# Chapter 10
# Looming Cognitive Style Contributes to Etiological Processes in Anxiety Disorders


The looming vulnerability model (LVM) is concerned with theoretical features of cognitive vulnerability and threat that have been overlooked by other contemporary cognitive vulnerability models. Cognitive vulnerability is not viewed in the LVM as simply due to beliefs and appraisals that overestimate the probability or costs of potential threat stimuli. Other cognitive vulnerability factors such as anxiety sensitivity and intolerance of uncertainty can be viewed in those more static terms. The LVM, in contrast, emphasizes that perceptions of rapid dynamic patterns of change and increases on threat appraisal dimensions also critically contribute to anxiety. For example, if a person believes that there is a high probability of a physical or psychological symptom leading to a negative or catastrophic outcome, the outcomes will evoke less intense anxiety if it is expected to progress slowly or be static than if it is perceived as progressing quickly and suddenly. Notably, a threat is less likely to have an impact on etiological pathways if it is not perceived as dynamically growing. The looming cognitive style (LCS) is introduced to represent these theoretical features of cognitive vulnerability that other vulnerability factors such as anxiety sensitivity and intolerance of uncertainty don't capture.

According to the LVM, the LCS is presumed to remain relatively latent until activated by requisite stimuli (such as negative environment stimuli or negative events). It is activated by major negative life events. However, when the LCS has been recently primed or activated and is more cognitively accessible (e.g., Higgins, Rholes, & Jones, 1977; Riskind & Rholes, 1984), relatively minor events may activate the LCS to a higher level.

Notably, a person is viewed as often having little awareness of these effects. As Bargh and Williams (2006) have described, encounters with everyday situations can activate emotional and motivational tendencies and biases without the person's conscious awareness. Nonetheless, after it is activated, the LCS is hypothesized to have significant repercussions on multiple etiological processes that can reverberate throughout "the whole of the person's cognitive, affective, and behavioral systems" (Riskind & Williams, 2006).



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## A Brief Sketch of Etiological Chains: How the Looming Cognitive Style Confers Cognitive Vulnerability

Once the LCS is activated, it is assumed to produce a schematic processing bias for threat information in individuals who are cognitively vulnerable. The LCS functions as a danger schema that actively affects the selection, interpretation, and memory of potential threat information (Riskind & Williams, 2006; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). This activation of schematic processing biases creates the person's perceptions of looming vulnerability. This schematic processing sensitizes the person to threat movement and signs of intensifying danger in the environment (even when they aren't there), biases cognitive processing, and renders the anxiety to be more intense, persistent, and less likely to habituate (Riskind, 1997; Riskind et al., 2000). In this way, the schematic processing can lead to hypervigilant attention, memory bias for threat information, biased appraisals and threat overestimation, and can generate a continuing stream of inflated cognitions and images of threat. As a direct result, the cognitively vulnerable individuals can come to feel more intense anxiety and negative affect than others do in the same circumstances as well as fear their intense emotions. Another repercussion of this pernicious chain of events is that they can lead the cognitively vulnerable person to become mentally depleted and to rely on maladaptive coping reactions such as indiscriminate freezing responses and rigid avoidance coping. In addition, LCS can contribute to the onset, escalation, and maintenance of anxiety through reciprocal influence processes.

In the LVM, the sense of looming vulnerability to a potentially uncontrollable threat is viewed both as a *necessary cause* of the experience of anxiety (i.e., it must be above a minimal threshold for any anxiety to occur) and a *sufficient cause* for the experience of anxiety (i.e., its occurrence guarantees the anxiety → self-protective response sequence). In some cases, individuals may have a "stimulus-specific" form of looming vulnerability theme without developing the general LCS. For example, some persons with specific phobias may have a restricted, stimulus-specific looming style (e.g., for representing spiders or social rejections as rapidly approaching or rising in risk). Although a person can have one without the other (i.e., the general LCS and the specific looming vulnerability theme), it is postulated that the general predisposition or LCS biases the person to be more sensitive to the looming properties and threat potential of a variety of environmental stimuli.

