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Rash impulsivity predicts lower anticipated pleasure response and a preference for the supernormal

Belinda C. Goodwin [a,b,*], Matthew Browne [a], Matthew Rockloff [a], Natalie J. Loxton [c,d]

[a] School of Human, Health, & Social Sciences, Central Queensland University, Australia
[b] Health Collaborative Research Network, Australia
[c] School of Applied Psychology, Griffith University, Brisbane Q. 4122, Australia
[d] Centre for Youth Substance Abuse Research, The University of Queensland, Brisbane Q. 4072, Australia

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ABSTRACT

Alcohol, other psychoactive substances, high calorie foods, media entertainment, gaming, and retail products are all forms of modern supernormal stimuli. They exhibit exaggerated features that activate evolved reward systems more so than the natural stimuli for which these systems are adapted. Recent findings suggest that people may vary in the strength of their preference toward supernormal stimuli. The current study assessed whether the two-factor model of impulsivity (Dawe & Loxton, 2004) predicts a preference for supernormal stimuli. A cross-sectional survey design (n = 5389) was used to measure anticipatory pleasure for both supernormal and natural-reward experiences; and their hypothesized antecedents: Rash impulsivity (RI) and reward drive (RD). As predicted, RI was positively associated with preference for supernormal stimuli and negatively associated with general anticipatory pleasure ratings. In contrast, RD was positively associated with general pleasure ratings, but explained little to no variance in supernormal preference when controlling for RI. The findings link trait rash impulsivity with increased sensitivity to supernormal stimuli, and provide new insights into both constructs.

1. Introduction

Alcohol, other psychoactive substances, high calorie foods, media entertainment, gaming, and retail products are often consumed in excess, contributing to poorer health outcomes for many people. Rash impulsivity (RI) and reward-drive (RD) are associated with excess consumption of such products (Gullo, Loxton, & Dawe, 2014; Kane, Loxton, Staiger, & Dawe, 2004). This has lead to the suggestion that these traits may play a role in some people's general propensity for excessive and unhealthy consumption (Goodwin, Browne, Rockloff, & Donaldson, 2015a; Kane et al., 2004). Recently, factor analytic studies have uncovered a potential latent trait reflecting individual differences in general consumption of hedonic stimuli (Goodwin et al., 2015a) and preferences toward particular types of reward (Goodwin, Browne, & Rockloff, 2015b). In this paper, we link these reward preferences to trait/personality measures of RI and RD.

1.1. Supernormal stimuli

Human beings often consume unhealthy stimuli, despite an awareness of subsequent negative consequences (e.g., obesity, pain, financial debt). One explanation for this based in evolutionary theory, is that human reward systems evolved to suit an environment in which resources were scarce and self-limiting consumption was not adaptive. In non-natural environments, where resources are plentiful, humans (along with other species) retain a tendency towards uncontrolled consumption of stimuli that are interpreted as conferring fitness: a phenomenon labeled as 'selection asymmetry' (Staddon, 1975; Ward, 2013). In this model, "supernormal" stimuli — those that posses exaggerated versions of naturally rewarding features, ought to be particularly attractive. For example, processed foods that contain concentrated and refined sugars and carbohydrates are attractive because they exaggerate the features found in seeds and fruits — a valuable and fitness-conferring resource in natural environments. For modern humans, highly appetitive experiences exist in a variety of artificial consumer products that have been carefully designed to maximize desirability. This broad range of products can be understood as supernormal-stimuli due to one common property; they invoke an evolved predisposition to respond to a degree not found in natural stimuli (Barrett, 2010). For example, psychoactive drugs (e.g., cocaine) are thought to mimic adaptive rewards by giving off a false and exaggerated sense of fitness and vitality (Nesse & Berridge, 1997). Industrially manufactured foods are carefully designed to provide enhanced appearance, smell, texture, and taste characteristics that can stimulate reward pathways more so than more natural food sources. More speculatively, television shows (Barrett, 2010), digital social networking (Ward, 2013)

* Corresponding author at: School of Psychology, Central Queensland University, Australia.
E-mail address: b.goodwin@cqu.edu.au (B.C. Goodwin).

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and various retail products (Etcoff, Stock, Haley, Vickery, & House, 2011; Morris, Reddy, & Bunting, 1995) have also been discussed as forms of modern supernormal stimuli due to properties that increase feelings of social status and belonging.

Supernormal experiences tend to be inherently unhealthy due to eliciting uncontrolled consumption, being synthetic in nature, and often encouraging prolonged sedentary behaviour (e.g., media consumption and gambling). This poses an important question for behavioural-health: Are some people generally more sensitive to reward from supernormal stimuli and therefore more susceptible to excess consumption of unhealthy products?

1.2. Individual differences and supernormal stimuli

Evolutionary adaptions to environments are typically species wide, however, many specific traits are associated with both benefits and costs to adaptive fitness and therefore even highly species-typical behaviours vary between individuals and situations (Lewis, 2015). Likewise, whilst virtually all people are prone to the allure of supernormal stimuli, one would expect to observe individual differences in susceptibility. A recent confirmatory factor analytic study analyzed covariance between the consumption of various artificial products: alcohol, drugs, cigarettes, fast food, snacks, TV, Internet, gambling products, caffeine, salt, and processed meat products; as well as several natural products (Goodwin et al., 2015a). A uni-dimensional latent factor with positive loadings for all artificial (but not natural) products fit the data well, suggesting that this behavioural trait may be interpreted as an orientation towards supernormal stimuli. However, pleasure is felt from a variety of experiences including those that are natural or not markedly artificial (e.g., viewing a landscape or helping others; Snaith et al., 1995). In a subsequent study, Goodwin et al. (2015b) developed a measure of anticipatory pleasure. Factor analysis revealed a clear two factor structure corresponding to two subdomains of anticipatory pleasure: one included items regarding supernormal stimuli (e.g., television and snack food) and the other included items regarding natural stimuli (e.g., smiling faces and attractive landscapes).

