



King's Research Portal

DOI:

[10.1016/j.psychsport.2019.05.008](https://doi.org/10.1016/j.psychsport.2019.05.008)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Gardner, B., Rebar, A. L., & Lally, P. (2020). 'Habitually deciding' or 'habitually doing'? A response to Hagger (2019). *PSYCHOLOGY OF SPORT AND EXERCISE*, 47, [101539].

<https://doi.org/10.1016/j.psychsport.2019.05.008>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

‘Habitually deciding’ or ‘habitually doing’? A response to Hagger (2019)

Benjamin Gardner

Amanda L. Rebar

&

Phillippa Lally

Author Note

Benjamin Gardner, Department of Psychology, Institute of Psychiatry, Psychology and Neuroscience, King’s College London, De Crespigny Park, London, SE5 8AF, UK.

Amanda L Rebar, Physical Activity Research Group, Appleton Institute, School of Health, Medical, and Applied Sciences, Central Queensland University, Rockhampton, Australia.

Phillippa Lally, Research Department of Behavioural Science and Health, University College London, London, WC1E 6BT, UK.

Correspondence concerning this article should be addressed to Benjamin Gardner, Room 2.11, Addison House, Department of Psychology, Institute of Psychiatry, Psychology and Neuroscience, Guy’s Campus, King’s College London, London, SE1 1UL, UK. Contact: benjamin.gardner@kcl.ac.uk; Phone: +44 207 848 6926.

‘Habitually deciding’ or ‘habitually doing’? A response to Hagger (2019)

Hagger (2019) offers an insightful synthesis of recent theoretical and empirical developments in understanding of habit and its relevance to physical activity. This commentary extends coverage of one such advance, namely the distinction between two manifestations of habit in physical activity: habitually ‘deciding’ to engage in activity (i.e. habitual instigation), and habitually ‘doing’ the activity (habitual execution). We explore the rationale for this distinction and argue that most contemporary theory and evidence around habitual physical activity – and by extension, Hagger’s review – implicitly focuses on instigation and neglects execution. We offer hypotheses around the potential roles that habitual execution may play in physical activity. Broadening the scope of inquiry within the field to more fully encompass habitual performance would achieve a more comprehensive and informative account that incorporates concepts of skill acquisition and mastery.

Keywords: Habit; physical activity; exercise habit; performance; motivation

‘Habitually deciding’ or ‘habitually doing’? A response to Hagger (2019)

Writing in *Psychology of Sport and Exercise* in 2008, Verplanken and Melkevik lamented that “habit has been an undervalued concept in the behavioural sciences during the past few decades” (p15-26). Hagger’s (2019) review summarises the many theoretical and empirical advances over the intervening decade in the understanding of habit and its application to physical activity (PA; see too Rhodes & Rebar, 2018). For example, Hagger cites a definition of habit as a cognitive process, rather than a form of behaviour (Gardner, 2015). This resolves a logical tension that arises when habit is theorised as a determinant of PA (e.g. Kremers et al., 2006); as Maddux (1997) noted, habit cannot be both behaviour and the cause of behaviour. This definition permits a distinction between the ‘habit’ process and ‘habitual behaviour’, which denotes any action facilitated by the habit process (Gardner, 2015). It also gives rise to the possibility that habit may manifest in PA in various ways. Hagger (2019) notes the recently proposed distinction between habitually selecting an action for performance (habitual instigation), and habitually performing the action (habitual execution; (Phillips & Gardner, 2016)). Yet, much contemporary research into habit and PA – and, by extension, Hagger’s (2019) review – implicitly focuses on instigation, not execution. This commentary extends coverage of the instigation-execution distinction and explores the potential implications of habitual execution for understanding and changing PA.