## Repercussions of Activation of the LCS: Cognitive Processing

As mentioned, the LCS can be viewed as having painful repercussions that reverberate throughout the whole of the individual's cognitive, affective, physiological, and behavioral systems. These repercussions can influence anxiety through a series of etiological chains. These include: (1) schematic processing biases in attention,

memory, and the interpretation of threat information; (2) more intense affective and physiological responses to threat; (3) greater behavioral urgency; (4) mental depletion and cognitive overload; (5) reliance on maladaptive, default coping responses. In addition, the LCS and its repercussions can interact through bidirectional or reciprocal feedback loops.

## *Attentional Processing Biases in Initial Processing*

As we saw in Chap. 6, looming objects capture attention. This has been evolutionarily adaptive on larger scale, but in the case of a person who has the LCS, a general tendency to perceive simulations of dynamic looming threats has morphed to become disruptive and dysfunctional. Such a person may be hypervigilant and susceptible to attentional capture, as well as find it more difficult to disengage attention, because he/she sees growing threat even when there is no such threat present.

Although a conspicuous dearth of research exists on the effects of LCS and hypervigilance, a recent study by Basanovic, Dean, Riskind, and Macleod (2017) has indirectly taken a step in this direction. Their study focused on the nature of the relationship between spider fear and attentional vigilance. To this effect, they used a novel attentional vigilance task to present color images of spiders or butterflies, some of which were approaching and some of which were receding from participants. While no fear-linked difference was found in vigilance for spider images that displayed approach movement, a significant fear-linked difference emerged when spider images displayed a receding movement. Namely, the higher spider fear participants, as compared to the lower spider fear participants, demonstrated heightened vigilance to spider images when images displayed a receding movement.

As was described in Chap. 6, virtually anybody is likely to have their attention captured when they spot a spider suddenly moving toward them. The state-elicitation of looming vulnerability by a looming spider can nullify or minimize the effects of preexisting differences in chronic fear levels. In the absence of the state-elicitation, however, spider fearful individuals may maintain more hypervigilance even to receding movement because of their internal simulations of rapidly approaching spiders.

## *Perceptual Biases*

We suggest that the LCS produces perceptual biases toward overestimating the speed, closeness, and time of arrival of approaching threat objects. Riskind, Kleiman, Seifritz, and Neuhoff (2014) examined the separate and conjoint effects of the LCS and anxiety on the anticipatory auditory looming bias (the tendency to overestimate the closeness and speed of an approaching sound source). One notable

finding was that although anxiety increased the anticipatory auditory looming bias, depression reduced it. This finding is consistent with the theoretical presupposition (see Riskind, 1997) that anxiety has the evolutionary adaptational function of increasing early detection and preparation for threats *before* they have already struck. Depression, on the other hand, lacks this function because it is an evolved adaptation for dealing with negative events (e.g., past losses) after the blow has already been struck.

The central purpose of the Riskind, Kleiman, Seifritz, and Neuhoff's (2014) study was to examine the interactive effects of LCS and anxiety. In specific, it was expected that facilitating effects of anxiety on the tendency to overestimate the speed and closeness of an approaching sound source would primarily occur under conditions in which the physical threat component of the LCS was high. In contrast, anxiety could divert a person's attention away from physical threat to ruminating about social rejection when the social threat component of the LCS was high. Anxious individuals who worried and ruminated about social threats would thus be less motivated to be vigilant to the rapid early detection of the approach of physical threats. Upholding these expectations, two significant interaction effects were found, which together accounted for an astounding 22% of the variance in anticipatory auditory looming. Notably, the interaction between anxiety and LCS-physical threat and anxiety and LCS-social were not due to suppression effects. Both were obtained when they were analyzed alone in separate regression models.

In a study designed to extend these above findings, Riskind, McDonald, Buzzell, and Beaver (under review) examined the effects of LCS and anxiety by using a visual expanding geometric object rather than an auditory looming paradigm. The participants were asked to perform in a novel task where they were shown a darkened circle that either expanded and approached (visual looming) or contracted and receded. They were asked over a series of trials to press a button to indicate when they believed the circle had reached its maximal distance in moving close when approaching or moving away when receding. Notably, the results revealed a significant main effect for LCS. The LCS for physical threat predicted a stronger tendency to overestimate the closeness of the expanding geometric object on this visual looming task. Unlike the auditory looming study of Riskind et al. (2014), no main effect or interaction for anxiety emerged. A methodological strength of this visual looming study was that the analyses controlled for the participants' tendencies to overestimate the distance of the object when it was receding. Thus, the study controlled for individual differences in impulsiveness.

