Relapse of Anxiety-Related Fear and Avoidance: Conceptual Analysis of Treatment with Acceptance and Commitment Therapy

Brooke M. Smith [1]

Gregory S. Smith [2]

Simon Dymond [3,4]

[1] Department of Psychology, Western Michigan University

[2] Applied Behavior Analysis Department, The Chicago School of Professional Psychology

[3] Department of Psychology, Swansea University

[4] Department of Psychology, Reykjavík University

Author Note

Brooke M. Smith, Department of Psychology, Western Michigan University; Gregory S. Smith, Applied Behavior Analysis Department, The Chicago School of Professional Psychology; Simon Dymond, Department of Psychology, Swansea University and Department of Psychology, Reykjavík University.

Correspondence concerning this article should be addressed to Brooke M. Smith, Department of Psychology, Western Michigan University, 1903 W. Michigan Ave. Mail Stop 5439 Kalamazoo, MI 49008 (email: brookem.smith@wmich.edu)

Abstract

Excessive fear and avoidance in relatively safe situations can lead to a narrowing of one's behavioral repertoire and less engagement with valued aspects of living. Ultimately, these processes can reach clinical levels, as seen in anxiety, trauma, and obsessive-compulsive disorders. Research on the basic behavioral processes underlying successful treatment with exposure therapy is growing, yet little is known about the mechanisms contributing to clinical relapse. Until recently, these mechanisms have largely been conceptualized in terms of Pavlovian return of fear, with relatively little research into operant processes. In the current paper, we briefly review translational research in anxiety disorders and the connections between fear and avoidance, focusing on recent work in the acquisition, extinction, and relapse of avoidance behavior and the generalization of this learning through arbitrary symbolic relations. We then introduce one possible treatment approach to mitigating clinical relapse, acceptance and commitment therapy (ACT), and provide a conceptual analysis for why ACT may be especially well-situated to address this issue. Finally, we end with potential directions for future research in the treatment and relapse of anxiety disorders.

Keywords: relapse, anxiety, acceptance and commitment therapy, avoidance, mechanisms of change

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Fear and avoidance of potentially dangerous situations are adaptive human responses to potential threat. The subjective experience of fear helps to prepare our body to engage in the fight or flight response, facilitating escape from danger, and avoidance ensures that we remain protected from encountering future dangerous situations (LeDoux & Pine, 2016). However, excessive fear and avoidance in relatively safe situations can lead to a narrowing of one's behavioral repertoire, increasingly less engagement with valued aspects of living and, eventually, culminate in clinical levels of avoidance as observed in anxiety, trauma, and obsessive-compulsive disorders. This excessive fear/avoidance repertoire develops through the complex interactions of basic behavioral processes, many of which researchers are only now beginning to explore. Even less well known are the mechanisms that lead to relapse following a successful course of anxiety disorder treatment.

Relapse of fear responses are well-established in the literature, and their theoretical translation to anxiety disorders continues to motivate this research. However, the majority of this research has examined Pavlovian processes, with very little research on operant contributions to relapse (Craske, Hermans, & Vervliet, 2018; Dymond, 2019). Additionally, the links between fear and avoidance are understudied, as are their relations with clinical anxiety disorders. This is even more so in the case of clinical relapse. In the current paper, we briefly review translational research in anxiety disorders and the connections between fear and avoidance, focusing on recent work in the acquisition, extinction, and relapse of avoidance behavior and the generalization of this learning through arbitrary symbolic relations. We then introduce one possible treatment approach to mitigating clinical relapse, acceptance and commitment therapy (ACT), and provide

a conceptual analysis for why ACT may be especially well-situated to address this issue. Finally, we end with potential directions for future research in the treatment and relapse of anxiety disorders.

Anxiety disorders and exposure therapy

Anxiety-related disorders, including trauma and obsessive-compulsive disorders, are the most common class of psychological disorders in the United States (Kessler, Chiu, Demler, & Walters, 2005) and worldwide (Kessler et al., 2007). In a systematic review of 87 prevalence studies across 44 countries from 1980 to 2009, current global prevalence ranged from 5.3% to 10.4%, with the highest rates in Western (Euro/Anglo) cultures (Baxter, Scott, Vos, & Whiteford, 2013). In addition, anxiety disorders are the most economically costly of all psychological disorders, accounting for up to 31.5% of the total cost of all psychological disorders in the United States (Greenberg et al., 1999). Following onset, these disorders tend to be chronic (Anthony & Stein, 2009), resulting in functional impairment (DuPont et al., 1996) and a significantly lowered quality of life (Olatunji, Cisler, & Tolin, 2007).

Exposure therapy is considered a critical component of effective treatments for anxiety disorders. Cognitive behavioral treatments that incorporate exposure are the gold standard and generally tend to outperform those therapies that do not include exposure elements (Carpenter et al., 2018; Olatunji, Cisler, & Deacon, 2010). Nevertheless, there is still significant room for improvement. Response rates for exposure-based cognitive behavioral therapies are approximately 50% at posttreatment and 45% at follow-up (Loerinc et al., 2015). Despite decades of research on exposure therapy, response rates have not been improving (Springer, Levy, & Tolin, 2018; Whittal, Robichaud, Thordarson, & McLean, 2008). Although there is little research that has systematically examined relapse rates following exposure therapy specifically,

one study showed relapse in obsessive-compulsive disorder to be as high as 50% in treatment responders over the course of a typical follow-up period of 6 months (Hiss, Foa, & Kozak, 1994). A recent meta-analysis of long-term outcomes in cognitive behavioral therapies for anxiety-related disorders (including but not limited to exposure therapy) showed relapse rates after 3 to 12 months ranged from 0-14% (van Dis et al., 2019). Although only six studies were included in this analysis, these studies highlight the possibility of problematic relapse following anxiety disorder treatment.