The concepts of habitual instigation and execution assume a hierarchical structure to behaviour, whereby all actions can be deconstructed into a series of ‘smaller’ component actions (Cooper & Shallice, 2000; Vallacher & Wegner, 1987). ‘Going for a swim’, for example, may entail ‘travelling to the swimming pool’, ‘getting changed’, ‘swimming’, ‘showering’, and ‘travelling home’. These may be deconstructed yet further; as Hagger (2019) notes, the act of ‘swimming’ can be conceived of as a sequence of coordinated arm

and leg movements. Actions at lower levels of the hierarchy (e.g. ‘travelling to the swimming pool’, ‘getting changed’) serve to sustain behaviour until the higher-level act (‘going swimming’) is completed. Computational models of behaviour depict a process whereby the triggering of the representation of a higher-level action (‘swimming’) in turn spreads activation downwards within the hierarchy, initiating the first sub-action involved in performing that action (‘travelling to swimming pool’; Cooper & Shallice, 2000). Unless performance is blocked – for example, by strong opposing motivational forces, or external barriers – the series of lower-level acts directed at achieving the higher-level action will begin.

Gardner and colleagues propose that the habit process may facilitate PA either by triggering selection of a high-level action (i.e., habitual instigation), or propelling progression through the sequence of lower-level actions (i.e., habitual execution; Gardner, Phillips, & Judah, 2016). In crude terms, habitual instigation is akin to ‘habitually deciding’ to engage in an activity¹: the habit process, activated by exposure to an associated cue, bypasses conscious decision-making to select and generate a commitment to performing a given activity without prior forethought or awareness (Verplanken, Aarts, & Van Knippenberg, 1997). Unless obstructed, this will translate into enactment of the initial lower-level action entailed by the higher-level activity. For example, a person with a habit for going swimming at 6pm will be prompted by the 6pm time cue to select ‘go swimming’ from the array of available behavioural options, and so will initiate ‘travelling to the swimming pool’. Habitual execution is equivalent to ‘habitually doing’ an activity: successful completion of one action

¹ We hesitate to use the term ‘decide’, which implies deliberative input culminating in a conscious decision, because habitual instigation refers to the **non-conscious** generation of a commitment to perform an action, in the absence of deliberative decision-making. We prefer the term ‘commitment (to action)’ to describe the outcome that is arrived at either via conscious decision-making, or habitual instigation. Note, however, that research participants appear to intuitively grasp the distinction between habitual instigation and execution of physical activity where they are respectively framed as ‘habitual deciding’ and ‘habitual doing’ (Phillips & Gardner, 2016).

within the lower-level sequence (e.g. ‘travelling to the swimming pool’), or the attainment of its consequences (arrival at swimming pool), habitually cues ‘getting changed’, completion of which habitually prompts ‘swimming’, and so on (Gardner et al., 2016). Although ostensibly similar to Grove, Zillich and Medic’s (2014) concept of ‘patterned action’, which describes a sequence of acts consistently performed in the same way, conceiving of behaviour as habitually executed advances understanding by specifying habit as a mechanism that underpins patterned action. The definition of habitual execution does not however refer solely to sequences that are *fully* automated; as Hagger (2019) points out, it is unlikely that a bout of PA will be performed entirely outside of conscious awareness. Rather, any behaviour can be said to be habitually executed where habit plays *some* facilitating role (Gardner, 2015). This allows for performances that are partly driven by habit, and partly consciously regulated; for example, ‘arriving at the swimming pool’ may non-consciously prompt ‘getting changed’, but ‘getting changed’ and its sequelae may be performed mindfully. The term ‘habitual behaviour’ denotes any action that is facilitated by habit, whether habitually instigated but non-habitually executed (e.g., being triggered to go to the gym by a time cue, but subsequently performing gym-based exercises mindfully), non-habitually instigated but habitually executed (e.g. consciously deciding to go to the gym, but performing gym-based exercises non-consciously), or both habitually instigated and habitually executed. Nonetheless, instigation and execution describe the operation of the same process – i.e., habit – at different levels of the action hierarchy. Habitual instigation portrays the operation of habit at the interface *between* discrete behaviours; the 6pm time cue may, for example, prompt a transition from ‘working in the office’ to ‘going swimming’. Execution describes a role for habit *within* any given behaviour; habit may inform how or in what order the ‘going swimming’ sequence proceeds.

