

# Integrating behaviour change interventions and patient decision aids: How to accomplish synergistic effects?

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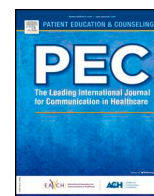
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# Integrating behaviour change interventions and patient decision aids: How to accomplish synergistic effects?



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## ABSTRACT

People make numerous health-related choices each day: For example, deciding to brush one's teeth or to eat well and healthy – or not to do these activities. To support complex decisions and subsequent behaviour change, both Behaviour Change Interventions (BCIs) and Patient Decision Aids (PtDAs) have been developed and evolved independently to support people in health-related decision making. In this paper, we critically review BCIs and PtDAs, examine their similarities and differences, and identify potential for integration of expertise to increase the benefits for people engaging with healthcare and health behaviours. The two approaches appear to mainly differ in terms of their (1) goals and foci, (2) theoretical basis, (3) development frameworks, (4) active ingredients and (5) effect evaluation. To facilitate the integration of scientific insights from these two fields, we recommend to (1) bring both fields together and promote interprofessional discussions, (2) train (health) professionals to recognise strengths of both approaches, (3) investigate the synergy of the two fields, (4) be prepared for and try to mitigate a culture shock when the fields start to interact. Knowledge generated by researching PtDAs could be used to facilitate decisional processes that enable patients to choose goals that are in line with their values and preferences, while insights from researching BCIs could be used to facilitate engagement with, and implementation of those goals. This integration could allow researchers and intervention providers to increase the benefits for people engaging with healthcare and health behaviours.

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## 1. Introduction

People face a multitude of daily health-related decisions, for example whether to brush one's teeth [1] or to eat healthily [2]. While these decisions *seem* rather easy to make, and are often carried out automatically, some decisions *seem* harder to make and require much more conscious deliberation and effort [3]. Examples of such decisions are: Deciding which kind of cancer treatment aftercare trajectory one wishes to follow [4] or which diabetes mellitus treatment one prefers [5]. Decisions of the first type are often habitual, wellbeing-related and/or daily choices, while

decisions of the second type are often unfamiliar, illness-related and/or one-off choices. Moreover, decisions of the first type are often associated with health and illness prevention, while the second with treatment and illness-management. And while the latter often *require* engagement with health professionals [6], the former do not. That being said, health professionals provide guidance and information to support people to make informed, values-based decision in both contexts; e.g., by providing nutrition care in general practices [7] in order to help people to adjust their nutrition-related decision making in daily life or illness-related dietary modifications to manage some health problems.

Two types of complex intervention(s) (fields) [8] have been developed and evolved independently to support people in health-related decision making: Behaviour Change Interventions (BCIs) and Patient Decision Aids (PtDAs). BCIs tend to target decisions associated with health and illness prevention, PtDAs with treatment and illness management. Both BCIs and PtDAs can successfully support patients in health-related decision making to improve both personal

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and public well-being; e.g., by helping people to improve their behaviour by being more physically active [9] (BCIs) or by reducing the number of undecided people [10] (PtDAs). However, both types of interventions have been operating largely independently from each other so far. Yet, it could be argued that the distinction between the two types of decisions that tend to be targeted by the two types of complex interventions is rather arbitrary. In fact, some decisions require that individuals both (1) make a one-off choice and (2) change their habitual and/or daily behaviour to act on that decision. An example to illustrate this idea is smoking cessation: Patients who decide to quit smoking subsequently have to choose from the plethora of smoking cessation options available (e.g., pharmacological support [11], behavioural counselling [12], self-help or cessation without cessation assistance), after which they also have to adopt a new behaviour (i.e., using the chosen option when quitting). Some other ‘overlapping’ contexts are immunisation and screening, which often also are one-off choices with a clear focus on health and illness prevention as opposed to treatment and illness-management. Integrating insights from both BCI and PtDA research could therefore be potentially beneficial to optimally support patients in this and similar health (behaviour) choices and changes.

This paper provides a critical review of BCIs and PtDAs in order to examine their similarities and differences and identify integration potential. We provide practical recommendations to enable researchers and healthcare professionals to offer hybrid BCI-PtDA interventions in order to potentially increase the impact on patients’ decisions and alignment with behaviour change and to increase the benefits for people engaging with healthcare and health behaviours.

1.1. Describing Behaviour Change Interventions (BCIs)

BCIs are defined as “coordinated sets of activities designed to change specified behaviour patterns” with the goal to improve public health by targeting individuals’ behaviour [13]. BCIs can be applied in different contexts, e.g., to change modifiable risk factors (e.g., [14]), but also, for example, to ensure that patients are more likely to adhere to the advice given by healthcare providers [15]. BCI development is often driven by health behaviour change theories, the most often applied being the Theory of Planned Behaviour [16,17]. As such, BCIs often focus on the determinants of behaviours, thereby indirectly influencing behavioural performance. Examples of such determinants on the individual level are knowledge, awareness, risk perception, automaticity, attitudes, outcomes expectations, social influences, skills, capability, self-efficacy and barriers [18,19]. In the field of BCIs, those determinants reflect individuals’ beliefs (e.g., “For me smoking is pleasurable”, a belief related to the concept of attitude) and are expected to lead to a change in behaviour by influencing individuals’ intention to change [20]. Designers of BCIs therefore need to identify the most important determinants that they need to target to change a particular behaviour(al intention) in a desired direction – which is the ultimate goal of BCIs. As such, the focus of BCIs is clearly on the outcome: Interventions are designed to stimulate people to engage in a predefined target behaviour and

their efficacy is most often assessed by adoption of the target behaviour (e.g., smoking cessation [21]), and changes in the aforementioned behavioural determinants.

