, 111–122. Doi: 10.1007/s10865-020-00168-9
- Berberoglu, B. (Ed.) (2020). *The global rise of authoritarianism in the 21st Century: Crisis of neoliberal globalization and the nationalist response*. New York: Routledge. Doi: 10.4324/9780367854379
- Biglan, A., & Hayes, S. C. (1996). Should the behavioral sciences become more pragmatic? The case for functional contextualism in research on human behavior. *Applied and Preventive Psychology: Current Scientific Perspectives, 5*, 47-57. doi: 10.1016/S0962-1849(96)80026-6
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Boston: Harvard University Press.
- Dixon, M. R., Belisle, J., McKeel, A., et al. (2017). An internal and critical review of the PEAK relational training system for children with autism and related intellectual disabilities: 2014–2017. *The Behavior Analyst, 40*(2), 493-521.

- Dymond, S., May, R. J., Munnely, A., & Hoon, A. E. (2010). Evaluating the evidence base for Relational Frame Theory: A citation analysis. *The Behavior Analyst, 33*(1), 97–117.
- Dymond, S., & May, R. (2018). Quantifying the empirical growth of Relational Frame Theory research: A cautionary note. *Psychological Record, 68*, 255–260. doi: 10.1007/s40732-018-0278-z
- Embry, D.D. (2004). Community-based prevention using simple, low-cost, evidence-based kernels and behavior vaccines. *Journal of Community Psychology, 32*: 575-591.
- Embry, D.D. & Biglan, A. (2008). Evidence-based kernels: Fundamental units of behavioral influence. *Clinical Child and Family Psychology Review, 11*: 75-113.
- Fowler, J. H. & Christakis, N. A., (2010). Cooperative behavior cascades in human social networks. *Proceedings of the National Academy of Sciences, 107*(12): 5334-5338. doi: 10.1073/pnas.0913149107.
- Fung, K. P., Lake, J., Steel, L., Bryce, K., Lunsy, Y. (2018) ACT processes in group intervention for mothers of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*(8), 2740-2747.
- Fung, K. P. & Lo, H. T., (2017). An integrative clinical approach to cultural competent psychotherapy. *Journal of Contemporary Psychotherapy, 47*: 65–73.
- Fung, K. P., Lo, H. T., Srivastava, R., Andermann, L. (2012) Organizational cultural competence consultation to a mental health institution. *Transcultural Psychiatry, 49*(2): 165-184.
- Gifford, E. V., Kohlenberg, B., Hayes, S. C., et al. (2011). Does acceptance and relationship-focused behavior therapy contribute to bupropion outcomes? A randomized controlled trial of FAP and ACT for smoking cessation. *Behavior Therapy, 42*, 700-715.

- Gilbert, P. (2010). *Compassion Focused Therapy: Distinctive Features*. New York: Routledge.
- Gloster, A. T., Walder, N., Levin, M. E., Twohig, M. P. & Karekla, M. (2020). The empirical status of acceptance and commitment therapy: A review of meta-analyses. *Journal of Contextual Behavioral Science, 18*, 181-192. doi: 10.1016/j.jcbs.2020.09.009.
- Gloster, A. T., Rinner, M. T. B. & Meyer, A. H. (2020). Increasing prosocial behavior and decreasing selfishness in the lab and everyday life. *Scientific Reports, 10*, 21220. doi:10.1038/s41598-020-78251-z
- Gould, E. R., Tarbox, J., & Coyne, L. (2018). Evaluating the effects of Acceptance and Commitment Training on the overt behavior of parents of children with autism. *Journal of Contextual Behavioral Science, 7*, 81-88. doi: 10.1016/j.jcbs.2017.06.003.
- Gutiérrez, O., Luciano, C., Rodríguez, M., & Fink, B. C. (2004). Comparison between an acceptance-based and a cognitive-control-based protocol for coping with pain. *Behavior Therapy, 35*(4), 767-783. doi: 10.1016/S0005-7894(04)80019-4.
- Hayes, S. C. & Brownstein, A. J. (1986). Mentalism, behavior-behavior relations and a behavior analytic view of the purposes of science. *The Behavior Analyst, 9*, 175-190.
- Hayes, S. C., Hofmann, S. G., Stanton, C. E., Carpenter, J. K., Sanford, B. T., Curtiss, J. E., & Ciarrochi, J. (2019). The role of the individual in the coming era of process-based therapy. *Behaviour Research and Therapy, 117*, 40-53. doi: 10.1016/j.brat.2018.10.005
- Hayes, S. C., Barnes-Holmes, D., & Wilson, K. G. (2012). Contextual behavioral science: Creating a science more adequate to the challenge of the human condition. *Journal of Contextual Behavioral Science, 1*, 1-16. doi: 10.1016/j.jcbs.2012.09.004