The conceptual separation of habitual instigation and execution poses theoretical and practical challenges. If all activities can be broken down to yet finer-grained levels of analysis, one must logically conclude that all PA is likely habitual in some respect, if only at relatively lower levels. That is, any activity that involves a learned and automated sequence of movements is by definition habitually executed. Researchers may therefore need to abandon the question of *to what extent* a given PA may be habitual, and instead ask *in what ways* it may be habitual (Gardner, Rebar & Lally, 2019); is the activity habitually instigated, habitually executed, or both habitually instigated and habitually executed?

Additionally, attempting to understand behaviour by deference to its constituent sub-actions risks an infinite regress, such that action at each level can be broken down to yet lower levels, ad infinitum. This gives rise to another problem: any given action habitually activated by a preceding action can reasonably be conceived of as having been habitually instigated or habitually executed, depending on the level of analysis. For example, if completion of 'leaving the house' habitually triggers 'walking to the bus stop', then 'walking to the bus stop' could be conceived of as a discrete act that is habitually instigated by 'leaving the house', or as a sub-component of a habitually executed higher-order act into which both actions are subsumed (e.g. 'commuting to work'). This dilemma may be avoided by identifying the most appropriate level (or levels) of analysis at which to understand and promote instigation of PA. This will depend on the research context and purpose, and to some extent can be guided by intuitive judgements of *less* appropriate levels of analysis; PA-promotion intervention developers, for example, are unlikely to be interested in the specific muscle movements involved in an activity. Specifying the optimal level(s) at which to represent PA is however a more difficult task. Habitual instigation is triggered by the activation of a mental representation of action (Gardner, 2015), and so resolving this issue may require understanding how people mentally represent specific physical activities. People

tend to think of actions at high levels of abstraction, according to their purpose or consequences (i.e. *why* the action is performed), rather than at lower levels, which describe finer-grained procedural details (i.e. *how* the action is performed; Vallacher & Wegner, 1987). Action representations serve to guide behaviour, and higher-level representations are more effective for monitoring progress towards a desired goal than are lower-level representations (Vallacher & Wegner, 1987). Portraying an action as ‘commuting to work’, for example, conveys more useful information for implementing and monitoring progress than does labelling it as ‘moving my legs’. The optimal level at which researchers and practitioners should conceive of any given PA may therefore be that which best matches lay representations of that action. For example, for somebody who mentally represents all of the movements required to transport herself from her home to her workplace as a unitary act (‘commuting to work’), habitual instigation will apply to the habitual selection of the act of ‘commuting to work’, and habitual execution will denote the facilitation of the lower-level activities entailed by that act. Another person may feasibly represent the same pattern of movements as multiple discrete acts (e.g., ‘leaving the house’, ‘walking to the bus stop’, ‘catching the bus’, and so on), each of which must be habitually or non-habitually instigated (Gardner & Tang, 2014). Action identification is however a dynamic process, and contextual factors can prompt adoption of lower-level representations (Vallacher & Wegner, 1987). Purposeful disruptions to usual performances, such as using the non-dominant hand to perform usual tasks, for example, can lead people to pay more conscious attention to procedural details of those tasks (Neal, Wood, Wu, & Kurlander, 2011). It may therefore be possible to promote more or less fine-grained representations of any one action.