Pavlovian, operant, and clinical relapse

Within the exposure literature, including applied studies of exposure therapy and basic studies of relapse intended to model the mechanisms of exposure, the term *relapse* may refer to one of at least three different phenomena: Pavlovian, operant, or clinical relapse. The use of the same term to refer to three distinct yet interrelated lines of research can sometimes lead to conceptual confusion when it goes unclarified. Therefore, each of these terms will be briefly defined here. Pavlovian relapse, or “return of fear” (Rachman, 1979; Vervliet, Craske, & Hermans, 2013), is the reemergence of a conditioned response following Pavlovian extinction, including renewal, reinstatement, and spontaneous recovery. In renewal procedures, following acquisition and extinction in different contexts, fear returns when tested in the original conditioning context (ABA renewal), a novel context (ABC renewal), or the extinction context (ABB renewal; Bouton, 2002; Vervliet, Baeyens, Van den Bergh, & Hermans, 2013). In spontaneous recovery, conditioned fear responses return after a period of time has elapsed since extinction but readily diminish in the continued absence of the unconditioned stimulus (US; Quirk, 2002). In reinstatement, unsignaled presentations of the US (i.e., not associated with any

conditioned stimuli or CSs) elicit a return of fear to the previously extinguished CS (Haaker, Golkar, Hermans, & Lonsdorf, 2014).

The three Pavlovian relapse phenomena are paralleled in operant relapse, or the reemergence of operant behavior following its suppression. In addition, operant-based laboratory models of treatment-relapse include resurgence (e.g., Leitenberg, Rawson, & Bath, 1970; Lieving & Lattal, 2003; Wathen & Podlesnik, 2018). Resurgence "occurs when reducing or eliminating reinforcement for an alternative response increases a previously reinforced and extinguished response" (Wathen & Podlesnik, 2018, p.3). The most relevant operant classes for anxiety disorder research are escape and avoidance. Finally, clinical relapse has been defined variously in the literature, but generally is considered to occur when an individual, no longer having met diagnostic criteria for an anxiety disorder at posttreatment (i.e., a treatment responder), experiences an increase in the number or intensity of symptoms such that the individual again meets diagnostic criteria, typically as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). When diagnostic criteria are met following a sustained period of recovery, this is known as "recurrence" (Bruce, Yonkers, & Otto, 2005; Eisen et al., 2013). Most anxiety disorder symptoms include both Pavlovian and operant responses. For example, many of the symptoms of panic disorder are Pavlovian responses (e.g., sweating, shaking, accelerated heart rate), but the diagnosis of panic disorder also includes symptoms that reflect operant behavior (e.g., maladaptive avoidance). Therefore, clinical relapse may overlap with and include the relapse of Pavlovian and operant responses, as well as other psychological experiences.

Translational research in anxiety disorders

Until recently, basic and translational researchers have largely conceptualized the mechanisms of exposure in terms of Pavlovian return of fear, measured as physiological responses or self-reported threat expectancy ratings, with relatively little research into the operant processes involved (Craske et al., 2018; Dymond, 2019). Operant processes are *hypothesized* to change as a result of Pavlovian fear extinction (Foa, 2011), but operant behaviors often go unmeasured in studies of exposure, and they have failed to be included in leading theories of the mechanisms of exposure (Craske et al., 2008; Foa & McNally, 1996). This reveals the implicit assumption that decreasing Pavlovian fear responses will naturally lead to decreased avoidance and enhanced life functioning, and relapse of fear will invariably lead to clinical relapse. However, this assumption is not supported by the literature. Decreases in Pavlovian fear responses do not consistently lead to decreases in avoidance (Treanor & Barry, 2017) or to more engagement in important areas of life (Gloster et al., 2017). Avoidance may persist even after fear has been extinguished, and the availability of an avoidance response following fear extinction has been shown to increase levels of fear (Vervliet & Indekeu, 2015; Vervliet, Lange, & Milad, 2017; Xia, Eyolfson, Lloyd, Vervliet, & Dymond, 2019).

The finding that Pavlovian extinction does not consistently lead to a decrease in escape and avoidance behavior is a demonstration of the phenomenon known as "decoupling," in which "normative relationships between…an internal experience and overt behavior (e.g., negative affect and smoking) are reduced, eliminated, or altered through changes in the context in which they occur" (Levin, Luoma, & Haeger, 2015, p. 2). A Pavlovian response is both a response and a stimulus that can control other behavior. A negatively valenced Pavlovian response (e.g., rapid heart rate) can function as an aversive stimulus, but this function can be altered without altering the topography or valence of the stimulus itself through the contextual control of behavior. It is

possible to experience a rapid heart rate as unpleasant without escaping or avoiding it. Alternatively, it is possible for a stimulus to have a positive or neutral valence *and* an escape/avoidance function. It follows that decreasing an unpleasantly rapid heart rate may not necessarily lead to a reduction in escape/avoidance behavior. Multiple stimulus control may provide at least a partial account of this phenomenon. If escape/avoidance is maintained following extinction of Pavlovian responding, then it is to be reasoned that other stimuli, internal or external, are controlling the operant response. For example, in the presence of a crowd, an individual may experience rapid heart rate ("fear") and attempt to escape or avoid the situation. Through repeated exposure to crowds in the absence of aversive consequences, the individual no longer experiences a rapid heart rate in their presence (the Pavlovian response is extinguished), but still avoids them (the operant response is maintained). This would demonstrate that avoidance was not solely controlled by the Pavlovian response (i.e., escape is not causally predicated on fear), but that it continues to be controlled by the crowd, and there may be additional controlling stimuli as well (e.g., verbal). The crowd remains an aversive stimulus, but the aversive nature of it is demonstrated by the fact that it evokes escape/avoidance, not by the fact that it elicits "fear." Therefore, it is important to study avoidance in its own right and not merely assume that it will decrease following Pavlovian fear extinction.

In addition to its apparent independence from fear, avoidance also plays a key role in clinical outcomes (typically measured using self-report symptom questionnaires). Higher rates of pre-treatment avoidance have been related to poorer outcomes in obsessive-compulsive disorder (Wheaton, Gershkovich, Gallagher, Foa, & Simpson, 2018) and social anxiety disorder (Mesri et al., 2017), and reductions in avoidance strategies have been shown to predict improved outcomes in generalized anxiety disorder (Mahoney, Newby, Hobbs, Williams, & Andrews, 2019). The use

of safety behaviors, or avoidance strategies aimed at immediately decreasing distress associated with feared stimuli, has long been associated with decreased effectiveness in exposure therapy (Blakey & Abramowitz, 2016). Recently, safety behaviors have also been linked to lower quality of life, as measured by self-report questionnaire, in those with social anxiety and/or panic symptoms (Kirk, Meyer, Whisman, Deacon, & Arch, 2019). Exposure therapy protocols almost always involve an explicit focus on decreasing avoidance, both in their rationale and implementation (Andrews et al., 2003; Foa, Hembree, & Rothbaum, 2007; Foa, Yadin, & Lichner, 2012), despite avoidance not being included in their underlying theories. Finally, avoidance may play a role in clinical relapse, though this has received less empirical attention. For example, residual agoraphobic avoidance following successful treatment for panic disorder has been shown to predict clinical relapse at 2-year follow-up (Craske, Brown, & Barlow, 1991).

