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Opinion Articles

Towards a Unified Model of Depression in Schizophrenia

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Abstract

Schizophrenia affects approximately 1% of the population. The Salience Hypothesis represents a highly influential theory of schizophrenia and argues that individuals with schizophrenia assign greater salience to stimuli, causing redundant stimuli to appear novel and significant. Whilst the Salience Hypothesis provides a comprehensive account of hallucinations and unusual beliefs, it fails to account for commonly co-occurring symptoms, such as depression. This paper argued that the Salience Hypothesis can be extended to account for depression in schizophrenia, as elevations in the salience of contextual stimuli may attenuate individuals' perceived control, culminating in an increased risk of depression.

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1. Introduction

Schizophrenia affects approximately 1% of the population (Kirkbride et al., 2012; Perälä et al., 2007) and entails so-called 'positive,' 'negative,' and 'disorganized' symptoms (Berrios, 1985; Jackson, 1932; Snezhnevsky, 1968; Strauss et al., 1974). Positive symptoms include hallucinations, delusions and disorganized thinking, while negative symptoms involve social withdrawal, diminished motivation, reduced emotional expression, decreased pleasure and limited speech (APA, 2013). Cognitive difficulties, such as deficits in attention, memory, decision-making and planning, are also prevalent (APA, 2013). Individuals with schizophrenia often experience a lower quality of life (Eack & Newhill, 2007). Thus, it is crucial for researchers to investigate the underlying cognitive mechanisms of schizophrenia to facilitate the development of effective psychological and medical interventions (e.g., Myles, 2021; Myles & Jones, 2024; Myles & Merlo, 2022).

It is important to note that symptoms of schizophrenia are distributed across the general population to varying extents (Claridge, 1987, 1997; Claridge & Beech, 1995; Nelson et al., 2013). Research suggests diagnostic labels like ‘schizophrenia’ may lack substantial evidence to qualitatively distinguish them from experiences common among the broader population (Guloksuz & Os, 2018; Kirk et al., 2017; Van Os et al., 2009; Van Os & Reininghaus, 2016). Indeed, studies have shown that 5-30% of individuals experience hallucinations and unusual beliefs (Freeman et al., 2005; Johns et al., 2004). Moreover, contemporary research is challenging the validity and reliability of psychiatric diagnoses more broadly (Scull, 2021). Therefore, when terms like ‘schizophrenia’ are used, they refer specifically to individuals diagnosed with the condition.

This paper will outline the Salience Hypothesis, a highly influential theory of schizophrenia. An extension of the Salience Hypothesis will then be introduced, elucidating the potential role of stimulus salience in depression in people with schizophrenia.

2. The Salience Hypothesis

Since the diagnosis of schizophrenia was first developed (Bleuler, 1911), differences in attention have been noted in affected individuals (Anscombe, 1987; Braff, 1993; Frith, 1979; Gray et al., 1991; Hemsley, 1993; Miller, 1976; Mirsky & Duncan, 1986; Nuechterlein & Dawson, 1984). Qualitative reports describe perceptual sensations as ‘heightened’ and appearing ‘important’ (Anonymous, 1955; Bowers, 1968; Bowers & Freedman, 1966; Chadwick, 2007; Kapur, 2003; MacDonald, 1960; McGhie & Chapman, 1961; Sack et al., 2005). These observations laid the groundwork for the development of the Salience Hypothesis, which proposes that individuals with schizophrenia assign greater salience to stimuli, causing redundant stimuli to appear novel and significant (Howes & Kapur, 2009; Kapur, 2003; Kapur et al., 2005). This theory posits that hallucinations result from the abnormal assignment of salience to internal stimuli, while unusual beliefs emerge as individuals attempt to make sense of these highly salient experiences. For example, thoughts may become so salient that they appear to originate externally, resulting in the perception of a voice or image. Unusual beliefs may develop as individuals try to make sense of voices, images and seemingly significant, yet redundant, stimuli. The content of these beliefs is shaped by individual differences in pre-existing beliefs and schemas (Kennerley et al., 2016; Morrison et al., 2014). For further information, see Myles et al.'s (2023) recent review of the Salience Hypothesis.

3. Extending the Salience Hypothesis

Whilst the Salience Hypothesis provides a comprehensive account of hallucinations and unusual beliefs, Kapur et al. (2005) acknowledged that it fails to account for commonly co-occurring

symptoms, including depression. Depressive symptomology (DS), characterised by low mood, despondency and loss of interest in pleasurable activities (APA, 2013), is experienced by up to 80% of people with schizophrenia (Buckley & Castle, 2015; Uptegrove et al., 2017; Winograd-Gurvich et al., 2006) and suicide risk is up to 13 times higher than in the general population (Hayes et al., 2012), though this varies with demographic factors (Majadas et al., 2012; Subodh & Grover, 2020). Furthermore, DS correlates with fluctuations in positive symptoms to a greater extent than negative symptoms in both people with schizophrenia (Lysaker et al., 1995; Norman & Malla, 1994) and neurotypicals (Lewandowski et al., 2006), providing an, albeit highly tentative, indication that these symptoms may partially be underpinned by similar cognitive processes. Despite this, contemporary theories lack a parsimonious account of hallucinations, unusual beliefs and DS that appeals to a single cognitive mechanism rather than several separate comorbid deficits (Myles & Johnson, 2023).