The theoretical advances, practical implications and future research directions outlined by Hagger (2019) almost solely relate to instigation, not execution. Current interest in habit within the PA domain, and in social and health psychology more broadly

(Verplanken, 2018), can arguably be attributed to two hypothesised effects of habit on behaviour, which arise from non-conscious activation in associated contexts (Kremers et al, 2006; Triandis, 1977). First, habit strength will be positively associated with performance likelihood, with stronger habits being elicited more frequently. Second, habit impulses will dominate over motivational tendencies, such that people may act habitually even when they have little conscious motivation to do so. These effects are well-evidenced in the PA domain, mostly in correlational studies using the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003), a measure comprising statements about the extent to which activity is undertaken automatically and efficiently, with minimal awareness or intention (e.g. ‘engaging in active sports and/or vigorous PA during my leisure time is something I do automatically’ [strongly disagree – strongly agree]; Chatzisarantis & Hagger, 2007) (see too Gardner, de Bruijn, & Lally, 2011; Rebar et al., 2016). Crucially, recent evidence suggests that the two hypothesised effects of habit on action are attributable to habitual instigation. Phillips and Gardner (2016) found that an SRHI variant worded to capture instigation (‘deciding to exercise... [... is something I do automatically]’) predicted PA frequency but an execution-specific variant did not (‘once I am exercising, going through the steps of my routine...’; see too Gardner et al., 2016). In a later study of flossing and dietary consumption, factor analysis showed that an instigation SRHI variant (‘deciding to floss...’) loaded on the same underlying factor as did the original SRHI (‘flossing...’), whereas an execution variant (‘once I have decided to floss, the act of flossing...’) loaded on a separate factor (Gardner et al., 2016). These studies reveal that the habitual selection of action directly enhances performance frequency, but the automaticity with which it is performed does not (see too Verplanken & Melkevik, 2008).

The instigation-execution distinction qualifies Hagger’s (2019) recommendations for habit-based behaviour change. Hagger’s recommendations concur with those of other

commentators who have reasoned that, if habit overrides the impact of motivation on behaviour, habit formation may sustain and shield new behaviours against motivation loss, and interventions targeting undesirable behaviours should disrupt habitual enactment rather than promoting motivational change (Rothman, Sheeran, & Wood, 2009). A more precise reading of these recommendations is that interventions designed to increase engagement in PA should develop habit for instigating bouts of PA, rather than inflexible habitual execution patterns, as a mechanism for PA maintenance. Similarly, habit-disruption interventions should focus on the point at which a commitment is habitually made to engage in an unwanted action, rather than targeting the manner in which an action is performed.

Emphasising instigation risks undervaluing the role of habitual execution in PA promotion. Although Phillips and Gardner (2016) found that, when controlling for habitual instigation, habitual execution did not directly impact on PA performance frequency, their study focused on ongoing PA. This design is of limited utility for understanding habit development, which is better revealed by longitudinal studies of people pursuing new and unfamiliar actions (Gardner, 2015). It remains possible that habitual execution may play one or more indirect roles in PA uptake, as well as shaping PA performance outcomes. We hypothesise that habitual execution may impact on PA engagement via several mechanisms, including self-efficacy, affective judgements, and self-regulatory capacity.

PA frequency is closely linked to performance striving. For example, a person may intend to go running each morning (frequency) to improve their running time (performance; Beauchamp, Crawford, & Jackson, in press). As people master the movements involved in a new activity and develop habitual execution patterns, so they gain confidence in their capability to perform it (Bandura, 1997). Such task self-efficacy is a well-documented positive determinant of future PA engagement (Jackson, Beauchamp, & Dimmock, in press). Making efficient or otherwise effective practices habitual can ensure consistently high-

quality performance, which may also foster self-efficacy; elite athletes, for example, often execute pivotal actions in a rigid way (Jackson & Baker, 2001), and some report elaborate performance rituals that they deem instrumental to success (Williams, 2003). Thus, we predict that the development of habitual patterns of successfully executing a given activity will indirectly promote engagement in that activity via enhancements in task self-efficacy.

