

# Combining explicit and implicit measures when measuring health dilemmas

**Marleen Gillebaart**

*Utrecht University*

Dilemmas are a core aspect of health behavior. Many people hold intentions and goals with respect to various aspects of their health and the concurrent behavior, including diet, exercise, and sleep. However, people are also subjected to several dilemmas concerning these long-term goals in daily life. These dilemmas often include short-term temptations (e.g., sugary snacks, canceling a gym class, staying up late on a work night) that are not in line with long-term health goals (e.g., a healthy BMI, being in good shape, feeling fit at work), and that cannot both occur at the same time. Because of these dilemmas, people's health behaviors are sometimes suboptimal and not in line with their long-term goals. This phenomenon has been labeled the intention-behavior gap (Sheeran, 2002). The notion that people's health behavior does not always align with their intentions has implications for studying health behavior.

Research into the determinants of behavior has early on pegged a number of factors that influence our intentions to behave in certain ways. A prime example is the theory of planned behavior, proposing perceived control, social norms, and attitude as primary influences on behavior (Ajzen, 1991). However, much of this research has focused on intentions rather than behavior, and understandably so, since the determinants of actual behavior may be much more complex and difficult to oversee. For instance, there is a wide array of nonconscious processes like biases and heuristics, as well as environmental cues that trigger behavior apart from intentions (e.g.,

Gigerenzer & Gaissmaier, 2011; Kahneman, 2011; Tversky & Kahneman, 1974). These influences often remain obscured from introspection and other forms of explicit measurement (Nisbett & Wilson, 1977; Wilson & Schooler, 1991). As such, the emergence of implicit measures in psychology has great potential, and has already significantly benefitted the field of health behavior. In this paper, we will discuss how explicit (in this case, self-reports that rely on introspection) and implicit measurement (measurements that are designed to tap into otherwise inaccessible aspects of behavior or its underlying processes) of health behavior dilemmas has developed recently, and what implications as well as complications that may hold for the field.

A health dilemma, or response conflict, emerges when people are confronted with different behavioral tendencies that cannot be combined into one behavior. Oftentimes, these dilemmas include a short-term goal and a long-term goal. For example, for someone with a dieting goal, temptations are everywhere during the day, and dilemmas ensue when one is offered a biscuit with their tea, birthday cake from a colleague, or a good-looking dessert at a restaurant. For someone with an exercise goal, there are the ever-lurking temptations of Netflix and napping on the couch. To handle these dilemmas, people have to use their self-control: the capacity they have to inhibit impulses and initiate behavior into the direction of their long-term goal (Carver, 2005; Friese, Hofmann, & Wiers, 2011; Myrseth & Fishbach, 2009).

## Explicit measures

When one wants to study health dilemmas, explicit self-reports have proven to be a valuable mode of measurement. For example, in the field of ambivalence (i.e., attitudinal dilemmas) research, people have been asked to provide information on their subjective affective and cognitive experiences of ambivalence, and how uncertain they felt about the attitude object. Some types of measurement have tried to somewhat surpass the highly subjective nature of these types of self-report by asking people to separately rate positivity and negativity of an attitude object, subsequently calculating an ambivalence index that may be relatively more objective than the subjective, or 'felt' ambivalence self-report (Breckler, 1994; Kaplan, 1972). These measures have been translated to health behavior dilemmas, for example in research exploring the underlying processes of self-control. In a paper by Gillebaart, Schneider, and De Ridder (2016), a first attempt at investigating how self-control affects the health dilemma that people experience when being confronted with tasty, yet unhealthy snacks was made by simply asking people how conflicted, mixed, and indecisive they felt about the food items. People were also asked to provide a positivity rating about the food item, thereby ignoring the negative aspects that item may also hold, and vice versa a negativity rating that did not take any positive aspects into account. These ratings result in a polarity index that is thought to indicate how big the dilemma actually is (Kaplan, 1972; Priester & Petty, 1996). Interestingly, results demonstrated that people with a higher level of trait self-control showed lower ratings of conflictedness and a lower 'objective' index of conflict compared to people with a lower level of self-control. These results were in line with findings from a current study into threat and challenge appraisals that repeatedly demonstrated

