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Self-regulation interventions - what do we know and where should we go?

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This special edition of *Health Psychology Review* provides a very impressive and welcome attempt to synthesise the evidence to date on the effectiveness of self-regulation strategies in understanding and predicting health behaviour change. In this brief commentary I reflect on three issues: (a) the importance of small treatment effects; (b) variability in how interventions are delivered; and (c) the importance of emotion in relation to self-regulation.

Is small bad?

This special issue clearly demonstrates that there are significant improvements that need to be made in systematic reviews in this field, e.g., reporting a protocol, using an established classification system, using GRADE, assessing risk of bias, publication bias, etc. (Hennessy, Johnson, Acabchuk, McCloskey & Stewart-James, 2019). When the current evidence is systematically appraised, those interventions that are successful often appear to produce quite small effect sizes (Hennessy et al. 2019). Health Psychologists often appear almost apologetic in the tone of reporting small effects. However, as I have argued before (O'Carroll, 2013), as a discipline, perhaps we should be more positive about the fact that we can bring about important, if modest, behaviour change as a result of our interventions. Further, from the reviews in the special issue, some self-regulatory behaviour change techniques appear to be effective across interventions, e.g. goal- setting, self-monitoring and personalised feedback (Hennessey et al. 2019).

A comparison with the reporting of treatment effects from medicine is worthy of consideration. For example, "Medicine A can bring about a 20% risk reduction for myocardial infarction (MI)". This impressive sort of claim is often presented as a *relative* risk reduction rather than an *absolute* risk reduction - the latter is always lower. For example, in the long-term, statins reduce cardiovascular events from 18% to 14% (primary and secondary prevention combined), an absolute risk reduction of 4% but a relative risk reduction of 21% (Leucht, Hierl, Kissling, Dold, & Davis 2012). If you are "selling" your treatment effect, 21% is obviously much more impressive than 4%! In medicine, the absolute risk reductions are often quite small, and the general public may well believe that the medications they have been prescribed are much more effective than they actually are. Trewby et al. (2002) studied the threshold of benefit for a hypothetical cholesterol-lowering drug and found that three-quarters of patients would not take a drug offering 5% or less absolute risk reduction over 5 years. Five percent is roughly the efficacy of best medical treatment. The general public's expectation of benefit from a preventive drug may thus be significantly higher than the actual benefit provided by current drug treatments. Turning to our own discipline, at a population level, how important are small treatment effects? A recent example from Steptoe (2019) is illuminating. He reports that psychologists may be disappointed if their interventions lead to a 2-3% change in the outcome. But a small percentage point change in thousands of people could be of vital benefit at the population level. In a country the size of the UK, every 2-percentage point fall in tobacco smoking prevalence results in more than 8,000 deaths averted per year (Steptoe, 2019 p.586). Few resources are available for psychological researchers that explain how they can quantify which effect sizes are practically meaningful, and which are not. Anvari and Lakens (2019) provide a helpful guide on this topic.

Another way of presenting treatment efficacy is by using the number needed to treat (NNT). This issue is well reviewed by Ogden (2016) in her consideration of cost-benefit analyses. The NNT indicates how many people need to take any given treatment to prevent one event (i.e. an MI). For example, an NNT of 1 indicates that all patients benefit, whereas an NNT of 2 indicates that only 50% of patients benefit. As in the discussion of relative and absolute risk reduction above, I suspect that many members of the general public would be very surprised at the effectiveness of common medical treatments if they were presented as NNTs. Let us look at a couple of examples taken from the NNT website (https://www.thennt.com/). This is a website established by a group of physicians who have developed a framework and rating system to evaluate therapies based on their *patient-important* benefits and harms. The authors use high quality, evidence-based studies (frequently, but not always Cochrane Reviews) to calculate the NNTs for a variety of common medical treatments.

The first of two examples (taken from https://www.thennt.com/) is an examination of the effectiveness of taking aspirin to prevent cardiovascular disease in patients with known heart disease or previous stroke. The NNT to prevent death is 1 in 333, i.e. 333 people are prescribed aspirin to prevent 1 death. We also need to consider the potential for all treatments (including psychological interventions) to cause harm. In the above case, 1 in 400 were harmed (a major bleeding event). A second example considered aspirin to prevent a first heart attack or stroke. In this case, 1 in 1667 had a cardiovascular problem prevented and 1 in 3333 were harmed (major bleeding event). Are most patients taking this treatment really aware of the true likelihood of benefit and harm? But what about the relative effectiveness of well-established psychological interventions? Psychotherapy is recognised as effective treatment for depression and anxiety. A meta-analysis of the effectiveness of psychotherapy treatment studies for depression in adults concluded that, in the highest quality studies, the standardised mean treatment effect was a modest $d = 0.22$ and the NNT was 8 (Cuijpers, van Straten,