Neurological evidence supports the idea that some people are more susceptible to consummatory stimuli than others. For example, those who struggle with weight and eating problems show greater activation of reward pathways to palatable food and food-related cues (e.g., knives, forks) than normal weight/non-eating disordered individuals (Stoeckel et al., 2008). Thus, individual differences in a general susceptibility to supernormal stimuli would be consistent with some individuals exhibiting sensitive dopamine pathways.

1.3. Reward drive and rash impulsivity

Impulsivity in general has been associated with specific risky behaviours such as substance abuse, problem gambling, and excessive video-gaming (Walther, Morgenstern, & Hanewinkel, 2012), yet varied models of impulsivity derived from different theoretical backgrounds have been applied across previous studies of personality and addiction. For example, Whiteside and Lynam (2001) describe multi-factor models of impulsivity largely based on the factor analysis of self-report questionnaire data. Factors include urgency, lack of premeditation, lack of perseverance, and sensation seeking (Whiteside & Lyman). More recently, conceptualizations of impulsivity, particularly as related to addictive behaviours, have focused on two distinct dimensions based on separate neural processes (Dawe & Loxton, 2004; Gullo et al., 2014). While both conceptualizations share similarities, it has been demonstrated that the two-factor model is the more parsimonious approach for understanding addictive behaviours (see Gullo et al., 2014). In this model, the first dimension, reward drive (RD) refers to the tendency of an organism to initiate goal-directed approach behavior in response to signals of reward. Reflecting Gray and McNaughton's, (2000) motivational Behavioral Approach System (BAS), RD involves the mesolimbic dopaminergic pathways; a brain region associated with natural reinforcement as found in response to food, sex and drugs, and moreover, in the prediction of potential reward (Hernandez & Hoebel, 1988; Krüger, Hartmann, & Schedlowski, 2005). There has been a rapidly increasing body of evidence supporting the association between RD and a range of consumption behaviours (see Gullo et al., 2014 for a review). For example, heightened RD has been consistently associated with binge-eating, having a preference for foods high in fat and sugar, a preference for colourful and varied food, hazardous drinking, and an early age of drug experimentation (Davis et al., 2007; Dissabandara et al., 2014; Kane et al., 2004).

The second dimension, rash impulsivity (RI) refers to difficulties in inhibiting one's behavior following the activation of an approach response despite potential negative consequences. The second facet is proposed as involving dysfunction in the orbitofrontal cortex and the ventromedial prefrontal cortex; areas associated with impulse control and decision-making (Dawe & Loxton, 2004). RI has been associated with chronic alcohol and poly-drug use (Gullo, Ward, Dawe, Powell, & Jackson, 2011), pathological gambling (Walther et al., 2012), and compulsive shopping (Black, Shaw, McCormick, Bayless, & Allen, 2012).

These findings have prompted research into the unique contributions of each of these dimensions to health and lifestyle choices. When both constructs are considered as predictors in the same model, RI and RD both explain unique variance in alcohol use and drug use. However, RI appears to be the stronger predictor of the two (Gullo et al., 2011; MacLaren, Fugelsang, Harrigan, & Dixon, 2012). Highly reward driven individuals experience heightened positive affect in rewarding situations and have been found to report greater psychological well-being and hope, and to experience greater sociability and less loneliness (Clark, Loxton, & Tobin, 2015; Harnett, Loxton, & Jackson, 2013). This suggests that RD can be involved in both functional and less desirable reward outcomes. High RD individuals might therefore be likely to experience high anticipatory pleasure for all rewarding experiences, whether or not those experiences could be construed as supernormal. RI, on the other hand, is primarily associated with more dysfunctional behaviours such as substance use, gambling, excessive retail shopping, and binge-eating (Black et al., 2012; Dawe & Loxton, 2004; Kane et al., 2004; Walther et al., 2012). All of these dysfunctional behaviours would appear to fall into the supernormal category of stimuli. Thus, high RI individuals should anticipate more pleasure from supernormal stimuli, rather than reward stimuli in general.

1.4. The current study

Impulsive personality characteristics are consistently associated with unhealthy behaviours (Gullo et al., 2014); and more recently, research has focused on the unique effects of two separate dimensions of impulsivity on functional and clearly dysfunctional behaviours. The supernormal/natural distinction appears to be a useful organizing principle for understanding stimuli that particularly encourage excessive consumption. The aim of this study is to investigate the relationships between the two-factor model of impulsivity (RD and RI) on preferences for supernormal (versus natural) pleasurable stimuli. We tested the following predictions:

1) Reward drive is associated with general anticipatory pleasure, but not preference for supernormal over natural stimuli;
2) Rash impulsivity is associated with a differential preference for supernormal stimuli, but not general anticipatory pleasure.

2. Methods

2.1. Participants and procedure

Data for the current study was collected as part of a large research project, factor analysis results involving the SNPS items have been