In addition to avoidance, other operant processes are involved in successful treatment with exposure therapy and may also impact clinical relapse. These include the acquisition of positively reinforced replacement behaviors and engagement in values-based behaviors. During the course of exposure-based therapy, clients are encouraged not only to decrease maladaptive avoidance, but to engage in approach behaviors in order to encourage new learning about feared stimuli, expand their behavioral repertoires, and increase the amount and number of sources of positive reinforcement they receive from the environment. Examples of positively reinforced approach behaviors include attending work or school regularly, engaging in social relationships, exercising, or spending time with one's family, even when such activities elicit anxiety. Broadly, these behaviors can be conceptualized as composing adaptive life functioning. Impairment in important areas of functioning is a diagnostic criterion of nearly every psychological disorder (American Psychiatric Association, 2013), highlighting life functioning as a critical outcome of

therapy. Thus, operant processes play an important, yet understudied, role in clinical treatment and relapse. The relative dearth of operant work in this area is noteworthy in light of the seminal contributions made by behavior analysis in research on avoidance (e.g., Dinsmoor, 1977; Higgins & Morris, 1984; Hineline, 1981; Sidman, 1953) and the long-acknowledged role of operant processes in maintaining and overcoming avoidance (e.g., Cain, 2019; Dymond & Roche, 2009; Hayes & Hofmann, 2018; LeDoux & Pine, 2016; Pittig, Treanor, LeBeau, & Craske, 2018; Urcelay & Prével, 2019). Closer cooperation between researchers from operant and Pavlovian domains is clearly needed if the translational relevance of this research agenda is to be fully realized.

Acquisition, extinction, and relapse of avoidance

In the field of experimental psychopathology, research on avoidance is undergoing something of a renaissance (Cain, 2019; Dymond, 2019; Grillon, Robinson, Cornwell, & Ernst, 2019; LeDoux, Moscarello, Sears, & Campese, 2017). The central diagnostic status of maladaptive and excessive repertoires of avoidance in the anxiety disorders (American Psychiatric Association, 2013; Craske et al., 2009), combined with the high translational value of variants of the Pavlovian threat-conditioning and avoidance learning paradigm (Krypotos & Engelhard, 2018; Vervliet & Raes, 2013), has prompted renewed interest in the factors by which avoidance is acquired, maintained and extinguished.

At present, research on avoidance is generally conducted using variants of the Pavlovian threat-conditioning paradigm (Lonsdorf et al., 2017). During threat-conditioning, presentations of a stimulus (a conditioned stimulus or CS) are followed by an aversive event (unconditioned stimulus or US), such as brief electrical shock, while presentations of another stimulus are followed by the absence of the US. Following several CS-US pairings, or merely learning

through either observation (Haaker, Golkar, Selbing, & Olsson, 2017) or instructions (Mertens, Boddez, Sevenster, Engelhard, & De Houwer, 2018), the stimulus followed by shock (CS+) comes to elicit conditioned responding (measured through self-report of shock expectancy, physiological arousal, etc.) while the stimulus not followed by shock (CS-) results in reduced or absent responses. Avoidance is studied within this framework by the addition of a discrete, active response made in the presence of the CS+ which prevents or minimizes contact with the US. Avoidance in the presence of the CS– results in no programmed consequences. Differentiated active, signaled avoidance using this preparation can be said to occur when response rates are higher in the presence of the CS+ than the CS- (Dymond & Roche, 2009). However, avoidance may appear excessive when it continues to occur despite the US being withheld (termed *fear extinction*; Dymond, 2019). Excessive avoidance that occurs in the scheduled absence of the aversive event may play a central role in the etiology and maintenance of anxiety, largely because it prevents the individual from learning that threat is absent from the immediate environment.

Research conducted to date has focused primarily on the acquisition and extinction of avoidance, with little known about the treatment-relevant relapse of avoidance (Dymond, 2019; LeDoux et al., 2016; Urcelay & Prével, 2019). However, using a within-subjects design, Urcelay, Symmons, and Prével (2019) recently demonstrated, for the first time, greater ABA renewal of avoidance than ABB renewal in humans. Using a validated approach-avoidance task, Schlund et al. (this issue) found parametric increases in fear and avoidance renewal in humans. Although only a few studies with humans have investigated reinstatement of avoidance, moderate levels of reinstatement have been seen (Cameron, Schlund, & Dymond, 2015; Krypotos & Engelhard, 2018). Finally, resurgence of negatively reinforced behavior maintained by escape has been

demonstrated (Alessandri, Lattal, & Cançado, 2015), yet little is known about resurgence of avoidance in humans (for evidence of the resurgence of positively reinforced behavior in humans see, Smith, Smith, Shahan, Madden, & Twohig, 2017). To our knowledge, Pavlovian-based studies employing the threat-conditioning paradigm have not yet investigated resurgence of avoidance; developing such models may necessitate arranging schedules of differential alternative reinforcement to compete with avoidance. Such research certainly warrants further attention.

The spread of fear and avoidance through relational networks

The uniquely human capacity for symbolic cognition, as described by relational frame theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), confers numerous survival advantages (Hayes & Hofmann, 2018), but it also supports rigid behavioral repertoires for avoiding potential sources of threat, either real or imagined. One need not be clinically anxious to fear the potentially catastrophic consequences that might attend from failing to engage in a particular instance of avoidance. For example, it is an adaptive avoidance response to step out of the road when one recognizes that a speeding car is approaching. The failure to do so could result in very harmful consequences, and fear of this possibility is both natural and expected. It is perhaps understandable that avoidance can soon become maladaptive and a default means of coping with threat. Symbolic cognition gives our species tremendous benefits, but it also brings with it a propensity to compare, evaluate, ruminate and, ultimately, to suffer. Symbolic cognition allows us to experience fear of the unknown, to suspect that threat lurks around every corner, to find ever more elaborate ways of avoiding threat, and to seek to solve our struggles with anxiety by minimizing contact with stressful or anxiety-inducing events or situations.