that people with higher levels of trait self-control considered self-control dilemmas more challenging and less threatening than people with lower levels of self-control (Gillebaart, Bogaers, & De Ridder, 2018). Although this line of research provided some insight into why people with higher levels of self-control are better able to handle health dilemmas (i.e., they report feeling less conflicted and less threatened), information about the process that led to the conscious self-report of feelings of conflict and challenge appraisals was lacking. The self-reports from these studies are a reflection of the outcome of a process in which the dilemma is noticed, identified, and resolved one way or the other. This entire process however is not reported on when people are asked about their feelings of conflict.

## Integrating implicit measures

To get a better hold on the processes that take place outside of conscious awareness, implicit measures need to be incorporated into study designs. For example, in Gillebaart et al. (2016), an implicit measure was added to the design, by applying a 'mousetracking' paradigm. With mousetracking, people's hand movements are measured while they perform a choice or categorization task on a screen (Freeman & Ambady, 2010). These movements serve as a proxy for the processes that take place during the categorization or choice, and that are rarely tapped into by simply measuring the outcome or asking people about it. Mousetracking has been on the rise as a valuable tool for implicitly assessing all kinds of conflict, from attitudinal ambivalence (Buttlar & Whalther, 2018; Schneider & Schwarz, 2017) to self-control and self-regulation contexts (Lim, Penrod, Ha, Bruce, & Bruce, 2018; Lopez, Stillman, Healtherton, & Freeman, 2018), and to social and affective settings (Brambilla, Biella, & Freeman, 2018; Lazerus, Ingbreetsen, Stoller,

Freeman, Yamauchi & Xiao, 2017). In the case of Gillebaart et al. (2016), the mousetracking data showed a different pattern from the feelings of conflictedness explicitly reported by participants. Of course, the rich data from the mousetracking provided additional information about timing (i.e., response time, time of peak conflict), but also about the magnitude of the conflict. Interestingly, although people with a higher level of trait self-control reported feeling less conflicted on the explicit level, this pattern did not show up in the mousetracking data at all: no differences were found in conflict magnitude variables (i.e., 'area under the curve', 'maximum deviation') between people with higher and lower levels of self-control. The explicit and implicit measure thus diverged rather than converged. A similar divergent pattern of results was obtained when Gillebaart et al. (2018) conducted a study that measured the psychophysiological underpinnings of threat and challenge appraisals (i.e., cardiac output). Whereas self-reports showed clear differences in appraisals as a function of trait self-control, this pattern was absent from the implicit, psychophysiological measure.

## Potential and pitfalls of combining explicit and implicit measures

These recent studies represent of course a small selection of an array of studies that combine explicit and implicit measures in the field of health behavior research. However, they do highlight how adding implicit measures can enrich our understanding of how people deal with health dilemmas. Specifically, they provide insight beyond self-reports, into the processes that take place before or while people are making a choice or decision. In the mousetracking example, the authors were able to demonstrate that the dilemma

emerged similar in size for all participants, but that those with high self-control were able to resolve the dilemma faster, which may have translated into the differences observed in their self-reports (Gillebaart et al., 2016). Similarly, the fact that self-control did not predict any differences in psychophysiological preparation for conflict, while people with higher self-control did report to feel more challenged and less threatened, is informative with regards to the underpinnings of successful self-control. It may for instance mean that at the most basic level, dilemmas are experienced similarly for people with high and low self-control. However, in the process that take place from the emergence of the dilemma to resolution and explicitly reporting on it, differences ensue between people with high and low self-control. These differences could be due to the ability to identify a conflict earlier on (as in the Gillebaart et al., 2016) study, or in the (pro-active) coping mechanisms (Aspinwall & Taylor, 1997) or situational strategies (Duckworth, Gendler, & Gross, 2016) that allow for appraisals of challenge over threat, which may be subject to individual differences. Adding the implicit psychophysiological measure to this study allowed for a more focused perspective on the underlying process, and adds to the understanding of the whole dilemma and how it is solved, instead of focusing only on the outcome.