1.2. Describing Patient Decision Aids (PtDAs)

PtDAs are defined as “evidence-based tools designed to help patients make specific and deliberated choices among healthcare options” [10] and focus on proactively enhancing the decision-making or reasoning process [22]. Their goal is to present accurate information of all options and their consequences, and encourage people to evaluate this information with their own values, and trade-off these evaluations to reach a decision that is right for them [10,23]. PtDAs can be used in a wide range of contexts ranging from screening decisions (e.g., [24]), to treatment decisions (e.g., [5]) to aftercare decisions (e.g., [4]). PtDAs are underpinned by theories explaining how we make decisions under risk and uncertainty, and the factors influencing our judgments and choices, such as the Conflict Model of Decision Making [25]. That being said, it is reported that theories are underused in PtDAs [26]. The content and development of PtDAs are informed by evidence-informed guidance from the International Patient Decision Aid Standards (IPDAS) Collaboration guidelines [23,27]. Some argue PtDAs are particularly useful for decisions with clinical equipoise, where one option does not clearly outperform all other options in terms of benefits and harms according to the clinical evidence [10,28]. PtDAs’ efficacy is therefore most often assessed by measures of informed decision making and decisional quality (such as decisional conflict [29]), understanding of the health problems and options, and engagement with health services [10].

2. Differences between BCIs and PtDAs

While BCIs and PtDAs can both have an impact on health(-care) decision making they differ regarding five domains: (1) Goals and foci, (2) theoretical basis, (3) active ingredients or components, (4) development frameworks and (5) effect evaluation approaches. A short overview of the main differences between BCIs and PtDAs is presented in Table 1.

2.1. Goals and foci

Regarding their respective goals, BCI developers’ focus is more likely to be behaviour change, while PtDA developers are more likely to focus on informed or shared decision making. Development frameworks used to develop BCIs often start by identifying a behaviour that needs to be adapted or implemented to improve health [19], e.g., a BCI designed to maintain a healthy workforce can focus on reducing working while being sick (i.e., presenteeism) [30]. PtDAs often start with identifying the decision problem, options and consequences in the context of healthcare delivery [10], e.g., a PtDA designed to support patients in breast cancer aftercare decision making is designed to enable patients to identify what is important

**Table 1**  
Overview of the main differences between Behaviour Change Interventions (BCIs) and Patient Decision Aids (PtDAs).

	BCIs	PtDAs
Intervention goal and focus	Behaviour change/behavioural outcomes	Deliberate value-based decision making, focus is on the (shared) decision-making process
Theoretical basis	Explain behaviour (change)	Explain decisional processes
Active ingredients/components	Elements encouraging behaviour change by changing behavioural determinants	Elements de-biasing information and boosting reasoning
Development frameworks	Encourage behaviour change, e.g., Intervention Mapping	Encourage informed decision making, e.g., International Patient Decision Aid Standards (IPDAS)
Effect evaluation approach	The extent to which they can change people’s behaviour or antecedent determinants	The extent to which they can support people in making informed, value-based health(-care) decisions (with health professionals)

to them about care options, and share their preference when planning care with professionals in order to support autonomous decision making [4]. To conclude, BCI developers *tend* to focus their efforts on behavioural outcomes (such as presenteeism [30] or smoking cessation [21]), while PtDA developers *tend* to focus their efforts on (decisional) processes, such as decision quality [31]. Most, if not all, other differences stem from this.

## 2.2. Theoretical basis

Theoretical underpinnings of BCIs tend to explain behaviour (change) and its antecedent factors and/or explain how motivation to perform a certain behaviour is formed, whereas theoretical frameworks underpinning PtDAs are usually designed to either explain decisional biases or factors boosting reasoning. The aforementioned Theory of Planned Behaviour for example posits that people's intentions are formed depending on their attitude, perceived behavioural control and subjective norms [16]. Another well-known theory, the Self-Determination Theory [32], describes different qualities of motivation that are formed through the fulfilment of different psychological needs, such as the need for autonomy [25,33]. The Conflict Model of Decision Making, on the other hand, describes decision making as a process in which decision makers have to choose one option from a set of alternatives (all with inherent (dis-)advantages) following a stress-inducing event [34].