At its core, symbolic cognition is the act of relating; it is the ability to relate seemingly unrelated events (i.e., stimuli that share no formal properties) arbitrarily. This capacity has been the subject of considerable empirical scrutiny for several decades now under the rubric of arbitrarily applicable relational responding (Dymond, Bennett, Boyle, Roche, & Schlund, 2018; Dymond & Roche, 2013). Once acquired, extinguished, or recovered, it is feasible to expect that avoidance may readily spread or generalize via relational learning to seemingly innocuous stimuli (Dymond et al., 2018; Dymond, Dunsmoor, Vervliet, Roche, & Hermans, 2015; Hunt, Cooper, Hartnell, & Lissek, 2019). As the range of stimuli and situations which evoke avoidance increase, layer upon layer of relational networks are derived and expanded as the functions of indirectly related events readily come to transform even remotely related situations and cues into potential sources of threat. For example, imagine an individual who receives a painful dog bite and then, as a result of Pavlovian and operant conditioning processes, avoids dogs (US = pain of the bite, CS+ = dog). Following this experience, dogs may come to be in a relation of equivalence (i.e., “sameness”) with places where dogs are commonly found, such as parks or sidewalks, which are in turn in equivalence relations with all outdoor areas. The avoidance function of the dog transforms to these stimuli and, eventually, the individual may avoid leaving the house entirely. This would occur despite dogs and outdoor areas sharing no formal stimulus properties and despite many outdoor areas being relatively safe.

To date, research on the spread of avoidance through perceptual and symbolic relational networks has largely focused on acquired active avoidance with little or no research attention paid to the spread of avoidance extinction or relapse. The literature on generalization of fear and avoidance is burgeoning and several excellent reviews are available, but we will for present

purposes focus on the relevance of the behavior analytic literature on derived or symbolic relational networks for understanding treatment relapse (Dymond et al., 2018).

It has long been known that Pavlovian eliciting and operant avoidance functions, among others, may alter or transform in accordance with how events are related (Dougher, Augustson, Markham, Greenway, & Wulfert, 1994; Dymond & Rehfeldt, 2000; Vervoort, Vervliet, Bennett, & Baeyens, 2014). Active avoidance responses, physiological responses, and self-report measures have all been shown to spread via relational networks and in so doing to capture some of the core features of clinically relevant fear and avoidance. Laboratory based treatment research of this kind has however tended to favor demonstration studies with otherwise healthy human volunteers over controlled interventions with clinical populations. Working with undergraduate students, Augustson and Dougher (1997) first showed that a fixed ratio (FR) schedule requirement of shock cancellation learned in the presence of one CS readily transferred to indirectly related stimuli through derived stimulus equivalence ("sameness") relations.

This basic effect has now been replicated and extended several times (Dymond, Schlund, Roche, De Houwer, & Freegard, 2012; Dymond et al., 2011) and with relations other than equivalence (Bennett, Hermans, Dymond, Vervoort, & Baeyens, 2015; Dymond, Roche, Forsyth, Whelan, & Rhoden, 2007). For example, derived avoidance responses may be altered in accordance with relations of "sameness" (i.e., equivalence) and "opposition" (Dymond et al., 2007). In this study, participants were taught the following relations: SAME-A1-B1, SAME-A1-C1, OPPOSITE-A1-B2 and OPPOSITE-A1-C2. After demonstrating the appropriate derived (i.e., untrained) relational responses, all participants then progressed to the signaled active avoidance phase during which a key press response in the presence of stimulus B1 cancelled a scheduled US presentation (aversive images and sounds). Another stimulus, B2, was never

followed by the US. In the critical test, participants were presented with C1 and C2, in the absence of the US. Most participants consistently emitted avoidance in the presence of C1 but not C2 (because C1 was derived as the same as B1, whereas C2 was the opposite), thus demonstrating derived avoidance in accordance with relational networks of same/opposite. Studies like this may also highlight possible ways in which environmental stimuli come to maintain avoidance in intricate ways. For instance, Bennett et al. (2015) extended the findings of Dymond et al. (2007) to test whether a stimulus opposite to the CS+ had evoked low levels of avoidance because it also participated in a derived sameness relation with a non-aversive stimulus rather than participating solely in a derived opposition relation with an aversive stimulus. These authors showed that, following a non-differential threat conditioning procedure which controlled for aversive learning history, the derived same stimulus evoked a higher proportion of avoidance than either of the derived opposition stimuli or a novel stimulus (Bennett et al., 2015).

Complex, multi-phase demonstration studies like these clearly speak to the intricate patterns of fear and avoidance that emerge early in clinical anxiety and may perpetuate and reinforce suffering. Despite the implications for treatment development, surprisingly little research has been conducted on ways in which relational networks may impact relapse. Only a handful of studies have investigated extinction processes in arbitrarily applicable relational responding, for instance. It is known however that extinction of fear may readily spread through relational networks (Vervoort et al., 2014). These authors found that extinction of fear to an original CS+ transferred to related stimuli, but that extinguishing fear of a derived stimulus did not reduce fear of the original CS+. While the therapeutic merits of extinguishing either the directly learned CS+ or the indirectly derived network member on subsequent fear relapse

remain to be fully determined, this study highlights the enormous potential implications findings may have for reducing relapse in exposure therapy for anxiety.

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012), a contemporary cognitive behavioral psychotherapy, may be well-suited to address phenomena related to relapse and, therefore, potentially reduce its occurrence. While the primary treatment target of ACT is the promotion of values-consistent operant behavior (i.e., valued living), we argue that skills trained through ACT may mitigate some of the influences of Pavlovian relapse and therefore reduce the probability of operant relapse. Because much of the relapse literature has centered around Pavlovian conditioning processes, we discuss the role of both operant and Pavlovian responding in analyzing how ACT can be an effective intervention that promotes maintenance of treatment gains. Psychological flexibility, a core process of change in ACT, is the behavioral pattern of flexibly adjusting (or persisting in) behavior when doing so serves useful and meaningful ends (Hayes et al., 2012). In order to illustrate how ACT skills that promote psychological flexibility may first produce desired outcomes in targeted operant behavior and subsequently reduce operant relapse, we consider the case of social anxiety.