Interestingly, additional findings of this study also revealed that the LCS for social threat also predicted participants' tendencies to overestimate the speed and closeness of the expanding visual object. As well, the effects of the LCS-physical and LCS-social components of the LCS were independently statistically significant. Riskind et al. suggested that the LCS-social factor may have increased physical threat because research has shown that there is a more general tendency for individuals to make anthropomorphic appraisals and attributions to moving visual objects (e.g., see Chap. 5; (Heider & Simmel, 1944; Kuhlmeier, Wynn, & Bloom, 2003; Michotte, 1962)).

Combined, these studies support that the LCS is related to overestimation of the closeness and time of arrival of both visual and auditory looming stimuli. Future studies could compare threatening and neutral stimuli rather than rely just on the neutral geometric object used by Riskind et al. on distance estimation. It would also be interesting to explore other biases such as perceptual biases in time duration during threat exposure. As previously seen, individuals have been found to overestimate the passing of time (time dilation) when in the presence of threat (see Chap. 5; Langer, Wapner, & Werner, 1961).

## *Influence of Perceptions of Looming Vulnerability on Appraisals and Inferences*

In describing his emotions theory, Scherer (Scherer & Brosch, 2009) briefly cited the looming vulnerability model and impact that perceptions of dynamic spatial/temporal movement can have on cognitive appraisals. Scherer and Brosch stated that the LCS can be "considered an example of a dysfunctional appraisal bias" that affects many aspects of perception and judgment and that it "may facilitate the development of the actual anxiety disorder" (p. 275). In connection with Sherer's model and many other cognitive models of emotion (Ellsworth & Scherer, 2013), we could expect for similar reasons that an individual's perceptions of dynamic parameters should likely have significant effects on a range of appraisals such as novelty, intrinsic pleasantness, urgency, certainty/predictability, goal significance, and coping potential (see Chap. 5).

As previously described in Chap. 5, research suggests that when threat stimuli (e.g., images of tarantulas) are displayed as approaching, people tend to judge them as more threatening, more likely to produce harm, more difficult to control, etc., than when the images are displayed as stationary or moving further away (Riskind, Kelly, Harman, Moore, & Gaines, 1992; Riskind & Maddux, 1993). In addition to these state elicitions of looming vulnerability, the LCS, which biases people to perceive threats as growing and approaching, is also postulated to produce more negative threat appraisals. Consistent with these expectations, Riskind et al. (2000) found that scores on the LCS were highly correlated with other self-reports of appraisals of the probability including negative events in the LMSQ scenarios, as well as of their uncontrollability and unpredictability.

Another study by Riskind, Calvete, and Black (2017) employed a longitudinal prospective design which included a measure of thought tapping. Participants' in a public speaking course was asked to record their thoughts four times over the course of 3 weeks leading up to a public speech (at the announcement of the speech, a week later, 2 weeks later, and on the day of the speech). The LCS for social threats prospectively predicted the extent to which the participants exhibited threat ideation on the thought tapping measure over the course of the study. This finding is noteworthy because anxiety did not predict the course of their threat ideation.

Several studies have extended the foregoing sets of findings on the expected effects of the LCS with laboratory-based tasks. As will be discussed soon in somewhat more detail, a study by Riskind et al. (2000) demonstrated that college students with higher levels of the LCS were more likely than students with lower levels to interpret ambiguous verbal information on a homophone task in a threatening manner. Specifically, they tended to spell out ambiguous tape-recorded words (e.g., "die" versus "dye") with the more threatening spelling and meanings.

In another lab-based study, Pietri, Fazio, and Shook (2012) reported novel evidence that supports that the LCS can affect threat appraisals. They focused on a hypothesized "negative weighting bias" that occurs when individuals make negative attitude generalizations from prior events. The participants in their study performed on a computer game in which their task was to maximize points. They had to learn which presented stimuli (i.e., game beans) would win as opposed to lose them points. In the next phase, they were shown novel (never seen before) game beans that resembled prior beans that had either earned or lost them points. Pietri et al. observed that a stronger negative weighting bias was displayed by participants with higher levels of the LCS, as well as those with aversion to risk-taking and rejection sensitivity. Thus, their findings suggest that individuals with LCS tend to make more negative inferences in attitude generalization.