Enhanced feelings of efficacy also bolster intrinsic motivation (Ryan & Deci, 2000), and may have affective benefits, both of which foster stronger intentions and can sustain over time (Hagger & Chatzisarantis, 2008; Rhodes, Fiala, & Conner, 2009). Put simply, people come to enjoy engaging in actions that they can perform well. The development of habit for effective execution of a given PA behaviour may therefore lead to more autonomous motivation and more positive affective judgements about PA, prompting more frequent engagement. Conversely however, enacting a given activity in the same inflexible way on each occasion can invoke boredom and so disengagement. People are more likely to adhere to PA programmes that promote experiences of variety (Sylvester et al., 2016). This would suggest that a more strongly habitually executed performance is not uniformly beneficial for PA promotion. Rather, PA performance should ideally combine elements of habitual execution to afford efficiency, and conscious regulation to allow for variation in the content or order of activities entailed by a PA episode. There may perhaps be an inverted-U relationship between habitual execution and affective judgements, such that the acquisition of habitual patterns of executing a given PA fosters positive affective judgements to a point, beyond which rigid enactment invokes negative affect. Alternatively, the direction of the relationship between execution and affective judgements may be moderated by individual differences, with more rigid execution prompting negative affect among people with greater need for variety.

Developing habitually executed performance can be understood as a form of skill acquisition, characterised by a ‘chunking’ of discrete actions into higher-level action units (Gobet et al., 2001). This frees working memory capacity: a person attempting to ride a bicycle for the first time, for example, must devote attentional resources to the coordination of perceptually discrete actions (moving each leg, balancing), in a way that the person who effortlessly discharges the learned sequence of actions need not. Mindfully enacting PA can be cognitively draining, and ego-depletion has been found to diminish intentions to engage in PA (Rebar, Dimmock, Rhodes, & Jackson, 2018). We therefore hypothesise that habitual execution may promote PA by boosting self-regulatory capacity, which in turn enhances the likelihood of engaging in PA.

Hagger’s (2019) review prioritises an operationalisation of habitual PA as action that is non-consciously selected from an array of alternatives, and thus summarises recent progress in understanding habitual instigation and its implications for explaining and promoting PA. This overlooks the potential contribution of habitual execution to PA promotion. Specifically, we propose that habitual execution may foster engagement in PA by bolstering self-efficacy, positive affective judgements or autonomous motivation, and self-regulatory capacity. This is not intended as a comprehensive account of the potential effects of developing execution habit; Phillips (in press) proposes, for example, that developing a habitually executed PA sequence may promote the development of habitual instigation, which subsequently maintains frequent performance. Rather, our aim is to generate hypotheses to guide future research into the possible roles of habitual execution in PA uptake and maintenance. We recognise the tentative nature of our hypotheses and paucity of evidence around the relationship between habitual execution and PA uptake. Indeed, the only study to date to investigate the relationship between habitual execution and ongoing PA found that execution, while moderately correlated with PA frequency, did not predict

frequency when controlling for habitual instigation (Phillips & Gardner, 2016). Adequately testing our hypotheses will likely require studying the formation of habitual execution, and its dynamic relationship with PA frequency and hypothesised mechanisms, over a prolonged period. Research might usefully focus on the concurrent development of habitual instigation and execution patterns for new activities, to explore the dynamic relationships between these processes, and PA frequency and performance indicators, over time. Our intention in outlining these hypotheses is to encourage new theoretically-informed research to test our predictions. We believe that the concept of habitual execution offers an important addition to the extant literature around habit and PA as summarised by Hagger (2019). Broadening the scope of research into habit to encompass both instigation and execution will afford a more comprehensive account of the multiple manifestations of habit in PA, and may generate important new insights for understanding and promoting PA.