As illustrated in aforementioned research, physiological Pavlovian responses are central to concepts of conditioned fear and likely play an important role in maintaining problematic avoidance behavior. These physiological responses may have acquired aversive functions through their correlation with other aversive events or by way of transformation of stimulus functions through relational networks (as described earlier). As such, when an individual begins to interoceptively sense this aversive stimulation, avoidance or escape of the social situation is evoked, which in turn produces escape from the internal stimulation. Thus, operant

escape/avoidance behavior is negatively reinforced. The aversive physiological stimulation is often sufficient to evoke operant avoidance; in other words, the individual does not need to actually engage in the desired behavior of interest (e.g., social interactions with others) in order to experience the relevant aversive stimulus. In turn, any potential contact with desirable, possibly reinforcing consequences that may be produced by engaging in the desired response (i.e., social interactions with others) is precluded. This contingency arrangement maintains a very rigid and narrow behavioral repertoire with respect to the events of interest.

The ability for humans to psychologically contact experiences and events which are not physically present allows for a possible interaction between covert verbal behavior and Pavlovian conditioning. The verbally contacted aversive events can serve to further elicit Pavlovian responding, possibly of greater intensity than that elicited from the physical context. This can occur because the range of aversive events that can be contacted by way of language/cognition are not bound by the physical properties of the environment and can be much more catastrophic in the consequences they describe, up to and including death. For example, a common symptom of panic disorder is to misinterpret physiological sensations, such as an accelerated heart rate, as indicative of a deadly condition, such as a heart attack, even if this is not actually the underlying cause of the physiological response. Similarly, more intense Pavlovian responses may evoke additional and more intense covert verbal behavior, where intensity may refer to rate of responding or intensity of the aversive consequences (e.g., “I think I might die,”) described therein. It is possible these forms of responding can enter into a type of positive feedback loop, in which successive responses may continue to increase in intensity based on the stimulus control of the responses that precede them, producing greater and greater aversive stimulation for the individual. This may be construed as a kind of motivating operation

(Laraway, Snycerski, Michael, & Poling, 2003) that momentarily increases the aversive value of related events and also increases the probability of operant behavior which has produced the removal of the aversive stimulation in the past (i.e., escape and avoidance). We contend that skills acquired through ACT may address the potential adverse impact of both Pavlovian (e.g., physiological) and covert operant (e.g., verbal) sources of aversive stimulation that maintain avoidance behavior and contribute to operant relapse.

ACT Processes

In the foregoing analysis, our primary tenet is that the uniquely human behavior of derived relational responding, with resulting transformation of stimulus function, fundamentally alters the way in which verbally able humans respond to their environment. It is therefore at the core of both problematic behavior and adaptive behavior change. The ACT model describes six psychological processes of change, within which behavioral skills related to each process promote psychological flexibility, while their opposites contribute to psychological *inflexibility* as manifest in rigid behavior patterns.

These processes are not intended as basic behavioral accounts. Rather, they are middle-level terms that serve to summarize and orient researchers and clinicians to sets of more technical mechanisms and accounts and to the specific contexts of human behavior within which certain stimuli are targeted via transformation of stimulus function (Levin, Twohig, & Smith, 2015). In the following analysis, we suggest that several of the ACT processes are essentially based on the transformation of stimulus function of various stimulus events of interest, with the middle-level terms (i.e., processes) pointing to specific domains of stimulation being targeted. For example, cognitive defusion (described in detail below) targets transformation of stimulus function of referents of thinking behavior, while acceptance targets a variety of external and

internal stimuli in attempts to alter their stimulus functions from avoidant to approach or tolerance. In either case, the context controlling ongoing responding is altered by way of transformation of stimulus functions of relevant stimuli. Therefore, the reader may notice similarities in descriptions of basic accounts across several of the middle-level ACT processes. In the following sections, we attempt to describe each of the ACT processes and their corresponding basic mechanisms, as well as how they may serve to reduce clinical relapse, using the example of social anxiety.

Present moment awareness. Present moment awareness is an appropriate starting point due to its apparent role as a touchstone process that can facilitate the function-altering effects of stimulus events described by the other ACT processes. Present moment awareness consists of directing and sustaining attention toward the moment-to-moment stream of stimuli that are available to be perceived and to whether these stimuli are currently controlling one's behavior (i.e., their stimulus functions). Importantly, from an ACT perspective, this applies to both overtly observable environmental stimuli and behavior as well as internal stimulation that may only be perceptible to the individual experiencing it. Within the latter category are interoceptive stimulation and physiological changes (such as increases/decreases in heart and respiration rates), covert verbal behavior, and phases of emotional responding that are not overtly observable, among others.

In more technical language, present moment awareness allows one to better tact the momentary stimuli and contingencies controlling behavior. The verbal product of the tact then serves as a discriminative stimulus for subsequent responding related to the skills acquired in ACT (further detailed in sections below). Emission of responses acquired through ACT alter stimulus functions of events participating in the tacted contingencies. In turn, those functionally

altered stimulus events evoke additional behavior which is topographically and, importantly, functionally distinct from the behavior which would have otherwise been evoked.

In this way, the ongoing reciprocal stream of behavior-environment interactions allows for behavior to alter the functions of current stimulus events, which in turn evokes functionally related behavior, which may continue to alter the functions of stimulus events, and so on, allowing for a different trajectory (pattern) of one's behavior within a given context. This is not unlike Skinner's (1984) analysis of problem-solving behavior in which one's behavior serves to alter the present environment, the altered stimulus control of which affects subsequently evoked behavior, which then alters the environment further, and so on, with a notable difference being the former largely deals with internal or covert experiences that are not overtly observable by others. We offer more concrete examples of such interactions in the sections that follow.

Cognitive defusion. Cognitive defusion is the ability to recognize thoughts as precisely that: thinking behavior that is occurring in the moment within a context. As such, the ongoing stream of covert verbal and thinking behavior occurs almost continuously and one often has little or no direct control over the content of the behavior. This is noteworthy because the content of thinking, i.e., what it describes or refers to, can have aversive functions.