Bohlmeijer, Hollon, & Andersson, 2009). If a person is offered a course of psychological treatment for depression, and they ask how likely it is to be effective, should we say that "there is a 1 in 8 chance you will benefit"? How is this likely to impact on the person's likelihood of engaging with an evidence-based psychological treatment that is widely recommended internationally (particularly if the depressed person has the common depressive negative triad of a negative outlook on themselves, their environment and their future)? Are optimism and positive expectation not important determinants of all treatment outcomes? It is very clear from research on the placebo effect that positive expectations are a crucial part of treatment efficacy (Rief & Petrie, 2016). How should we best communicate modest treatment effectiveness evidence in both medicine and psychology? How should we help people make truly informed decisions about such interventions? These are important and challenging issues. My impression is that Health Psychologists are much more likely to present their intervention efficacy findings cautiously, however, we need to be fully aware of the implications of such caution and the wider comparative presentation of treatment efficacy in psychology and medicine.

"It ain't what you do it's the way that you do it, and that's what gets results"

With due acknowledgement to Ella Fitzgerald and later, Fun Boy Three with Bananarama, the title of this song is important in relation to Health Psychology interventions.

When we review the effectiveness of interventions, it is vital that the reporting of the methods allows us to ascertain exactly what was done, by whom and how it was conducted. There is now a wealth of literature documenting that, in the past, this has rarely been reported in sufficient detail to allow for replication. By way of example, Hennessey et al. (2019) report that the content of "stress management" interventions is likely to be highly variable across studies which then creates significant problems when attempting to synthesise findings (mixing apples with oranges?). On the plus side, this situation is improving, and

advancements in taxonomies of behaviour change and tighter operational definitions of specific behaviour change techniques (BCTs) make it likely that going forward, replication of interventions should be made easier and allow us to better integrate and evaluate intervention effectiveness. However, *how* interventions are delivered, and variability in this form of delivery must also be critical determinants of intervention effectiveness.

Dombrowski, O'Carroll, & Williams (2016) propose that behaviour change interventions consist of three broad groups of interconnected components: (1) BCTs (i.e., the content of the intervention); (2) theory (i.e., the processes through which the intervention is believed to influence behaviour); and (3) the Form of Delivery (FoD) (i.e., the way in which the intervention is delivered). Dombrowski et al. (2016) define FoD as including all features through which behaviour change intervention content is conveyed including the provider, format, materials, setting, intensity, tailoring, and style. We need to study variability in FoD and how it affects outcomes in self-regulation interventions e.g. mode of delivery (face-to-face, telephone, email, text, app) and time dynamics – the when, frequency and duration of intervention delivery.

We can also learn from research evidence in Clinical Psychology where marked variation in therapy effectiveness has been explained by therapist variables, as well as the specific intervention content. For example, in face-to-face interventions in Clinical Psychology, the ability to establish rapport, engage, empathize, and demonstrate good interview skills are well recognised as powerful determinants of outcome. A recent review by Johns, Barkham, Kellett, & Saxon (2019) reported that 5% of the variance in patient outcomes is accounted for by the variability between therapists. Although a 5% effect may appear small relative to patient variability, some studies in the review reported some therapists being *consistently* more than twice as effective as others. Therapist characteristics thus make a crucial contribution to variability in outcomes. Similar variability in how health behaviour change

interventions are delivered and by whom, is also likely to be a powerful determinant of variability in outcomes.

Facts versus Feelings

Affect plays a key role in influencing self-regulatory behaviour (Williams, Rhodes and Connor 2019). In the following section, following Williams et al. (2019) affect is defined as including core affect (e.g. hedonic response [pleasure/displeasure] and arousal), emotions (e.g. anger, fear, sorrow, joy), and moods (e.g. happy, contented, depressed, irritable). It is well recognised, for example, that depression can have a major impact on outcomes in long-term conditions by reducing medication adherence (Grenard, Munjas, Adams, Suttorp, Maglione, McGlynn & Gellad (2011). Given that a very high proportion of people with chronic health problems suffer from co-morbid depression, depression is likely to also significantly reduce the effectiveness of self-regulation interventions. There does not appear to have been a sufficient focus on the role of emotion. In their meta-review of meta-analyses of self-regulation interventions and adherence, Wilson et al. (2019) concluded: "*it has been posited that emotion regulation (e.g., successfully reducing negative emotions in the context of stress) may be important for managing goal-directed behavior. However, the included meta-analyses did not provide sufficient information to assess adherence interventions designed to promote emotion regulation".* Leventhal's Common-Sense Model or CSM (Leventhal, Brissette, & Leventhal, 2003) is a very influential theory of self-regulation which has been widely used to inform intervention development. The CSM is explicitly a dual-process model, with cognitive representations (illness perceptions) running in parallel with emotional representations (anxiety/worry/depression) and both influencing each other. Interventions based on the CSM tend to focus on the former by eliciting and modifying illness perceptions (e.g., timeline, consequence, timeline, control) in an attempt to change