References

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Beauchamp, M. R., Crawford, K. L., & Jackson, B. (in press). Social cognitive theory and physical activity: Mechanisms of behavior change, critique, and legacy. *Psychology of Sport and Exercise*. <https://doi.org/10.1016/j.psychsport.2018.11.009>
- Chatzisarantis, N. L., & Hagger, M. S. (2007). Mindfulness and the intention- behavior relationship within the theory of planned behavior. *Personality and Social Psychology Bulletin*, 33, 663–676. <https://doi.org/10.1177/0146167206297401>
- Cooper, R., & Shallice, T. (2000). Contention scheduling and the control of routine activities. *Cognitive Neuropsychology*, 17, 297–338. <https://doi.org/10.1080/026432900380427>

- Gardner, B. (2015). A review and analysis of the use of ‘habit’ in understanding, predicting and influencing health-related behaviour. *Health Psychology Review*, *9*, 277–295.
<https://doi.org/10.1080/17437199.2013.876238>
- Gardner, B., de Bruijn, G.-J., & Lally, P. (2011). A systematic review and meta-analysis of applications of the Self-Report Habit Index to nutrition and physical activity behaviours. *Annals of Behavioral Medicine*, *42*, 174–187.
<https://doi.org/10.1007/s12160-011-9282-0>
- Gardner, B., Phillips, L., & Judah, G. (2016). Habitual instigation and habitual execution: Definition, measurement, and effects on behaviour frequency. *British Journal of Health Psychology*, *21*, 613–630. <https://doi.org/10.1111/bjhp.12189>
- Gardner, B., Rebar, A. L., & Lally, P. (2019). A matter of habit: Recognizing the multiple roles of habit in health behaviour. *British Journal of Health Psychology*, *24*, 241–249.
<https://doi.org/10.1111/bjhp.12369>
- Gardner, B., & Tang, V. (2014). Reflecting on non-reflective action: An exploratory think-aloud study of self-report habit measures. *British Journal of Health Psychology*, *19*, 258–273. <http://dx.doi.org/10.1111/bjhp.12060>
- Gobet, F., Lane, P. C. R., Croker, S., Cheng, P. C.-H., Jones, G., Oliver, I., & Pine, J. M. (2001). Chunking mechanisms in human learning. *Trends in Cognitive Sciences*, *5*, 236–243. [https://doi.org/10.1016/S1364-6613\(00\)01662-4](https://doi.org/10.1016/S1364-6613(00)01662-4)
- Grove, J. R., Zillich, I., & Medic, N. (2014). A process-oriented measure of habit strength for moderate-to-vigorous physical activity. *Health Psychology and Behavioral Medicine*, *2*, 379–389. <http://dx.doi.org/10.1080/21642850.2014.896743>
- Hagger, M. S., & Chatzisarantis, N. L. (2008). Self-determination Theory and the psychology of exercise. *International Review of Sport and Exercise Psychology*, *1*, 79–103.
<https://doi.org/10.1080/17509840701827437>

- Hagger, M. S. (2019). Habit and physical activity: Theoretical advances, practical implications, and agenda for future research. *Psychology of Sport and Exercise*.
<https://doi.org/10.1016/j.psychsport.2018.12.007>
- Jackson, B., Beauchamp, M. R., & Dimmock, J. A. (in press). Efficacy beliefs in physical activity settings: Contemporary debate and unanswered questions. In G. Tenenbaum & R. C. Eklund (Eds), *Handbook of Sport Psychology* (4th ed.). Hoboken, NJ: Wiley.
- Jackson, R. C., & Baker, J. S. (2001). Routines, rituals, and rugby: Case study of a world class goal kicker. *The Sport Psychologist*, *15*, 48–65.
<https://doi.org/10.1123/tsp.15.1.48>
- Kremers, S. P., de Bruijn, G.-J., Visscher, T. L., van Mechelen, W., de Vries, N. K., & Brug, J. (2006). Environmental influences on energy balance-related behaviors: A dual-process view. *International Journal of Behavioral Nutrition and Physical Activity*, *3*, 9. <https://doi.org/10.1186/1479-5868-3-9>
- Maddux, J. E. (1997). Habit, health and happiness. *Journal of Sport & Exercise Psychology*, *19*, 331–346. <https://doi.org/10.1123/jsep.19.4.331>
- Neal, D. T., Wood, W., Wu, M., & Kurlander, D. (2011). The pull of the past: When do habits persist despite conflict with motives? *Personality and Social Psychology Bulletin*, *37*, 1428–1437. <https://doi.org/10.1177/0146167211419863>
- Phillips, L. A. (in press). Challenging assumptions about habit: A response to Hagger (2019). *Psychology of Sport and Exercise*. <https://doi.org/10.1016/j.psychsport.2019.03.005>
- Phillips, L. A., & Gardner, B. (2016). Habitual exercise instigation (vs. execution) predicts healthy adults' exercise frequency. *Health Psychology*, *35*, 69–77.
<http://dx.doi.org/10.1037/hea0000249>
- Rebar, A. L., Dimmock, J. A., Jackson, B., Rhodes, R. E., Kates, A., Starling, J., & Vandelanotte, C. (2016). A systematic review of the effects of non-conscious

