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Applying a revised two-factor model of impulsivity to predict health behaviour and well-being

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ABSTRACT

Individual differences in reward drive and sensitivity, reward preference, and impulsivity lead some people to seek more frequent, and less healthy reward (e.g., energy-dense foods and illicit substances). Healthy lifestyle choices tend to be associated with higher well-being and overall life satisfaction, yet the links between reward traits, health-related behaviours and well-being remain unclear. The current study investigated the link between reward approach traits, behaviours, and quality of life outcomes in an online panel (n = 1619, ages 18–50). Reward drive (RD), based on the revised behavioural activation system (rBAS) was associated with higher overall well-being. This relationship was partially mediated by fruit and vegetable intake, exercise, and volunteering. Rash impulsivity (RI) was positively associated with drug, alcohol and tobacco use, poor diet, lack of sleep and gambling problems; and was also related to lower overall well-being. This relationship was partially mediated by lack of sleep. This suggests that individuals high in RD are likely to enjoy increased levels of overall well-being, partly due to their tendency to engage in healthy behaviours. Those high in RI are more likely to risk their health for hedonic risky pursuits; however, such risky pursuits appear to have little impact on well-being.

1. Introduction

Human behaviour is thought to be largely motivated by an evolved tendency to seek reward (Reynolds, 1975; Skinner, 1963). However, individual differences in reward drive or sensitivity (Corr, 2008), reward preference (Goodwin, Browne, & Rockloff, 2015), and impulsivity (Dawe & Loxton, 2004; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001) lead some people to consistently seek more frequent, and less healthy forms of reward than others. A healthy lifestyle is generally associated with higher well-being and overall life satisfaction (Siahpush, Spittal, & Singh, 2008). It is therefore important to understand how reward-seeking might affect health behaviour and well-being. The current study addresses this by investigating the effect of individual differences in reward seeking traits (i.e., reward drive and rash impulsivity) on various health-related behaviours and on overall well-being.

1.1. The (revised) two factor model of impulsivity

In 2004, Dawe and Loxton proposed a two-factor model of impulsivity based on two correlated yet distinct forms of approach behaviour. The first, labelled rash impulsivity (RI), refers to difficulty inhibiting one's behaviour following the activation of an approach response, despite potential negative consequences. RI is thought to reflect decreased activity in orbitofrontal brain regions associated with impulse control and decision-making (Dawe, Gullo, & Loxton, 2004), suggesting that a rash impulsive approach to reward is likely to be the result of poor executive functioning and lack of self-control. The second factor, reward drive (RD), reflects the tendency for one to initiate goal-directed approach behaviour in response to signals of reward. It is thought to be positively associated with activity in dopaminergic pathways in the brain (Dawe & Loxton, 2004; Gray, 1970; Gullo, Loxton, & Dawe, 2014), making an individual more likely to engage in reward approach and to experience greater positive affect during reinforcement. Several studies applying the two-factor model have shown that both RD and RI predict addictive, risky, and/or hedonic behaviours; including alcohol misuse (Loxton & Dawe, 2001), problem gambling (Loxton, Nguyen, Casey, & Dawe, 2008) and unhealthy eating (Goodwin, Browne, Rockloff, & Loxton, 2016; Loxton & Dawe, 2001). When compared to RI, RD tends to share relatively weaker associations with risky or illicit behaviours such as drug use, gambling, and smoking (Goodwin et al., 2016; Gullo, Ward, Dawe, Powell, & Jackson, 2011; Loxton, Wan, et al., 2008). However, stronger associations have been found between RD and behaviours such as eating sweet foods intake, purchasing retail goods, and social networking (Goodwin et al., 2016). These are activities that are not risky or illicit, but can be unhealthy when done in excess.

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These correlates of RD have been interpreted with respect to Gray's (1970) original conceptualization of the behavioural approach system (oBAS) involving individual differences in sensitivity to reward and impulsivity. However, this system has recently undergone re-conceptualization (rBAS) and is now thought to reflect reward sensitivity (or drive) as a trait distinct from rash impulsivity, suggesting that the two-factors (i.e., RD and RI) ought not be correlated (Corr, 2008; Jackson, 2009; Jackson, Loxton, Harnett, Ciarrochi, & Gullo, 2014). As such, a revised measure of RD has been developed (forming a subscale of a revised sensitivity to reward and punishment questionnaire known as the Jackson 5) to capture a measure of RD that is not contaminated by elements of rash impulsivity (Jackson, 2009). Demonstrating discriminant validity, the Jackson 5 measure shares a stronger association with controlled executive functioning when compared to the RD scale based on the oBAS (Jackson et al., 2014). Accordingly, in a two factor model of impulsivity based on the revised RD measure, RD reflects heightened sensitivity and subsequently heightened approach to reward whereas rash impulsivity is associated with instant responses that lack inhibition.

To date, the revised RD subscale has not been applied in studies based on the two-factor model of impulsivity. However, some findings suggest that RD based on the rBAS is associated with more positive outcomes (e.g., social well-being, hope, and life satisfaction) than RD according to the oBAS (Harnett, Loxton, & Jackson, 2013). Therefore, the revised RD measure, void of rash impulsive elements, should be more clearly associated with positive outcomes. Accordingly, in comparison to previous applications, a two-factor model of impulsivity measured using the revised RD scale ought to provide more unique relationships between RD and positive outcomes, and RI and negative outcomes.