However, this paper argues that the Salience Hypothesis can be extended to account for DS in schizophrenia. First, it is necessary to elucidate a common cause of DS. Seminal research indicates that low perceived control (PC), defined as the perceived absence of the capability to influence environmental contingencies (Seligman, 1975), maintains a causal role in depression (Abramson et al., 1978, 1989; Alloy & Abramson, 1979; Bandura, 2010; Seligman, 1975, 1992). Evidence for this comes from cross-sectional demonstrations that individuals with lower PC exhibit greater DS (Bjørkløf et al., 2016; Bostik & Everall, 2007; Cheng et al., 2013; Crandall et al., 2018; Crona et al., 2017; Gómez-Tabares et al., 2024; Kleinberg et al., 2013; Myles et al., 2020, 2021; Nicolopoulos et al., 2018; Volz et al., 2018). Moreover, longitudinal studies indicate that low PC predicts the subsequent manifestation of depression, suggesting PC maintains a causal role in DS (Bjørkløf et al., 2018; Galla & Wood, 2015; Hamilton & Abramson, 1983; Millman et al., 2017; Tobin & Raymundo, 2010). These robust, replicable findings provide strong evidence that low PC increases one's vulnerability to depression.

This paper proposes that low PC may also account for DS in schizophrenia. Perceived control can be conceptualised as an association between environmental outcomes (US) and an agent's actions (CS; Seligman, 1975). Crucially, contextual stimuli, referring to all other stimuli that the agent has encoded, also form associations with the US, such that the CS and context are 'competing' for associative strength (Miller & Matzel, 1988; Rescorla & Wagner, 1972; Stout & Miller, 2007; Wagner, 1981). As contextual stimuli generally represent poor predictors of the US, compared to the agent's actions, the salience of contextual stimuli would typically decline (Le Pelley, 2004; Le Pelley et al., 2016; Mackintosh, 1975; Pearce & Hall, 1980; Pearce & Mackintosh, 2010). However, if redundant stimuli retain greater salience in high schizotypy individuals and people with schizophrenia, the salience of contextual stimuli should remain

higher for a longer duration. As elevated salience increases the associability of stimuli and the US is partially contingent upon the context, the association between the context and US would ostensibly be relatively stronger in high schizotypy individuals and people with schizophrenia, which may consequently limit the associative strength acquired by the agent's actions (Le Pelley, 2004; Le Pelley et al., 2016; Mackintosh, 1975; Miller & Matzel, 1988; Pearce & Hall, 1980; Pearce & Mackintosh, 2010; Rescorla & Wagner, 1972; Stout & Miller, 2007; Wagner, 1981). Attenuating the associative strength of the agent's actions would theoretically reduce the individual's perceived ability to modulate environmental contingencies and, by definition, their PC, culminating in an increased risk of depression. Accordingly, the theory that people with schizophrenia assign aberrant salience to redundant stimuli can be extended to contextual stimuli to theoretically account for the manifestation of depression in schizophrenia.

Given that this represents a novel extension of the Salience Hypothesis, it is unsurprising that few studies have evaluated the relationship between DS and the attribution of salience to stimuli. Studies of latent inhibition (LI), the phenomenon that learning about a CS-US relationship is diminished following pre-exposure to a CS (Lubow & Moore, 1959), likely occurring due to reductions in the salience of the CS (Mackintosh, 1975; Pearce & Hall, 1980), are typically used to examine the attribution of salience to stimuli. To the best of the author's knowledge, only one study has examined the relationship between LI and DS, which reported that LI is intact in people with 'mild depression' (Msetfi et al., 2017). However, participants classed as 'mildly depressed' entailed a minimum Beck's Depression Inventory score of 5, which falls within the range of scores indicative of 'minimal depression' (Beck et al., 1996). Thus, there may have been too little variation in DS to detect meaningful differences in LI. Furthermore, participants received pre-exposure to the context in the non-pre-exposed group, which may have resulted in the context acquiring inhibitory properties, by virtue of its presentation in the absence of the US, and/or the CS's salience being bolstered at test through novel pop-out effects. This would enhance associative learning in the non-pre-exposed group, artificially inflating the magnitude of 'LI.' Whilst this study provides limited insight into the relationship between LI and DS, additional research examining the relationship between DS and LI is absent.

4. Concluding Comments

In conclusion, the Salience Hypothesis represents a highly influential theory of schizophrenia. This paper argued that the Salience Hypothesis can be extended to account for DS in schizophrenia, as elevations in the salience of contextual stimuli may attenuate individuals' perceived control, culminating in an increased risk of depression. However, further research is necessary to determine whether assigning aberrant salience to redundant contextual stimuli

reduces perceived control by weakening the association between actions and outcomes, thereby increasing the risk of depression, in people with schizophrenia.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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