## *Memory Bias*

To examine the links between the LCS and schematic processing bias, several studies have been conducted to investigate its effects on memory. A cluster of our studies have examined memory for lexical and visual threat-related stimuli on both explicit memory tasks (which make direct reference to study materials) and implicit memory tasks (which make no direct reference to such materials). First, as just mentioned, the results of the study that used a homophone task indicated that the LCS is significantly and uniquely related to the tendency to process and interpret ambiguous verbal information (e.g., "dye" versus "die") in a threatening manner (e.g., Riskind et al., 2000).

Viewed from a more detailed perceptive, the results indicated that the standardized coefficient representing the path between the LCS and the homophone measure was significant, whereas the coefficient representing the path between anxiety and the homophone measure was not. Further, elimination of the path between the LCS and the homophone measure resulted in a significant decrement in model fit, whereas elimination of the path from anxiety to the homophone variable did not. A second set of analyses conducted to distinguish the effects of the LCS from likelihood estimates and the latent anxiety variable on the prediction of homophone spelling revealed a similar outcome: only the path between the LCS and the homophone measure was significant, and it was only the elimination of this path that produced a significant decrement in model fit.

These results indicate that the LCS produces a schematic bias to interpret and implicitly remember ambiguous information that cannot be accounted for by static expectations of threatening situations (e.g., likelihood estimates). Consistent with a broader perspective that emphasizes the role of danger schemas in information processing, they suggest that anxiety may primarily exert effects on such interpretative and memory biases via the guiding influence of the LCS. Finally, it was noteworthy that these results were even replicated in a *low anxiety* subsample, based on a median split of the participants performed on the latent anxiety variable. Thus, these exciting results suggest that the LCS produces a schematic bias in implicit memory, even for individuals who are *demonstrably* not currently anxious. Despite the fact that they did not examine actual clinical anxiety, these data are especially provocative since they imply that in many cases anxiety may primarily exert an effect on schematic processing via the LCS. Moreover, they imply that inconsistent findings regarding the associations between anxiety and schematic memory biases may sometimes emerge because of failure to take the LCS into account.

In another experimental laboratory study, Riskind et al. (2000) investigated the effects of the LCS on memory for visual threat-related stimuli. Participants were presented with 45 neutral (e.g., fish), positive (e.g., flowers), or threatening visual images (e.g., a house fire or auto crash) and asked to rate the extent to which each image was threatening so as to ensure their attention to the stimuli. The study included two measures of explicit memory (a free recall task, a frequency estimation task), and a measure of implicit memory (a word-stem completion task). Structural equation modeling replicated the pattern of the preceding study. Again, the standardized coefficient representing the path between the LCS and the dependent variables was significant, whereas the coefficient representing the path between latent anxiety and these dependent variables was not. Further, omission of the path from the LCS to each of these dependent variables resulted in a significant decrease in model fit, whereas elimination of the path between anxiety and the dependent variables did not.

Using a false memory paradigm, Monds, Paterson, Kemp, and Bryant (2013) examined the relationships between the LCS and the Post-Traumatic Cognitions Inventory (PTCA; Foa et al., 1999) on false memory for trauma-related words. College students were presented with six lists of trauma-related words (e.g., cut, assault, beaten) and six more lists of neutral words (e.g., shoe, hill, and postman) on a computer screen (2 s for each word), and then administered a free recall questionnaire and a recognition questionnaire. False memory scores were assessed by computing scores for free recall and reported recognition of critical lures (e.g., injury, suffered) that were thematically related to the original sets of trauma words but had not been shown.