When we psychologically interact with products of our thinking behavior as though they are actually the events they describe, this is referred to as cognitive fusion, and it contributes to psychological inflexibility by narrowing and constraining behavior. The inverse, cognitive defusion, describes the ability to recognize that thinking behavior persists despite efforts to reduce or control it, and that sometimes the content will be unpleasant, particularly under aversive conditions. The skill of being able to recognize these features of ongoing thinking alters the context of thinking, thus transforming the stimulus functions of thoughts. This allows one's

behavior not to be rigidly controlled by the stimulus products of one's thinking behavior and, instead, to come under the control of other stimuli.

Acceptance. Acceptance can be described as maintaining contact with aversive stimulation, generally of an internal form (e.g., thoughts, feelings, or emotions), instead of engaging in escape/avoidance behavior to remove it. This can be overt, such as remaining in a physical location that elicits or evokes aversive stimulation, or covert, such as not engaging in covert verbal behavior directed at suppressing or distracting from aversive thought content. Acceptance is the inverse of experiential avoidance, which consists of behavior that produces the removal or cessation of aversive internal stimulation, including conditioned Pavlovian responding. When targeted operant approach behavior (e.g., toward a social situation) begins to produce aversive stimulation, rigid escape and avoidance behavior are evoked, and the individual does not contact the target social situation.

Acceptance as a skill targets behavioral rigidity by altering the context of the aversive stimulation and thus transforming its stimulus functions. This is accomplished by elaborating the stimulus relations between the aversive events and other stimulus events. For example, prior to treatment, the experienced aversive stimulation is likely related to desirable social interactions through relations of "opposition" or "exclusivity," for example, "I cannot have one (social interactions) if I have the other (anxiety)." Elaborating the ways in which aversive internal stimulation is related to desired social interactions is a specific target of treatment. Further elaborated relations might consist of learning that anxiety and social interactions will have to co-occur and the individual will, at least initially, be exposed to the one in order to contact and be exposed to the other. The elaborated relations may be of an if-then variety, such as, "If I want this, then I also must have that," or of a hierarchical variety, such as, "Feeling this way is always

going to be a part of that larger experience I value, so I will have to accept this piece of it in order to have that larger experience." This language-based approach to acceptance can be considered use of formative augmentals (under the rubric of rule-governed behavior in RFT). The goal of this work is to transform the stimulus function of aversive stimulation from avoidance to approach, through its newly established relation to desired consequences, and therefore motivate approach behavior toward both aversive and desired experiences.

Once this initial approach behavior occurs, more direct-acting contingencies become available. By approaching and maintaining contact with conditions that elicit aversive stimulation, reinforcement of the approach behavior through natural contingencies can occur. New learning at the Pavlovian level can potentially allow for Pavlovian extinction to occur, though it is not necessary for operant behavior change. Additionally, new learning at the level of relational responding can consist of elaboration of the relations between the relevant stimulus events; for example, approaching social situations does *not* result in catastrophic consequences. The latter descriptions of acceptance-based behavior change share similarities with more traditional exposure treatments.

Self-as-context. Self-as-context skills involve facilitating defusion from (or transformation of the stimulus functions of) verbal descriptions and evaluations regarding one's verbally established sense of self. This includes one's current and past "feelings, sensations, preferences, abilities, thoughts, interactions, and learning" (McHugh, Stewart, & Almada, 2019, p. 106), rules about how one should or could behave, and interpretations of each of these and how they relate to each other (i.e., self-stories). Cognitive fusion with the verbally constructed sense of self just described is referred to as self-as-content, the converse of self-as-context, and it implies that self-referential verbal stimuli control behavior. When behavior is thus controlled, it

has the potential to be rigid, resulting in a narrowing of one's behavioral repertoire (e.g., "I am too anxious to be able to have meaningful friendships. Therefore, I shouldn't even try"). The ability to verbally respond to one's own behavior is facilitated through deictic relational responding, or relating that depends on the perspective of the individual (McHugh, Stewart, & Almada, 2019). Thus, self-as-context exercises involve training to more accurately tact covert experience and more fluently engage in deictic relational responding (i.e., perspective-taking). This helps one to recognize that various thoughts and feelings about oneself come and go and to take a perspective in which the content of covert experience does not define one's identity. This contributes to greater flexibility across situations and opens up control of behavior to other stimuli.

Values. Values, and exercises related to clarifying values, help the individual identify domains of life, and ways of behaving within those domains, that are meaningful to that individual. In the case of those who suffer from debilitating, anxiety-related avoidance behavior, the situations and events which are avoided are often highly valued by the individual, and this is why the inability to contact those sources of reinforcement is so distressing and ultimately leads the individual to seek treatment. Training around the values component of ACT often involves determining which domains of life or ways of being are most important and to what extent the person is currently behaving in a manner orientated toward those values (i.e., that bring the person into contact with sources of reinforcement related to those values).

Values work may also generate rule statements describing the specific target behavior (e.g., interacting socially) and desired consequences (e.g., establishing and building social relationships), which can be contacted through verbal and relational processes, thus serving as a kind of verbal motivating operation (motivative augmental in RFT; Maraccini, Houmanfar, &

Szarko, 2016) to momentarily increase the reinforcing value of the described consequences and the probability of behavior that will produce those consequences.

Utilizing this motivative approach can be especially useful in the face of aversive internal stimulation related to the target setting, and it can facilitate the function-altering effects of other skills trained in ACT treatment. For example, as described earlier, the emission of values-based rule statements interacts with acceptance behavior to facilitate the transformation of stimulus function of aversive internal stimulation by elaborating the relations between values-aligned behavior and aversive experience.

Committed action. Committed action, which is closely related to the values component of ACT, consists of training skills to identify smaller steps within a larger behavioral chain; i.e., a task analysis related to values-aligned patterns of behavior. In doing so, the individual works to achieve the smaller goals first, which brings them into contact with reinforcers related to those smaller goals. It should be noted that although larger patterns of valued behavior are broken down into smaller, more attainable goals, these smaller steps can be incredibly challenging and involve a great deal of aversive stimulation for individuals with a longstanding history of reinforced problematic behavior. As such, the various ACT processes we have discussed above are brought to bear on even the smallest, earliest steps in the process of committed action.