1.2. Health behaviour and well-being

Associations among healthy behaviour and well-being is well established in the literature. For example, sleep (Pilcher, Ginter, & Sadowsky, 1997), exercise (Baker, Cahalin, Gerst, & Burr, 2005), eating well (Ares, De Saldamando, Giménez, & Deliza, 2014), and volunteer involvement[1] (Pichler, 2006), have all been associated with higher levels of overall well-being and/or life satisfaction. Furthermore, negative associations have been found between well-being and risky health behaviours such as smoking (Bergman & Scott, 2001), alcohol use (Murphy, McDevitt-Murphy, & Barnett, 2005), and gambling (McCormack & Griffiths, 2011). These findings might be explained by the fact that unhealthy or risky behaviours can lead to poor physical and mental health which is linked to decreased levels of overall well-being (Dolan, Peasgood, & White, 2008; Steptoe & Wardle, 2001). On the other hand, some risky behaviours involving intense reward such as risky sex, gambling and substance use, might conversely promote well-being via the pleasure and enjoyment they provide some individuals (Huta & Ryan, 2010).

1.3. The current study

Although several studies have linked RD and RI with health-related behaviours (Goodwin et al., 2016; Loxton & Dawe, 2001; Loxton, Nguyen, et al., 2008; Gullo et al., 2011), the relationship between these two traits and overall well-being is untested, as is the potential mediating role of health-related behaviours. In this study, we apply the two-factor model of impulsivity, using the revised RD scale (from the Jackson 5 scale; Jackson, 2009) to assess the differential relationships between RD, RI and health behaviours and well-being outcomes. By applying the revised RD scale in this model, that eliminates elements of rash impulsivity, we expect that RD and RI will be uncorrelated. Furthermore, considering the more functional outcomes of RD in general (both original and revised constructs; Goodwin et al., 2016; Harnett et al., 2013; Loxton, Mitchell, Dingle, & Sharman, 2016), we expect RD to predict healthy reward seeking behaviour and subsequently better overall well-being, while RI (consistent with previous research; Goodwin et al., 2016; Gullo et al., 2011; Loxton, Nguyen, et al., 2008; MacLaren, Fugelsang, Harrigan, & Dixon, 2012) will be associated with riskier, unhealthy behaviour, and subsequently poorer well-being.

We test the following three hypotheses:

1) RD, based on the revised measure will be uncorrelated with RI.
2) RD will be positively associated with healthy/functional behaviours (including sleep, fruit and vegetable intake, exercise and volunteering), which will mediate an increase in well-being.
3) RI will be positively associated with unhealthy/risky behaviours (including risky sex, drug use, tobacco, problem gambling, and alcohol), which will mediate a decrease in well-being.

2. Methods

2.1. Participants and procedure

Participants (n = 1619, 70% female) were members of an Australian online panel set up by an agency specializing in the recruitment of survey participants (Qualtrics). Emails were sent to panel members inviting them to participate in an anonymous online survey for which they could earn points that could be accumulated and exchanged with the company for cash. The survey took approximately 15 min to complete. Respondents were aged from 18 to 50 years old ($M = 35.68$, $SD = 9.44$). This age range was specified in the recruitment process, as a younger sample would be more likely to report risky behaviours (Goodwin et al., 2016). The majority of participants spoke English as their first language (90%).

2.2. Measures

2.2.1. Reward drive

Reward drive was measured using the rBAS subscale from the Jackson 5 scale (Jackson, 2009). Participants responded to 6 items (e.g., "I like to get a feel for how things work" and "I actively look for new experiences") on a 5-point Likert scale (0 = strongly disagree; 1 = disagree; 2 = neither agree nor disagree; 3 = agree, 4 = strongly agree). Cronbach's alpha in the present sample was 0.87.

2.2.2. Rash impulsivity

Rash impulsivity was measured using a short version of the Barratt Impulsivity Scale (BIS-11; Spinella, 2007) consisting of 15 statements (e.g., "I act on impulse" and "I am a careful thinker (reversed)"). Participants rated the extent to which they agreed with each statement on a 5-point Likert scale (0 = strongly disagree; 1 = disagree; 2 = neither agree nor disagree; 3 = agree, 4 = strongly agree). Cronbach's alpha in the present sample was 0.83.

2.2.3. Well-being

The Personal Wellbeing Index (PWI) from the Comprehensive Quality of Life Scale (ComQol; Cummins, 1997) was used to measure well-being. Participants responded to eight items regarding standard of living, health, achievements, relationships, safety, community belonging, future security, and "life as a whole" over the last 12 months on an 11-point scale (0 = no satisfaction and 10 = complete satisfaction). Items are averaged to produce an overall well-being score. The PWI is a reliable and valid measurement tool regularly applied to Australian samples (Cummins, Eckersley, Pallant, Van Vugt, & Misajon, 2003; Lau, Cummins, & Mcpherson, 2005). Cronbach's alpha for the current sample was $\alpha = 0.93$.

[1] Although not strictly a 'health-related' behaviour, we consider volunteering as 'healthy' herein as it generally involves social interactions, physical or cognitive activity and promotes a sense of self-satisfaction.