Neither of the cognitive predictors predicted false memory scores for trauma words on the free recall task. Monds et al. (2013) interpreted this as indicating that these did not affect false memory processes. Notwithstanding this conclusion, their findings did reveal that LCS had a significant positive association with an intrusion index of false memory. Individuals who were higher in the LCS exhibited a greater number of false intrusions (remembering having seen trauma words that were nei-

ther false lures or words on the original list). Such intrusions are also indicative of false memory. Thus, Monds et al.'s data provided interesting evidence suggesting that the LCS can contribute to false memory. In addition, they noted that stronger findings might have been obtained had participants been selected for having experienced traumas.

Another interesting finding of Monds et al. (2013) is that LCS and PTCI were both positively associated with higher rates of *accurate* recognition memory of words from all the previously seen word lists. They explained this finding by suggesting that greater hypervigilance to threat cues would have increased accuracy. This would explain why they would exhibit increased accuracy by reducing levels of incorrect identification of the critical lures in the previously seen word lists.

More recently, West, Riskind, and Chrosniak (2018) explored the impact of the LCS and anxiety on the generation of false memories for images of threatening or nonthreatening animals (e.g., spiders versus turtles). As compared to individuals who were low in one or both factors, those who combined high anxiety with high LCS for physical threats were significantly more likely to falsely remember images of threat animals as approaching than as receding. West et al. interpreted these findings as indicative of the greater behavioral urgency of highly anxious individuals who have the LCS. Namely, a greater sense of looming vulnerability and behavioral urgency could heighten the likelihood of their falsely remembering seeing images of threatening animals as approaching. Moreover, the behavioral urgency account is also consistent with the finding that those participants tended to have faster reaction times in the recognition task. Behavioral urgency has been shown to produce faster reaction (Landy, Rastegary, Thayer, & Colvin, 1991).

## Repercussion of the Activation of the LCS for Emotion and Physiological Response, Behavioral Urgency, and Defensive Responding

### *Intense Emotion and Physiological Response*

As compared to individuals who have lower levels of the LCS, those with higher levels of the LCS are expected to have more intense emotion and physiological distress in response to threatening environmental stimuli or events. In addition, they might have different patterns of neural activation during neural imaging studies. To date, there is a paucity of research that explores these issues. However, Franklin, Ruscio, and colleagues have reported preliminary evidence that individual differences in the LCS predict cognitive, emotional, and physiological responses to a stressor task (the Trier Social Stress Task; Kirschbaum, Pirke, & Hellhammer, 1993) among individuals with GAD, comorbid GAD, and comorbid major depressive disorder, or no lifetime psychopathology (Franklin, Forbes, Kennedy, Spandorfer, & Ruscio, 2018). As we will soon mention at a later point in this chapter, the LCS may also predict corresponding fears of intense emotions and loss of emotional control.

### *Behavioral Urgency and Self-Protective Responses*

We suggest that the sense of rapidly rising risk from dynamic growing threat is also likely to naturally evoke a greater sense of behavioral urgency and distress and lead cognitively vulnerable individuals to engage in various *self-protective behaviors*. When direct action is possible, cognitively vulnerable individuals may engage in behavioral avoidance. When direct action is not possible or when there are no instrumental responses immediately available to prepare for the possibility of countering the prospect of harm, the person may engage in cognitive avoidance behaviors.

*Freezing*. As we saw in Chap. 4, human and nonhuman subjects alike exhibit a brief initial freezing response and immobility when encountering threats. These brief freezing responses have been typically interpreted as having an adaptive function for evaluating the magnitude of the threat and available coping resources. Although such freezing responses might have an evolved adaptive function, it is presently assumed that the LCS can lead to maladaptive and inappropriate freezing responses that interfere with effective coping.

In a study that they designed to examine the psychometric structure of the intolerance of uncertainty construct, Hong and Lee (2015) reported that the LCS was significantly correlated with the "Inhibitory" component of intolerance of uncertainty. This Inhibitory component assesses maladaptive tendencies to "freeze-up" (paralysis) under conditions of uncertainty, as well as delayed decision-making and perseverative thinking about possible threats (Dugas, Gosselin, & Ladouceur, 2001; Dugas and Robichaud, 2007). Thus, Hong and Lee's finding suggests that LCS is associated with a chronic tendency to freeze-up under conditions of uncertainty. Unlike the Inhibitory component, the "Prospective" component of intolerance of uncertainty was not significantly associated with scores on the LCS. The Prospective component represents a desire for predictability of future events and triggers engagement in strategies such as information seeking to reduce uncertainty.