behaviour and improve outcomes, e.g. Petrie, Cameron, Ellis, Buick, & Weinman (2002). Such approaches focus mainly on eliciting and challenging cognitions and it is assumed that distress reduces as a consequence. We need to pay more attention to the role that emotions play in directly regulating our health behaviour, rather than seeing affect as a secondary outcome to be improved by changing illness perceptions. It is also important to highlight that some health behaviours and some health risk behaviours are used as emotion regulation strategies. For example, a person might use physical activity to feel happier, whereas another person might resort to eating chocolate to achieve the same outcome.

As Williams et al. (2019) point out, it is only recently that affective factors in their own right have become a major focus for health behaviour science and interventions. For many of us, our health decisions are often guided by emotion. For example, many people do not take part in cancer screening when they "know" they should. Many people also do not register as posthumous organ donors (despite "knowing" they should), for a variety of reasons, including a superstitious belief that registration may, in some way, hasten their own death. Such individuals are often perfectly aware that these beliefs do not make any sense – but the emotional discomfort (or attempts to avoid these unpleasant feelings) is a critical determinant of behaviour[1]. Moving forward, we need to focus more on the key role that emotions play in influencing our self-regulatory behaviour. We need to investigate if and how these emotional barriers can be better understood and overcome in order to improve health outcomes.

[1] I have significantly delayed presenting to accident and emergency services on two occasions. The first was a 24-hour delay presenting with severe chest pain which turned out to be a blocked bile duct. The second was a 3-week delay in presenting with a broken leg. In subsequent attempts to try and understand my clearly irrational behaviour, I came to the conclusion that emotion was the main reason for my delay i.e., fear of embarrassment. I did not want to attend the emergency services in case I was told that: (a) I had indigestion and (b) a sprained ankle.

Conclusion – Things can only get better…

My comments have focused on three main areas, effect size, form of delivery and the role of emotion. The special edition has highlighted a number of important limitations in how self-regulation research and evidence syntheses are conducted and reported. Hennessey et al. (2019) conclude that progress over the last 20 years has been modest. However, as I have argued above, small treatment effect sizes can lead to very important outcomes at the population level. Furthermore, I believe that there is room for optimism as our behaviours as researchers should be amenable to change. Take the example of replication. Psychology in general has recently admitted a "replication crisis" and is taking steps to improve the situation. The Many Labs 2 initiative (https://osf.io/8cd4r/) is conducting pre-registered replications of many classic and contemporary published findings with protocols that were peer reviewed in advance in order to examine variation in effect magnitudes across sample and settings. Such initiatives should improve the confidence we can have in replicated studies. Another area which is improving is the reporting of methodological details, particularly defining intervention content more precisely. Journals now often provide the option of on-line supplementary files, where full details of intervention protocols can be made available to readers. Similarly, these is also an increase in the availability of treatment manuals from intervention studies. Developments in the use of established classification systems, e.g., taxonomies of BCTs (e.g., Michie et al., 2013), have led to tighter definitions and detailing of specific BCTs that have been used in interventions. Taken together, these should help us achieve greater clarity of exactly *what* was delivered in an intervention and *how* it was delivered and by *whom*. This will enable us to better evaluate the relative importance of different forms of delivery. Furthermore, developments such as the new Theory & Technique Tool https://theoryandtechniquetool.humanbehaviourchange.org/, an online resource which provides information about links between BCTs and their mechanisms

of actions will hopefully help in the development and evaluation of theory-based self-regulation interventions.

This special edition also highlight the relatively low ratings of many reviews on the AMSTAR or AMSTAR 2 critical appraisal tool for systematic reviews. Greater awareness (e.g., as a direct result of this special edition of *Health Psychology Review)* should result in significant improvements in the conducting and reporting of future reviews in this area. The special issue has also called for a greater focus on the role of emotion-regulation in self-regulation interventions and I believe this will lead to a significant improvement in the effectiveness of our self-regulation interventions. I am also confident that in the future, we will learn more about not only *if* self-regulatory interventions work, but *how* they work. As Wilson et al. (2019) highlight, this area will benefit hugely from more tests of mediation to specify and test the putative causal pathways linking self-regulation interventions to behavioural outcomes. Such evidence will then enable us to identify the best variables to target in interventions to bring about health behaviour change. To conclude, the limitations highlighted in this special issue will hopefully stimulate an improvement in our science and our reporting methods so that in future, self-regulatory interventions will lead to more effective health behaviour change.

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