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Examining the Link Between Hoarding Symptoms and Cognitive Flexibility Deficits

Julia Y. Carbonella
Kiara R. Timpano
University of Miami

Executive functioning deficits have been found to underlie primary symptoms of hoarding, such as difficulty discarding belongings and significant clutter. Cognitive flexibility—the ability to inhibit irrelevant material and attend flexibly between different mental sets—may be impaired as well, as individuals experience difficulty staying on task and are often distracted by specific possessions that tend to evoke an exaggerated emotional response. The present study investigated cognitive flexibility deficits via eye-tracking technology as a novel approach. Participants (N = 69) with high and low self-reported hoarding symptoms were asked to respond to a series of auditory cues requiring them to categorize a small target number superimposed on one of three distractor image types: hoarding, nature, or a blank control. Across a range of behavioral and eye-tracking outcomes (including reaction time, accuracy rate, initial orientation to distractors, and viewing time for distractors), high hoarding participants consistently demonstrated greater cognitive inflexibility compared to the low hoarding group. However, high hoarding participants did not evidence context-dependent deficits based on preceding distractor types, as performance did not significantly differ as a function of hoarding versus nature distractors. Current findings indicate a pervasive, more global deficit in cognitive flexibility. Those with hoarding may encounter greater difficulty disengaging from previous stimuli and attending to a given task at hand, regardless of whether the context of the distractor is specifically related to hoarding. Implications and future directions for clarifying the nature of cognitive inflexibility are discussed.

Address correspondence to Kiara R. Timpano, Department of Psychology, University of Miami, Coral Gables, FL 33146; e-mail: kiaratimpano@gmail.com.

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Hoarding disorder is a condition that has attracted increasing attention in the research community in recent years, characterized by "persistent difficulties discarding or parting with possessions, regardless of their actual value" (American Psychiatric Association, 2013; p. 248). Hoarding is comprised of three core facets: excessive acquisition of possessions, difficulty discarding these items, and resulting clutter of living spaces (Frost, Steketee, & Grisham, 2004). The lifetime prevalence rate is estimated to be 2%–5% in the general population (Timpano et al., 2011). Hoarding disorder is marked by a chronic course, high levels of comorbidity with psychiatric and physical health conditions, and substantial distress and impairment across many domains (Frost, Steketee, & Tolin, 2011; Tolin, Frost, Steketee, Gray, & Fitch, 2008). Unfortunately, hoarding patients are often resistant to treatment, due to low levels of insight and internal motivation, difficulty staying on task, and high intervention dropout rates (Frost, Pekareva-Kochergina, & Maxner, 2011; Tolin, 2011). Existing treatments tend to be both effort- and time-intensive, sometimes lasting 9 to 12 months or longer (Steketee & Tolin, 2011; Tolin, Frost, & Steketee, 2007). Gaining further insight into the phenomenology of hoarding, as well as possible risk and maintenance factors, will therefore be necessary to allow us to develop more effective interventions to help mitigate this public health burden.

Of the risk factors that have been identified for hoarding, information processing deficits appear to be a key domain that contributes to the development

of all three key facets of hoarding. Neuropsychological assessments have highlighted potential impairments in the domains of attention and memory, as well as in executive functioning abilities such as decision making, categorization, and impulsivity (Timpano, Shaw, Yang, & Cek, 2014). For instance, hoarding symptoms have been associated with taking longer and using an underinclusive categorization style when sorting personal objects, as well as greater impairment on tasks requiring response inhibition and sustained attention, such as the Continuous Performance Test (Grisham, Brown, Savage, Steketee, & Barlow, 2007; Luchian, McNally, & Hooley, 2007). However, findings have been largely mixed with multiple null findings, preventing definitive conclusions about the nature of specific deficits in relation to hoarding (Woody, Kellman-McFarlane, & Welsted, 2014). In addition, a notable weakness of these previous tasks is their failure to take into account whether hoarding-relevant tasks or type of stimuli play a role in exacerbating potential deficits, or if information processing deficits remain more pervasive across tasks regardless of the specific context (Timpano, Shaw, Yang, et al., 2014).

In light of existing evidence suggesting that those with hoarding tend to exhibit deficits in various facets of executive functioning, it may be the case that hoarding symptoms could also be linked specifically with a deficit in cognitive flexibility. Within dual-process theories of self-regulation, cognitive flexibility is thought to reflect a top-down process that allows an individual to exert control over and allocate cognitive processes to adapt to a variety of changing conditions or cues in one's environment (Martin & Anderson, 1998; Moore & Malinowski, 2009). Cognitive flexibility is thought to be comprised of two related subfacets: inhibition of irrelevant material, as well as shifting attention flexibly between different tasks or mental sets (Miyake et al., 2000). High levels of cognitive flexibility allows one to adaptively shift focus depending on the changing situational demands as they arise (Lezak, 2004).

The relationship between cognitive flexibility and hoarding has received scant empirical attention. One investigation considered the link between hoarding and the broader construct of self-control (Timpano & Schmidt, 2013), which is defined as the ability to regulate one's behavior and exert control over various, often competing, urges. Timpano and Schmidt (2013) found across three studies that high hoarding symptoms demonstrated a specific association with lower levels of self-control, even after accounting for general depression and anxiety, and symptoms of impulse control deficits. Poor self-control was linked with greater tendency to save items, as well as increased difficulty discarding them. Although cognitive flexibility is a more specific and perhaps distinct construct from self-control, lower levels of flexibility may reflect individuals' difficulty to enforce a regulatory, top-down process similar to a failure to enact self-control. A more direct examination of cognitive flexibility was a recent master's thesis by van der Meulen (2013), which assessed the subconstructs of inhibition and set-shifting in relation to hoarding. As a whole, hoarding patients did not show significant impairments compared to an obsessive-compulsive disorder control group on two separate measures thought to assess shifting (i.e., Intra-dimensional/Extra-Dimensional Task) and motor inhibition (i.e., Stop Signal Reaction Task). However, those with hoarding evidenced difficulty on a subtask of the Stroop Color-Word Test that requires a joint ability to both inhibit a response and switch strategies, suggestive of a general deficit in cognitive flexibility (van der Meulen, 2013). Thus, further investigation of potential impairment in this area is warranted.

As a subcomponent of overall cognitive flexibility, "affective flexibility" has been termed as the ability to flexibly disengage or attend to emotional material (Malooly, Genet, & Siemer, 2013). It has been explored most notably in the depression literature, having been linked to poor emotion regulation in the face of negative affect (Malooly et al., 2013). This "affective inflexibility," as coined by Davis and Nolen-Hoeksema (2000), is characterized by difficulties with inhibiting processing of information that was previously relevant, and latency in shifting attention from past information to current input. Moreover, Whitmer and Banich (2007) found that difficulties inhibiting prior task sets were associated with depressive rumination; as suggested by the authors, having these "perseverative tendencies" may lead these individuals to experience difficulty blocking previously relevant material during a task.

Interestingly, based on our knowledge of those with hoarding, this sort of emotionally driven cognitive inflexibility appears to accurately characterize prototypical hoarding patients. As a defining feature of hoarding, individuals often evidence great difficulties with discarding particular objects they have formed an attachment with. Although this behavior is not the same as in-the-moment disengagement difficulties, it does reflect a general tendency to "get stuck" and not think flexibly about one's possessions. Given that patients with hoarding exhibit an exaggerated emotional response towards possessions and often rely on objects as a source of emotional comfort (Grisham