A chronic freezing response that is expressed in inappropriate contexts becomes ineffective and dysfunctional because it hinders flexible responding. Individuals who are not able to show an adequate freezing response, in terms of both its duration and context, tend to remain immobile and vigilant irrespective of the presence of actual danger, which limits their ability to use adaptive coping strategies (Hagenaars et al., 2014). Researchers have speculated that immobilizing freezing responses may be etiologically related to several anxiety disorders including social anxiety (Buss, Davidson, Kalin, & Goldsmith, 2004) and PTSD (Hagenaars, Van Minnen, Holmes, Brewin, & Hoogduin, 2008; Rizvi, Kaysen, Gutner, Griffin, & Resick, 2008).

With respect to this possibility, a study by Riskind, Sagliano, Trojano, and Conson (2016) examined whether the LCS predicts freezing reactions. Participants were asked to make judgments about whether images of animals or other stimuli were "living" or "nonliving." Slower reaction times (RTs) on this lexical decision task for images of approaching threatening animals (e.g., spiders or snakes), as compared to those of receding animals or nonthreatening animals, have been interpreted as indicating freeze-like reactions (Sagliano, Cappuccio, Trojano, & Conson,

2014). The study tested the hypothesis that higher scores on the LCS for physical dangers would be associated with more inflexible and indiscriminate freeze-like reactions. As expected, higher scores for the physical threat component of LCS were associated with more generalized freeze-responses (slower RTs) to all animal images (threatening or neutral) without regard to their movement direction (approaching or receding).

Unlike the overgeneralized freezing response pattern of participants with higher scores on the LCS for physical dangers, those with lower scores tended to exhibit more selective and functional freezing. Namely, freeze-like responses only occurred to threatening animals with the approaching motion (not to neutral animals or any animals with receding motion).

Although the participants with higher LCS scores for physical danger showed slower reaction times to animal stimuli, they weren't generally slower than those with lower levels of LCS. Other data revealed that they were no slower than those with lower LCS scores for physical danger when rating furniture or other neutral stimuli on a control task. The specificity of the association was also supported by additional findings that examined the LCS for social threat. When statistically controlling for the LCS for social threat, the findings for the LCS for physical remained significant, but the opposite wasn't true. The LCS for social threat was not significantly associated with reaction times when the LCS for physical threat was controlled. Additional findings revealed that there were no significant relationships between anxiety and behavioral inhibition scores on the BIS/BAS and freezing responses.

## *Other Maladaptive Coping*

*Cognitive Overload and Maladaptive Coping*. A chronic or prolonged activation of the LCS can lead to a sense of cognitive-affective overload (e.g., Wegner, 1994; Wegner, Erber, & Zanakos, 1993). We suggest that if individuals experience an unrelenting and cross-situational sense of behavioral urgency, this can deplete mental resources that they require for effective coping (Muraven, Tice, & Baumeister, 1998; Schmeichel & Baumeister, 2004; Vohs, Baumeister, & Ciarocco, 2005). Based on this reasoning, we expect that a person with LCS, and particularly when it is activated, can have fewer mental resources with which to engage in successful mood-regulation or to cope with potential threats (see Riskind & Williams, 2006).

In combination with the above, mental depletion of coping resources and cognitive overload could make it more difficult to step back from any inflated initial automatic negative appraisals and engage in "rational" re-evaluations of the magnitude of threats or of coping responses that remain available. On a similar note, Gilbert and Malone (1995) have proposed that the initial cognitive appraisals that individuals make of events are normally simplistic and impressionistic. Thus, to have more balanced appraisals, individuals must take a second step involving more effortful cognitive activity to adust their appraisals by taking account of additional information. However, individuals do not ordinarily take this extra step if

they are feeling threatened, stressed, fatigued, or distracted. This account aligns with the possibility that the cognitive overload and mental depletion resulting from the LCS can therefore impede individuals from adjusting initially extreme automatic judgments.