A limitation of combining explicit and implicit measures is that whereas convergence between these measures is interpreted rather unambiguously, divergence between these measures is meaningful, but can also be a sign that either measure's validity is compromised. There has been extensive debate on whether and how implicit measures predict behavior. For example, the Implicit Association Test (Greenwald et al., 1998), arguably the most used implicit measure for assessing attitudes, stereotypes, and self-esteem, has been heavily criticized. It has been suggested that the measure is able to tap into nonconscious processes that are not accessible for explicit self-

reports (Greenwald & Banaji, 1995), but there is also accumulating consensus on the idea that in fact, these nonconscious processes are accessible to people's introspection, but are suppressed in explicit self-reports due to factors like social desirability and cognitive elaboration (Fazio & Olsen, 2003; Hofmann, Gawronski, Le, & Schmitt, 2005). There is some meta-analytic evidence demonstrating that the IAT is able to predict behavior with a moderate effect size, and to a bigger extent as explicit self-reports, especially when it comes to topics sensitive to social desirability, suggesting to combine the two types of measures when seeking to predict behavior (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), as explicit and implicit attitudes seem to be different yet related constructs (Nosek & Smyth, 2007). However, other meta-analytic evidence has indicated that these associations between the IAT and behavior were significantly overestimated and identified a number of methodological issues with how these associations are interpreted (Oswald, Mitchell, Blanton, Jaccard, & Tetlock, 2013). Importantly, this debate has led to agreement on the need for more research before the IAT can actually be used to predict people's behavior (Greenwald, Banaji, & Nosek, 2015).

## Conclusion and future directions

The debate on the IAT illustrates the complexity of using implicit measures in psychological research. When it comes to measuring how people deal with health dilemmas, some similar issues will arise and will need to be addressed. Research on self-control measures has already identified these different measures may actually tap into different dimensions of the same construct, which affects con- or divergence between different measures (Duckworth & Kern, 2011). Furthermore, there are some indications that the time available for deliberation affects impulsive choices (e.g, when

solving a health dilemma; Veling et al., 2017), which shows that tracking the process is of utmost importance. As such, there is promise in measurements like mousetracking, eyetracking, and similar measures that assess an ongoing, online process instead of simply an outcome. When selecting an implicit measure, it is thus advisable to think about the process that you are trying to tap into, and select a paradigm that able to provide you with this insight. As behavior, as well as dilemmas and choices, do not exist in a vacuum, measuring a process may be more useful in addition to an explicit measure of the outcome compared to measuring the outcome on another level. Of course, caution is needed when designing or adopting implicit measures into your design. Integrating theory and study results with investigations into the validity and robustness of the measures that are used in the field is one of the cornerstones of psychological research (Mischel, 2009). Moreover, we should not be discouraged by the theoretical and methodological intricacies of including implicit measures but rather experience this as a challenge that comes with the job. After all, as psychologists we are already well aware of how complex and opaque human behavior can be.

## Statement of competing interests

The author states no competing interests.

## Acknowledgements

The author would like to thank Rob Holland for his comments on an earlier draft of this manuscript.



## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211.
- Aspinwall, L. G., & Taylor, S. E. (1997). A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin*, *121*, 417-436.
- Breckler, S. J. (1994). A comparison of numerical indexes for measuring attitude ambivalence. *Educational and Psychological Measurement*, *54*, 350-365.
- Brambilla, M., Biella, M., & Freeman, J. B. (2018). The influence of visual context on the evaluation of facial trustworthiness. *Journal of Experimental Social Psychology*, *78*, 34-42.
- Buttler, B., & Walther, E. (2018). Measuring the meat paradox: How ambivalence towards meat influences moral disengagement. *Appetite*, *128*, 152-158.
- Carver, C. S. (2005). Impulse and constraint: Perspectives from personality psychology, convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review*, *9*, 312-333.
- Duckworth, A. L., & Kern, M. L. (2011). A meta-analysis of the convergent validity of self-control measures. *Journal of Research in Personality*, *45*, 259-268.
- Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science*, *11*, 35-55.
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology*, *54*, 297-327.
- Freeman, J.B. & Ambady, N. (2010). MouseTracker: Software for studying real-time mental processing using a computer mouse-tracking method. *Behavior Research Methods*, *42*, 226-241.
- Friese, M., Hofmann, W., & Wiers, R. W. (2011). On taming horses and strengthening riders: Recent developments in research on interventions to improve self-control in health behaviors. *Self and Identity*, *10*, 336-351.
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, *62*, 451-482.
- Gillebaart, M., Bogaers, M., & De Ridder D.T.D. (2018). Self-control and appraisals of threat and challenge. *Unpublished manuscript*.
- Gillebaart, M., Schneider, I. K., & De Ridder, D. T. D. (2016). Effects of trait self-control on response conflict about healthy and unhealthy food. *Journal of Personality*, *84*, 789-798.
- Kahneman, D., & Egan, P. (2011). *Thinking, fast and slow (Vol. 1)*. New York: Farrar, Straus and Giroux.
- Greenwald, A. G., Banaji, M. R., & Nosek, B. A. (2015). Statistically small effects of the Implicit Association Test can have societally large effects. *Journal of Personality and Social Psychology*, *108*, 553-561.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464-1480.
- Kaplan, K. J. (1972). On the ambivalence-indifference problem in attitude theory and measurement: A suggested modification of the semantic differential technique. *Psychological Bulletin*, *77*, 361-372.
- Lazerus, T., Ingbretsen, Z. A., Stolier, R. M., Freeman, J. B., Cikara, M. (2016). Positivity bias in judging ingroup members' emotional expressions. *Emotion*, *16*, 1117-1125.
- Lim, S. L., Penrod, M. T., Ha, O. R., Bruce, J. M., & Bruce, A. S. (2018). Calorie labeling promotes dietary self-control by shifting the temporal dynamics of health- and taste-attribution integration in overweight individuals. *Psychological Science*, *29*, 447-462.
- Lopez, R. B., Stillman, P. E., Heatherton, T. F., & Freeman, J. B. (2018). Minding one's reach (to eat): The promise of computer mouse-tracking to study self-regulation of eating. *Frontiers in*

- nutrition*, 5, 43.
- Mischel, W. (2009). Becoming a cumulative science. *APS Observer*, 22.
- Myrseth, K. O. R., & Fishbach, A. (2009). Self-control: A function of knowing when and how to exercise restraint. *Current Directions in Psychological Science*, 18, 247–252.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231–259.
- Nosek, B. A., & Smyth, F. L. (2007). A multitrait-multimethod validation of the implicit association test. *Experimental Psychology*, 54, 14–29.
- Oswald, F. L., Mitchell, G., Blanton, H., Jaccard, J., & Tetlock, P. E. (2013). Predicting ethnic and racial discrimination: A meta-analysis of IAT criterion studies. *Journal of Personality and Social Psychology*, 105, 171–192.
- Priester, J. R., & Petty, R. E. (1996). The gradual threshold model of ambivalence: Relating the positive and negative bases of attitudes to subjective ambivalence. *Journal of Personality and Social Psychology*, 71, 431–449.
- Schneider, I. K., & Schwarz, N. (2017). Mixed feelings: the case of ambivalence. *Current Opinion in Behavioral Sciences*, 15, 39–45.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124–1131.
- Veling, H., Chen, Z., Tombrock, M. C., Verpaalen, I. A., Schmitz, L., Dijksterhuis, A., & Holland, R. W. (2017). Training impulsive choices for healthy and sustainable foods. *Journal of Experimental Psychology: Applied*, 23, 204–215.
- Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology*, 60, 181–192.

**Marleen Gillebaart**

Social, Health, and Organizational  
Psychology, Utrecht University

**M.Gillebaart@uu.nl**