Committed action is often likened to behavioral activation treatment, following on the central tenet that engaging in the targeted behavior allows for contact with direct-acting, naturally occurring contingencies of reinforcement in the environment, and that as behavior increases, rate of reinforcement increases, and the targeted behaviors producing that reinforcement are more probable. Committed action is conceptualized in the same way, but does not operate in isolation as the sole treatment modality; instead, it is implemented with the other

skills trained in ACT to improve the probability that behaviors needed to produce natural reinforcement occur in the first place and that they continue to support desired patterns of behavior when naturally occurring reinforcement is disrupted.

ACT as a Treatment to Mitigate Operant Relapse

The fact that natural sources of reinforcement are subject to disruption in an ever-changing environment positions ACT as a natural treatment approach for training patterns of behavior that are less susceptible to relapse phenomena. From an operant perspective, aforementioned research on relapse suggest that, under conditions of disruption, the previously reduced avoidance behavior may return. In addition to a purely operant analysis, aforementioned research on Pavlovian relapse suggests that Pavlovian responses are likely to recover, even if they are explicitly targeted during treatment (as is the case in traditional cognitive behavioral therapies). As such, if extinction of Pavlovian responding is the only treatment approach, treatment gains would not be likely to persist and maintain in the face of recovered Pavlovian responding (return of fear). Without directly targeting the transformation of stimulus function of these recovered responses, recovered fear is likely to serve as a discriminative stimulus for operant avoidance, and thus both fear and avoidance may relapse, leading to clinical relapse.

ACT provides skills that help to persist in valued behavior and maintain treatment gains. We contend that present moment awareness plays a central role in implementing the various skills trained in ACT. For instance, directing and sustaining attention toward the moment-to-moment stream of internal and external stimuli in one's environment allows one to tact these stimuli, their current function, and the correspondence between current behavior and values-aligned behavior patterns. If the stimuli controlling one's behavior are aversive, and behavior is not consistent with previously identified values, tacting this lack of correspondence makes the

momentary choice of persisting in current behavior or allocating responding to more values-aligned behavior more salient.

Skills related to cognitive defusion and self-as-context allow for the transformation of stimulus function of products of thinking behavior and self-referential rules, as they pertain either to recovered Pavlovian responses or the disruption of naturally occurring reinforcement (e.g., very lean schedules of reinforcement or extinction). The stimulus control of covert thinking behavior describing, for example, that "I should just give up," or "I cannot bear the pain of it all," or "because of my past, I am a failure, and I will never succeed," can be transformed through cognitive defusion and self-as-context skills, which reduce the control of these verbal stimuli over other behavior. Additional rules learned in ACT, such as "thoughts are just thoughts," or "I can have this uncomfortable feeling and still act in accordance with what matters to me," or "my past behaviors do not define me," are contextual cues (otherwise known as a Cfuncs) that can transform the function of the Pavlovian and verbal aversive stimuli from stimulation that must be escaped to stimulation that does not have to be escaped and, rather, can be approached (accepted).

Through elaborated relations with valued behavior, the functions of Pavlovian and verbal stimulation are further transformed, such that the aversive stimulation may be a necessary part of valued activity and may never cease, but is worth experiencing in order to engage in valued activities. Restating values and describing behavior consistent with one's values can also act as a motivative augmental (i.e., motivating operation) and serve to increase the reinforcing value of such aligned behavior, which may shift the allocation of behavior toward the (now) more reinforcing choice response, as described by matching theory (Herrnstein, 1970). Finally, through present moment awareness, one can more fully contact naturally occurring sources of

reinforcement related to behaviors identified through committed action, further increasing the probability of those behaviors in the future. Thus, present moment awareness facilitates cognitive defusion, self-as-context, acceptance, values, and committed action through transformation of stimulus function. As such, the development of skills related to present moment awareness is a core competency of the ACT model that facilitates the maintenance of treatment gains.

The conceptual analysis provided here highlights how ACT teaches skills that can be implemented to persist in valued behavior despite possible return of fear. This analysis also provides a possible explanation for why traditional exposure therapies, that implicitly assume the reduction of operant avoidance is predicated on reduction of Pavlovian responding (e.g., fear), have shown modest results in terms of treatment responders and the maintenance of treatment gains. Those treatments targeting only Pavlovian conditioning processes suffer from the inability to fully control Pavlovian responding over long periods (demonstrated by the robust nature of return of fear) and do not leave individuals with an effective skill set to respond to those events if and when they occur. Similarly, though there has been less research on addressing these problems from a purely operant perspective, treatments that are based on shaping and acquisition of alternative responses suffer from the inability to control sources of naturally occurring reinforcement and disruptions to those sources of reinforcement. This is problematic when the alternative response is a desirable one trained within the therapeutic setting, and maladaptive target behavior reemerges once the schedule of reinforcement shifts to substantial thinning or extinction (i.e., operant resurgence or relapse).

Verbally constructed values and concrete behaviors aligned with those value statements allow an individual to contact sources of reinforcement that are ostensibly always available. Because values statements are verbal, they may be contacted at any time through engaging in the

covert verbal behavior of restating one's values. Alignment of behavior with those values is then possible. Although some topographies of values-consistent behavior may not always be available (e.g., the valued behavior of parenting might not be available to someone who cannot have children), valued actions as taught in ACT are functional and therefore, in theory, one could always identify a functionally equivalent behavior that is available (e.g., adopting children or volunteering with at-risk children). The availability of this type of verbal reinforcement may mitigate the effects of disruption to direct-acting contingencies of reinforcement of desired alternative behavior. In short, ACT teaches individuals how to recognize when aversive stimuli are evoking problematic behavior, strategies for altering the functions of those aversive stimuli such that desired behavior is more probable, and how to orient behavior toward sources of reinforcement that the individual can pursue even in the face of aversive internal experiences or changing environmental contingencies.