To the extent that they have a diminished capacity for mental control while having exaggerated threat ideation, individuals can come to rely on ineffective, inflexible, "default" coping strategies (Riskind & Williams, 2006). Although these would have the advantage that they can be rapidly deployed, they have the cost of often being exaggerated and unnecessary, as well as represent highly restricted avoidance coping strategies (Riskind & Williams, 2006).

In research related to the foregoing concerns, Williams (2002) developed a measure of coping flexibility (the ability to re-evaluate and apply multiple coping strategies in response to changes in the veridical conditions of threat). His studies with this measure confirmed that individuals with the LCSs tend to use rigid and inflexible avoidance coping styles. In addition, this link or association between LCS and avoidance coping was stronger than the link between anxiety and such avoidance coping.

As we described, activation of the LCS is assumed to lead to the generation of a stream of threat ideation in the individual's stream of consciousness. This threat ideation intensifies the person's perception of behavioral urgency due to threat as well as the person's feelings of fear. Evidence that the LCS can generate a stream of threat ideation comes from a short-term prospective study by Riskind, Calvete, and Black (2017), mentioned earlier, that used a thought tapping paradigm. In this study, we assessed threat ideation four times over the course of 3 weeks leading up to a public speech. The LCS for social threats prospectively predicted the extent to which the participants exhibited threat ideation on the thought tapping task over the course of the study. Anxiety, however, did not predict the course of their threat ideation.

Building on a body of research on the role of worry in pathological anxiety, we assume that worry can be characterized as another self-protective process (e.g., Borkovec & Hu, 1990; Borkovec & Inz, 1990; Borkovec, Ray, & Stoeber, 1998). In addition, we assume that the worry process can be generated by the LCS because it leads individuals to engage in imagining and simulating dynamic mental experiences of anticipated rapidly growing and escalating threats. Significant relationships between the LCS and worry have been found in college students (Riskind et al., 2000; Riskind, Tzur, Williams, Mann, & Shahar, 2007), community samples (Riskind & Williams, 2005), and even in psychotic inpatients (Clemente, Gleeson, & Lim, 2013). Moreover, Riskind et al. (2007) found that the LCS functions as a cognitive vulnerability that predicts future levels of worry on the Penn state worry questionnaire over a 1-week prospective interval. In contrast to the LCS, they found that intolerance of uncertainty did not predict worry changes.

As previously suggested, the cognitive overload and loss of coping flexibility associated with the LCS, as well as the more intense anxiety and physiological reactions that it can elicit, should be expected to make the challenge of controlling intense emotions seem more threatening and uncertain. Consistent with this hypothesis, Riskind and Kleiman (2012) showed that the LCS was significantly and positively associated with higher scores for experiential avoidance and maladaptive

beliefs that emotions are uncontrollable and threatening. In a second study, Riskind and Kleiman demonstrated that the LCS significantly predicted increased fears of intense emotions and loss of emotional control over a month's prospective interval. These effects were obtained when controlling for initial fears of intense emotion and loss of emotional control at baseline.

In short, the LCS is predictive of both worry and fears of intense emotion. Other findings reported by Riskind et al. (2000) documents that the LCS is significantly associated with higher scores for thought suppression on the White Bear Thought Suppression Inventory (Wegner, 1994).

## Recursive and Bidirectional Feedback Loops Involving Looming Vulnerability Perceptions in Anxiety

Finally, we suggest that the etiological chains related to anxiety often involve bidirectional reciprocal feedback loops in which individuals' pathological anxiety, maladaptive avoidance, or neutralizing behavior helps to maintain their distorted perceptions of rapidly growing danger (i.e., the LCS). For example, the LCS can give rise to higher anxiety, which in turn can affect future LCS.

In one study, Calvete, Riskind, Orue, and Gonzalez-Diez (2016) employed a prospective longitudinal design to examine possible reciprocal relationships between the LCS and symptoms of social anxiety and depression over three time points (6 months apart from each other) over a year's time. Structural equations modeling was employed to determine whether the LCS-social looming scale predicted social anxiety and whether social anxiety predicted changes in the LCS-social looming scale in return. The findings strongly supported a reciprocal feedback loop between LCS and social anxiety. Individuals who were higher in the social looming scale of the LCS tended to become more socially anxious over the 12 months of the study and individuals who were higher in social anxiety also tended to exhibit higher scores on the social looming scale of the LCS. In contrast to social anxiety, the LCS did not predict depression and depression did not predict the LCS over the year of the study.

