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The intention-behaviour gap – it's all under control (executive control)

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Successful health behaviour change often requires the foregoing of short-term pleasures and convenience in favour of less pleasurable, more effortful behaviours. As initiating and maintaining a series of effortful behaviours over time inevitably requires considerable self-control, it is likely that natural (intra and inter-individual) variation in the strength and availability of cognitive or 'executive' control resources will be related to the likelihood that an individual's intentions are successfully translated into action.

Behavioural intentions do not reliably lead to changes in behaviour (Sheeran, 2002; Conner & Armitage, 1998; Godin & Kok, 1996), and the substantial 'intention-behaviour gap' remains a major focus of research in health psychology. Significant progress has been made towards understanding and reducing the gap, with the identification of key moderators of the intention-behaviour relationship. Individual differences in post-intentional processes such as action planning (where concrete behavioural responses are linked to situational cues in order to achieve the intended goal state) have been identified as important determinants of behaviour. The spontaneous use of action plans and the prompted use of implementation intentions or 'If-Then' plans have been found to predict behaviour over and above intentions and improve rates of intention-behaviour translation (Sniehotta et al, 2005; Ziegelmann, Luszczynska, Lippke & Schwarzer, 2007; Gollwitzer & Sheeran, 2006).

The success of this research suggests that it may be possible to explain additional variance in the intention-behaviour gap if other important post-intentional processes are identified. Successful goal pursuit requires many things in addition to planning, for example; suppression of goal-incongruent habits and thoughts, inhibition of distracting information, and maintenance of goal relevant thoughts and behaviours over time. As people who don't action plan are less likely to turn intentions to action, then it is possible that people who don't (or can't) efficiently control and utilise these additional processes will also be less likely to perform intended actions.

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The necessities of goal pursuit

Many of the processes involved in goal pursuit have been identified in cognitive and neuropsychological models of effortful action control. From the study of patients suffering damage to the frontal lobes of the brain and the task performance of normal adults under differing demands, it has been possible to map out many of the component processes involved in the control and instigation of effortful thoughts and behaviours. The identified 'executive control' processes include processes similar to action planning (planning and advance task set reconfiguration), but additionally describe further cognitive processes thought to be required during effortful modification of behaviour. These additional processes include selective attention, inhibition of prepotent responses, task-shifting, and flexibility of thought, and are used when complex or novel behaviours are required, when habitual or automatic behaviours are insufficient to achieve a goal or when a current response must be effortfully overridden (Norman & Shallice, 1986).

Norman & Shallice (1986) include executive control processes (referred to as the 'Supervisory Attentional System') as the highest level of their 'Attention to Action' model of action control. In the model, routine, familiar behaviours are thought to ▶

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be performed relatively automatically by action schemas (sets of thoughts and actions that have become linked together through repeated use or practice) and can be automatically elicited by environmental cues (e.g. getting into a car triggers the 'put on seatbelt' schema). When schemas are insufficient, that is when a complex or novel situation is encountered, or triggered schemas turn out to be inappropriate given the current context, the supervisory attentional system is activated. The SAS effortfully controls behaviour in a slow, volitional and flexible manner, selectively activating useful schemas and inhibiting inappropriate schemas, thus allowing overall goals to be achieved by producing novel, complex patterns of behaviour. As SAS / executive control processes are effortful they use considerable cognitive resource. When resources are not available (e.g. when an individual has naturally weak executive control, or when the available resources are being used elsewhere), behaviour would be expected to be largely driven by established habits and routines and attempts to effortfully change behaviour would be less likely to succeed.