- Hayes, S. C., Hofmann, S. G. & Ciarrochi, J. (2020). A process-based approach to psychological diagnosis and treatment: The conceptual and treatment utility of an extended evolutionary model. *Clinical Psychology Review*, 82, 101908. doi: 10.1016/j.cpr.2020.101908
- Hayes, S. C. & Hofmann, S. G. (2018). (Eds.), *Process-based CBT: The science and core clinical competencies of cognitive behavioral therapy*. Oakland, CA: Context Press / New Harbinger Publications.
- Hayes, S. C., Barnes -Holmes, D., & Roche, B. (2001). *Relational Frame Theory: A Post-Skinnerian account of human language and cognition*. New York: Plenum Press.
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hesser, H., Westin, V., Hayes, S. C., & Andersson, G. (2009). Clients' in-session acceptance and cognitive defusion behaviors in acceptance-based treatment of tinnitus distress. *Behaviour Research and Therapy*, 47, 523–528. doi: 10.1016/j.brat.2009.02.002
- Jablonka, E., & Lamb, M. J. (2006). *Evolution in four dimensions: genetic, epigenetic, behavioral, and symbolic variation in the history of life*. Cambridge, MA: MIT Press.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science & Practice*, 10, 144–156.
- Kantor, J. R. (1953). *The logic of modern science*. Bloomington, IN: Principia Press.
- Kelly, J. F., Stout, R. L., Magill, M., Tonigan, J. S., & Pagano, M. E. (2010). Mechanisms of behavior change in alcoholics anonymous: does Alcoholics Anonymous lead to better alcohol use outcomes by reducing depression symptoms? *Addiction*, 105(4), 626–636.
- Kohlenberg, R. J., & Tsai, M. (2007). *Functional Analytic Psychotherapy: Creating intense and curative therapeutic relationships*. New York: Springer.

Luciano, C., Valdivia-Salas, S., Ruiz, F.J., Rodríguez-Valverde, M., Barnes-Holmes, D.,

Dougher, M.J., López-López, J.C., Barnes-Holmes, Y. & Gutierrez-Martínez, O. (2014),
Effects of an acceptance/defusion intervention on experimentally induced generalized
avoidance: A laboratory demonstration. *Journal of the Experimental Analysis of
Behavior, 101*, 94-111. doi:10.1002/jeab.68

McCracken, L. M. (2020). Psychological flexibility in chronic pain: Exploring the relevance of a
process-based model for treatment development. Chapter in S. G. Hofmann & S. C.
Hayes (Eds.), *Beyond the DSM: Toward a process-based alternative for diagnosis and
mental health treatment* (pp. 199 - 223). Oakland, CA: Context Press / New Harbinger
Publications.

Molenaar, P. C. M. (2008) On the implications of the classical ergodic theorems: Analysis of
developmental processes has to focus on intra-individual variation. *Developmental
Psychobiology, 50*, 60-69.

O'Connor, M., Farrell, L., Munnely, A., & McHugh, L. (2017). Citation analysis of relational
frame theory: 2009–2016. *Journal of Contextual Behavioral Science, 6*(2), 152-158. Doi:
10.1016/j.jcbs.2017.04.009.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*.
Cambridge, UK: Cambridge University Press.

Pallmann, P., Bedding, A.W., Choodari-Oskooei, B. et al. (2018). Adaptive designs in clinical
trials: Why use them, and how to run and report them. *BMC Medicine, 16*, 29. Doi:
10.1186/s12916-018-1017-7

Priebe, S., & McCabe, R. (2008). Therapeutic relationships in psychiatry: The basis of therapy or therapy in itself? *International Review of Psychiatry*, 20(6), 521-526. doi:

10.1080/09540260802565257.

Rand, D. G., Arbesman, S., Christakis, N.A. (2011). Dynamic social networks promote cooperation in experiments with humans. *Proceedings from the National Academy of Sciences*, 108(48): 19193-19198. doi: 10.1073/pnas.1108243108.

Rosen, G. M., & Davison, G. C. (2003). Psychology should list empirically supported principles of change (ESPs) and not credential trademarked therapies or other treatment packages. *Behavior Modification*, 27(3), 300–312.

Schmidt, S. J., Lange, M., Schöttle, D., Karow, A., Schimmelmann, B. G., & Lambert, M. (2018). Negative symptoms, anxiety, and depression as mechanisms of change of a 12-month trial of assertive community treatment as part of integrated care in patients with first- and multi-episode schizophrenia spectrum disorders (ACCESS I trial). *European Archives of Psychiatry and Clinical Neuroscience*, 268(6), 593–602.

Skinner, B. F (1981). Selection by consequences. *Science*, 213, 501-504.

Tol, W. A., Augustinavicius, J., Carswell, K., Leku, M. R., Adaku, A., Brown, F. L., García-Moreno, C., Ventebogel, P., White, R. G., Kogan, C. S., Bryant, R., & Van Ommeren, M. (2018). Feasibility of a guided self-help intervention to reduce psychological distress in South Sudanese refugee women in Uganda. *World Psychiatry*, 17, 234-235. doi: 10.1002/wps.20537

Vaidyanathan, U., Morris, S., Wagner, A., Sherrill, J., Sommers, D., Garvey, M., Murphy, E., & Cuthbert, B. (2020). The NIMH Research Domain Criteria project: A decade of behavior and brain integration for translational research. Chapter in S. G. Hofmann & S. C. Hayes

(Eds.), *Beyond the DSM: Toward a process-based alternative for diagnosis and mental health treatment* (pp. 23 - 46). Oakland, CA: Context Press / New Harbinger Publications.

Vilardaga, R., Hayes, S. C., Levin, M. E., & Muto, T. (2009). Creating a strategy for progress: A contextual behavioral science approach. *The Behavior Analyst, 32*, 105-133.

Wilson, D. S. & Coan, J. (2021). Groups as organisms: Implications for therapy and training. *Clinical Psychology Review*.

World Health Organization (2020). *Guidelines on the management of chronic pain in children*. Geneva: World Health Organization.

Zettle, R. D., Hayes, S. C., Barnes-Holmes, D. & Biglan, T. (2016). (Eds.) *The Wiley handbook of Contextual Behavioral Science*. Chichester, UK: Wiley/Blackwell.