Conclusions

In conclusion, although research on avoidance is enjoying a recent revival of interest, it remains an understudied area of empirical investigation, and this is especially true for the relapse of avoidance. Research on renewal, reinstatement and resurgence of fear and avoidance may be limited, but research from related domains speaks to the issues at stake. First, demonstrations of the resurgence of derived relations (Doughty, Kastner, & Bismark, 2011; Doughty, Leake, & Stoudemire, 2014) signifies the operant basis of arbitrarily applicable relational responding and the relevance symbolic cognition has for understanding and treating clinical anxiety. Second, individual differences, such as trait positive affect (i.e., self-reported positive emotional responses), may mediate the return of fear following extinction. For instance, Zbozinek and Craske (2017) have shown that self-reported higher levels of positive affect (Watson & Clark,

1999) before and after extinction is associated with reduced CS+ fear at reacquisition compared to negative affect. Notably, these authors theorize that higher positive affect may, at least in part, facilitate relational learning. Thus, it may be helpful to measure trait factors such as positive affect prior to conducting a laboratory-based analogue study of exposure therapy. Third, both positive affect and post-extinction CS valence predict fear reinstatement (Zbozinek, Hermans, Prenoveau, Liao, & Craske, 2015), suggesting that decreasing the negative valence of the CS+ with strategies that enhance extinction may facilitate outcomes of exposure therapy. Strategies to reduce the valence of cues for fear and avoidance may include affect labelling (Craske et al., 2018), where participants are taught to tact "angry" faces and emotions (e.g., "I feel angry"), and other related defusion-like exercises from behavior therapies such as ACT. Fourth, conducting extinction with multiple extinction stimuli, or multiple exemplars of semantically related stimuli (e.g., different kitchen utensils), optimizes inhibitory learning, but effects may be stimulus specific (Zbozinek & Craske, 2018). That is, extinction of CS+ fear may not generalize to related stimuli, but reductions in generalized fear may be best achieved with varieties of generalized stimuli than with trial-unique exemplars. Finally, fear and avoidance renewal designs could investigate symbolic generalization by manipulating the context cues used during acquisition and extinction to include, for example, written and spoken words and their symbolic referents.

Although avoidance behavior is clearly of prime interest, the contribution of positively reinforced alternative behaviors to treatment and relapse of anxiety disorders should not be overlooked. Resurgence may be a useful model for examining the relationship between various operant behaviors, including avoidance and values-based behavior, during and after exposure. Using a typical three-phase resurgence preparation, it is possible to examine the acquisition of avoidance, extinction of avoidance and simultaneous acquisition of positively reinforced

replacement behavior, and relapse of avoidance, respectively. These processes represent factors related to the etiology, treatment, and relapse of anxiety disorders. For example, phase 1 of a resurgence preparation involves acquisition of a target behavior, corresponding to the pre-treatment development of avoidance. During phase 2, reinforcement for target behavior is withheld and alternative behavior is reinforced. This corresponds to the treatment phase of exposure therapy, when avoidance is decreased and positively reinforced replacement and values-based behaviors are increased through therapist and naturally-occurring environmental reinforcement. In the third phase, reinforcement for the alternative behavior is withheld or reduced. As a result, target behavior tends to increase, or resurge. This final phase corresponds to the period following treatment, when newly acquired approach behaviors may be subject to unreliable (i.e., intermittent) schedules of reinforcement and some sources of positive reinforcement may be lost altogether, for example, in the case of the loss of employment or a relationship. Anecdotally, such circumstances can lead an individual to relapse, and this relapse is thus modeled by the resurgence preparation. In order to extend resurgence research into a model of treatment and relapse in exposure therapy, it is necessary to study negatively reinforced target behaviors and positively reinforced alternatives. Although a handful of resurgence studies have examined negatively reinforced target behaviors in humans (Alessandri et al., 2015; Bruzek, Thompson, & Peters, 2009; Marsteller & St Peter, 2012; Volkert, Lerman, Call, & Trosclair-Lasserre, 2009; Wacker et al., 2013), to our knowledge, none have included positively reinforced alternative behaviors, a promising area for future research.

In addition, investigations into whether and how Pavlovian relapse phenomena are related to avoidance relapse are needed, as is research into each of their contributions to clinical relapse. In the course of this research, it is important to consider the potential drawbacks of current

assessment approaches in clinical studies that rely heavily on nomothetic measurement techniques that almost certainly obscure the ideographic course of treatment and relapse. For example, Brown and Barlow (1995) have suggested that the typical cross-sectional approach to follow-up measurement in studies of panic disorder can conceal important ideographic differences in response and tends to overestimate the long-term success of treatment. Longitudinal measurement methods, requiring more stable outcomes over the follow-up period, reveal that many clients who are considered panic-free at follow-up actually experience a considerable return of symptoms over the follow-up period that are not detected via the cross-sectional method of measurement. In other words, individuals who qualify as treatment responders at posttreatment may not be the same individuals who qualify as treatment responders at follow-up. These important individual trajectories go undetected using traditional cross-sectional and group measurement and statistical approaches. Carefully designed longitudinal research intended to capture the ideographic course of treatment and relapse in anxiety disorders will be necessary in order to gain a clearer understanding of the various mechanisms involved.

In closing, treatment approaches specifically tailored toward the reduction of clinical relapse in anxiety disorders should be further developed. Greater synthesis between Pavlovian and operant research domains will facilitate the translation of basic behavioral processes to the development of therapies aimed at mitigating relapse. We argue that ACT is one such approach, in that it teaches behavioral persistence in the face of return of fear (acceptance and cognitive defusion) and disruptions to naturally occurring sources of alternative reinforcement (through the motivating operations of verbally-contacted values). Additionally, if present moment awareness is a keystone process in ACT, as we argue that it is, its role in facilitating the implementation of other ACT skills should be investigated. Likewise, other therapeutic processes from ACT, or

processes from outside the ACT model, that target critical variables in the treatment and relapse of anxiety disorders may be deployed as independent treatment modules for relapse prevention. Indeed, the advent of process-based therapies and new approaches to diagnosis and functional analysis may also hold promise for a better understanding of the mechanisms of relapse (Hofmann, Curtiss, & McNally, 2016; Hofmann & Hayes, 2019a, 2019b). Anxiety disorders are a pervasive psychological problem, narrowing the lives of those who suffer from them and directly impacting their quality of life. Exposure-based treatments, despite their success, still leave substantial room for improvement. Efforts to better understand the mechanisms related to clinical relapse, including Pavlovian, operant, and relational processes and their interactions with one another, has the potential to reduce relapse when treatment has been effective, allowing treatment gains to endure and reducing overall prevalence rates. Continued basic and translational research into mechanisms of fear and avoidance in conjunction with applied research on theoretically-matched treatments will help to achieve these goals.

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