Executive Control as a Moderator of the Intention-Behaviour Relationship

Recent research has demonstrated that individual differences in some executive control processes are indeed predictably related to the likelihood that intentions are turned into actions. Hall, Fong, Epp & Elias (2007) proposed that individuals with strong cognitive inhibition would perform more effortful dietary and exercise behaviours than others. They gave participants a laboratory task designed to measure their ability to inhibit prepotent responses in an abstract, general way - the 'Go-NoGo' task. During Go-NoGo tasks, participants learn to make rapid 'Go' responses to certain stimuli, and are instructed to withhold this response ('NoGo') when other stimuli are shown. The speed with which a Go response can be made under conditions where the prepotent response would be a NoGo provides a measure of inhibition. When used to predict behaviour in the same participants over a subsequent 7 day period, Hall et al found that scores on the Go-NoGo task explained a significant amount of the variance in diet and exercise behaviour over and above that explained by intentions. Importantly, they also demonstrated a moderating effect of executive control as the correspondence between intentions and behaviour was greatest for those with strong inhibition suggesting that it was the people with better executive control who were more likely to turn their intentions into actions. The proportion of variance explained by

the independent and interactive effects of intention and executive control in this study was 59% for physical activity and 61% for dietary behaviour, almost double the amount typically explained by intention alone (Sheeran, 2002). However, this study only examined one of the many executive processes likely to be involved in intention-behaviour translation and the findings were interpreted in terms of this specific process (inhibition). Other control processes likely to be involved in intention-behaviour translation include task-shifting and cognitive flexibility. For example, changing an unhealthy diet for a healthy one requires considerable flexibility of thought when weighing up alternative possible foods as well as the ability to shift task set from normal to new eating behaviours. Recent results from our lab (Allan, Johnston & Campbell, in preparation) suggest that individuals who score poorly on objective tests of planning, cognitive flexibility and task switching eat fewer portions of fruit and vegetables and more unhealthy snacks than intended. As multiple different control processes seem to be involved in intention-behaviour translation, it is likely that it is general executive control ability that is important rather than the presence or absence of one specific skill.

Future Directions

This research raises a number of interesting questions. Firstly if executive control is predictably related to the intention-behaviour gap can executive control ability be improved to facilitate intention-behaviour translation?

Secondly, does executive control moderate the likelihood that any one specific intention is translated into the appropriate behaviour or does it operate at a more general level (i.e. in general, across all behaviours, people with weak executive control may be less likely to succeed)?

Thirdly, can we develop methods to reduce the demands on, or circumvent the need for, executive control during behaviour change?

There is some research that hints at the answer to the first question. Baumeister, Gailliot, DeWall & Oaten (2006) report work suggesting that self-regulation improves with practice, producing a beneficial effect across a range of different behaviours requiring self-control. However the causal pathways are unclear and the specific processes being improved have yet to be identified.▶

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Falko Sniehotta and colleagues are currently investigating the second question and preliminary evidence suggests that the effect of executive control seems to operate at a general level improving the general correspondence between intentions and behaviours across a wide range of different behaviours.

It is third question which presents the most interesting possibility, as theoretically anyone with naturally weak executive control or temporarily depleted executive resources (e.g. through tiredness, multi-tasking, effort expended elsewhere in their daily lives) could benefit from an intervention that reduces the need for/demand on executive control if executive control is essential for behaviour change. We already know that implementation intentions seem to be able to offset and even prevent control resource depletion ('ego-depletion'; Webb & Sheeran, 2003), presumably because the linking of actions to environmental cues allows the action to be elicited automatically, circumventing the need for executive control. If the other cognitive control processes identified as intention-behaviour moderators by our recent work can be used in a similar way, this opens the door for exciting new avenues of research. As an example, in the field of dietary behaviour change, removing cues to problem foods from the environment would theoretically reduce the demands on cognitive inhibition (as there would be less to be inhibited). Providing a reference list of good alternatives to various problem foods or a set menu would reduce the need for cognitive flexibility and remove the need for in situ deliberation (as deliberation is known to be a drain on cognitive resources), and so on and so forth.

Conclusion

The study of executive control in the specific context of health behaviour change is a new and developing field. However, the conceptual overlap between behaviour change research conducted in health psychology and goal-directed behaviour research conducted in cognitive neuropsychology is great. It is my opinion that there is much to be gained from integrating knowledge from the two domains, both in terms of insights for future directions and explanations of current problems. ∎

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