- regulatory processes in physical activity. *Health Psychology Review*, *10*, 395–407.
<https://doi.org/10.1080/17437199.2016.1183505>
- Rebar, A. L., Dimmock, J. A., Rhodes, R. E., & Jackson, B. (2018). A daily diary approach to investigate the effect of ego depletion on intentions and next day behavior. *Psychology of Sport and Exercise*, *39*, 38–44.
<https://doi.org/10.1016/j.psychsport.2018.07.010>
- Rhodes, R. E., & Rebar, A. (2018). Exercise habits. In B. Verplanken (Ed.), *The Psychology of Habit* (pp91-109). Berlin: Springer-Verlag.
- Rhodes, R. E., Fiala, B., & Conner, M. (2009). A review and meta-analysis of affective judgments and physical activity in adult populations. *Annals of Behavioral Medicine*, *38*, 180–204. <https://doi.org/10.1007/s12160-009-9147-y>
- Williams, R. (2003, Nov 20) *What does the Jonny Wilkinson stance mean?* Retrieved 14 March 2019 from
<https://www.theguardian.com/sport/2003/nov/20/rugbyworldcup2003.rugbyunion>
- Rothman, A. J., Sheeran, P., & Wood, W. (2009). Reflective and automatic processes in the initiation and maintenance of dietary change. *Annals of Behavioral Medicine*, *38*, S4–S17. doi <https://doi.org/10.1007/s12160-009-9118-3>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68.
<http://dx.doi.org/10.1037/0003-066X.55.1.68>
- Sylvester, B. D., Standage, M., McEwan, D., Wolf, S. A., Lubans, D. R., Eather, N., ...
Beauchamp, M. R. (2016). Variety support and exercise adherence behavior: experimental and mediating effects. *Journal of Behavioral Medicine*, *39*, 214–224.
<https://doi.org/10.1007/s10865-015-9688-4>
- Triandis, H. C. (1977). *Interpersonal behavior*. Monterey, CA: Brooks/Cole Pub. Co.

- Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review*, *94*, 3–15.
<http://dx.doi.org/10.1037/0033-295X.94.1.3>
- Verplanken, B. (Ed.). (2018). *The Psychology of Habit*. Berlin: Springer-Verlag.
- Verplanken, B., Aarts, H., & Van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology*, *27*, 539–560. [https://doi.org/10.1002/\(SICI\)1099-0992\(199709/10\)27:5<539::AID-EJSP831>3.0.CO;2-A](https://doi.org/10.1002/(SICI)1099-0992(199709/10)27:5<539::AID-EJSP831>3.0.CO;2-A)
- Verplanken, B., & Melkevik, O. (2008). Predicting habit: The case of physical exercise. *Psychology of Sport and Exercise*, *9*, 15–26.
<https://doi.org/10.1016/j.psychsport.2007.01.002>
- Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology*, *33*, 1313–1330.
<https://doi.org/10.1111/j.1559-1816.2003.tb01951.x>