A second study by Riskind, Calvete, and Black (2017) has provided additional support for the feedback loop hypothesis. Riskind et al. assessed the LCS for social threat and symptoms of anxiety at four times over a 3-week period prior to an assigned speech: when the assignment was first announced (T1), 2 weeks (T2), and 1 week (T3) prior to the presentation, and on the day of the presentation (T4). Consistent with Calvete et al.'s study (2016), higher scores on the LCS for social threat were predictive of higher subsequent levels of anxiety over time than as compared to lower scores, and higher levels of anxiety were predictive of higher scores on the LCS for social threat. Together, the findings of the two studies suggest a *cascade or snowball model* (Masten & Cicchetti, 2010) for anxiety, analogous to that for depression (Calvete, Orue, & Hankin, 2013, 2015; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007). Namely, the LCS and anxiety would seem to predict and intensify each other in a negative self-sustaining cycle.

Another reciprocal process in anxiety can involve the stress generation process (Hammen, 1991). A great deal of research has documented that depression, as well as cognitive vulnerabilities to depression, are associated with heightened tendencies for individuals to generate negative life events (Hammen, 1991; Liu & Alloy, 2010). Although the great bulk of this body of research has focused on depression, we have conducted a series of studies that have extended the work on stress generation to cognitive vulnerability to anxiety.

First, Riskind, Black, and Shahar (2010) examined whether LCS and anxiety sensitivity predicted elevated rates of stressful life events over a 4-month prospective interval. The rationale for the predictions in this study was that depletion of self-control resources can compromise a person's ability to solve problems, cope with stress, inhibit unwanted thoughts, and manage impressions (Gailliot, Schmeichel, & Baumeister, 2006; Schmeichel, Vohs, & Baumeister, 2003; Vohs et al., 2005). We hypothesized if individuals had the LCS this would deplete their coping resources by causing them to feel more anxious. In addition, we assumed that these depleting effects of anxiety would be synergistically compounded were the participants to have a co-occurring vulnerability to anxiety sensitivity since having this vulnerability would make the anxiety even more threatening. As expected, a significant interaction effect emerged between the LCS and anxiety sensitivity to predict stress generation, and this was found after controlling for the main effects of both cognitive vulnerability factors and for their baseline levels of stressful life events and anxiety and depression symptoms. The interaction effect indicated that individuals who were higher in both the LCS and anxiety sensitivity reported far higher rates of negative life events than others over the 4-month period than individuals who had only one or neither of these cognitive vulnerability factors. Those results were replicated in a follow-up study by Riskind, Kleiman, Weingarden, and Danvers (2013) that used a shorter 4-week (rather than 4 month) prospective interval.

In another study, Kleiman and Riskind (2013) demonstrated that the depressive cognitive style and looming cognitive style also significantly interacted to predict future stress generation. Extending previous studies of both the depressive cognitive style and the LCS, Kleiman and Riskind presented evidence that depressive cognitive style have a synergistically stronger stress generation effect if it co-occurs with the LCS than if it doesn't. They suggested that individuals who tend to explain negative events in mentally depleting ways with the depressive cognitive style may experience synergistically greater mental depletion if they also had the LCS and simulate negative events as making rapid gains and approaching.

## Summary and Conclusions

In this chapter, we have suggested that the LCS confers greater cognitive vulnerability to anxiety via the impact it has on several central pathways and etiological processes (see also, Riskind & Williams, 2006). These include: (1) schematic processing (attention, appraisal and attention biases, and memory); (2) more intense anxiety

and physiological responses; (3) fears of intense emotion and loss of behavioral control; (4) behavioral urgency; (5) cognitive overload; (6) reliance on maladaptive protective responses such as inflexible avoidance coping and cognitive-affective avoidance. Perceptions of looming vulnerability represent a common core mechanism of anxiety and anxiety-related disorders but can also occur in the form of specific looming vulnerability themes that correspond to specific types of disorders. Finally, these effects of the LCS can be compounded by snowballing spirals that deepen and self-sustain anxiety and anxiety-related disorders.

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