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Proactive and reactive inhibitory control in eating disorders
Savani Bartholdy*, Samantha Rennallsb, Claire Jacquesc, Hollie Danbyc, Iain C. Campbelt, Ulrike Schmidtit & Owen G. O'Dalyb

aSection of Eating Disorders, Department of Psychological Medicine, Institute of Psychiatry, Psychology & Neuroscience, King’s College London, UK
bDepartment of Neuroimaging, Institute of Psychiatry, Psychology & Neuroscience, King’s College London, UK
cDepartment of Neuroscience, Institute of Psychiatry, Psychology & Neuroscience, King’s College London, UK
*Corresponding author: Address: Section of Eating Disorders, Department of Psychological Medicine, Institute of Psychiatry, Psychology & Neuroscience, King’s College London, UK. Tel.: (+44) 0207 848 0183; fax: (+44) 0207 848 0182. savani.bartholdy@kcl.ac.uk

ABSTRACT
Altered inhibitory control has been implicated in the development and maintenance of eating disorders (ED), however it is unclear how different types of inhibitory control are affected across the EDs. We explored whether individuals with bulimia nervosa (BN), binge eating disorder (BED) and anorexia nervosa (AN) differed from healthy individuals (HC) on two types of motor inhibitory control: proactive inhibition (related to the preparation/initiation of a response) and reactive inhibition (withholding a response in reaction to a signal). Ninety-four women (28 AN, 27 BN, 11 BED, 28 HC) completed two neuropsychological tasks (a cued reaction time task and a stop signal task), and questionnaires assessing clinical variables, mood, anxiety, and inhibitory control. Self-reported inhibitory control was poorer in women with BN compared to the HC and AN groups, but greater in women with AN compared to all other groups. However, no group differences in reactive inhibition were observed. Proactive inhibition was augmented in women with AN compared to HC, and this was related to self-reported intolerance of uncertainty. The findings suggest that proactive inhibition may be a relevant target for behavioural interventions for AN, and call for further research into the relationship between intolerance of uncertainty and proactive inhibition.

1. Introduction
Altered inhibitory control, i.e., the ability to appropriately withhold a response (Bartholdy et al., 2016a; Wardak et al., 2012), has been implicated in the development and maintenance of eating disorders (EDs). For example, binge eating (a core symptom in bulimia nervosa [BN] and binge eating disorder [BED]) includes a perceived loss of control over eating. Studies report that individuals with BN or BED have poorer motor control (Galimberti et al., 2012; Wu et al., 2013a) and reward-based (Kekic et al., 2016a; Manasse et al., 2015) inhibitory control, i.e., the ability to inhibit an inappropriate motor response, and the ability to delay gratification, respectively. A meta-analysis revealed that individuals with bulimic-type EDs (BN, BED and anorexia nervosa (AN) binge-purge subtype) showed a general deficit (of small effect size) in inhibitory control compared to healthy controls (HC) using a range of neuropsychological tasks, with a greater deficit to disorder-relevant stimuli observed in individuals with BN (Wu et al., 2013b). In contrast, adult women with anorexia nervosa (AN), particularly individuals with AN restrictive subtype, have been reported to exhibit excessive reward-related inhibitory control compared to healthy individuals (Steinglass et al., 2012). However, these findings are not always consistent (for reviews, see Bartholdy et al., 2016c; McClelland et al., 2016).

EDs have been modelled along a spectrum of inhibitory control, with AN at the over-controlling end and BED at the opposite (impulsive) extremity (Brooks et al., 2012). However, it remains unclear whether different types of inhibitory control are similarly affected across the EDs, or whether any differences are disorder- or context-specific (Bartholdy et al., 2016c). For example, the evidence for such models with respect to reactive motor inhibitory control (i.e., withholding a response in reaction to a cue) is inconsistent (Bartholdy et al., 2016c). Moreover, there has been limited exploration of proactive motor inhibitory control, i.e., a form of inhibitory control related to the preparation or
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