## 2.3. Development frameworks

BCI and PtDA developers tend to use different development frameworks. For BCIs, frameworks such as Intervention Mapping [19] or the Behaviour Change Wheel [13] are often applied. Intervention Mapping [19] is an approach that can be used to design health promoting programs through an iterative step-based approach which starts by identifying what needs to be changed to realise an improved health status in populations. Interestingly, PtDAs are often developed by following the IPDAS systematic development process [27] which also advocates an iterative step-based approach to identify evidence to design the interventions. However, whereas frameworks such as Intervention Mapping [19] advocate the use of needs assessments to find out which determinants are associated with certain behaviours so that they can be specifically influenced in order to change behavioural patterns, the IPDAS development process emphasizes that individuals' decisional needs should be explored to facilitate choices for options that fit into their lives.

## 2.4. Active ingredients

Both BCIs and PtDAs include different types of active ingredients or components in order to achieve their goals: BCIs make use of methods associated with adopting a behaviour such as arguments and goal setting [18], PtDAs use methods to de-bias the information presented and boost reasoning such as removing value-terms [35] and rating advantages and disadvantages of all options [36]. One well known method to change attitudes are arguments for example [18] which present the message receiver with new information or information that challenges existing attitudes. Value clarification methods [36] on the other hand are often applied within PtDAs to support users in understanding what is important to them personally and cover a range of different applications, such as the rating of different attributes [37].

## 2.5. Effect evaluation

In line with their respective goals, BCIs are often evaluated by the extent to which they can change individuals' behaviour (e.g., to which extent smoking cessation interventions enable individuals to

cease smoking [12]) or antecedent determinants (e.g., by also monitoring the impact on determinants such as attitude [38]), while PtDAs are often evaluated by the extent to which they can support people in making informed, value-based health(-care) decisions (with health professionals) [10].

## 3. How can BCI and PtDA expertise be integrated?

We found that BCIs and PtDAs are inherently different and valuable in their own right, both underpinned by methods to develop research-informed, complex interventions [39]. We can see a way forward for developers of both types of interventions to recognise their strengths and differences, to enable different questions to be addressed about their efficacy in different contexts, and ensure best practice integrated effectively in healthcare settings to increase the benefits for people engaging with healthcare and health behaviours. In the following, we will provide practical examples on how this could be accomplished.

### 3.1. Integrating PtDA insights into BCIs

BCIs *tend* to focus on predefined outcomes without taking individual decisional outcomes into account, although of course this need not always be the case. However, given the fact that the inclusion of individuals' preferences can positively influence the effectiveness and efficiency of healthcare interventions [40] providing one predefined behavioural option for every patient could negatively influence the possible outcome of the intervention for some individuals. This is especially interesting, in light of Self-Determination Theory [32] which posits that we can increase the chances of behavioural maintenance if we increase individuals' perceived autonomy [41]. We propose that integrating insights from PtDA research could be used to increase individuals' perceived autonomy. An established technique for increasing the autonomy of individuals is the provision of choice [42,43], a function that PtDAs contain explicitly by providing balanced and neutrally worded information about the different options available (i.e., not clearly emphasizing one predefined option). *Example 1* shows one way of integrating PtDA insights into a BCI in order to offer a hybrid BCI-PtDA intervention.

#### *Example 1. Providing balanced and neutrally worded information in a Behavior Change Intervention (BCI)*

BCIs often contain explicitly or implicitly persuasive elements to convince recipients to adopt behaviours that are considered superior (i.e., health-promoting or -sustaining) to other behaviours. To increase patients' perceived autonomy, BCI developers could include balanced, neutrally worded information that does not contain elements that convince patients to adopt certain behaviours. To provide concrete examples, BCI developers could use the IPDAS background papers on providing information [44] and balanced presentation [35] to develop a smoking cessation intervention that includes information on all available smoking cessation options without naming a superior option (i.e., providing actual choices) and neutrally describing the different options' effectiveness and possible consequences.

### 3.2. Integrating BCI insights into PtDAs

The PtDA field, on the other hand, has developed in a direction where the focus is primarily on the process of decision making and engagement with healthcare, while patients and healthcare providers are interested in tangible outcomes as well, such as life expectancy and quality of life [45]. However, PtDAs often do not offer techniques to help people to actually implement their choices, even though it is known that a positive intention to change or to do

something does not always translate into actual behaviour [46]. Including behaviour change techniques – such as the making of plans [46] – to overcome this so-called ‘intention-behaviour gap’ could potentially lead to a higher percentage of patients actually executing the decision made. **Example 2** shows one way of integrating BCI insights into a PtDA.

**Example 2. Integrating implementation intentions into a Patient Decision Aid (PtDA)**

PtDAs often end after patients have made a decision – seemingly assuming that all patients will actually implement the option they decided to adopt. To improve the chances that patients convert their preferences into actual behaviour, developers could use implementation intentions [18] which have been proven effective for various health behaviours [47,48], in other words: The making of if-then plans. For example, a PtDA designed to support patients with diabetes mellitus in choosing an option to improve their HbA1c could (after elements that supported patients’ decision-making processes) end with prompts to make if-then plans that link situational cues to a preferred response (that was revealed by making use of the PtDA). Through the use of the PtDA, users could for instance decide they want to incorporate more physical activity into their daily life, as opposed to changing their medication regimen. The PtDA could then end with the making of concrete plans, such as “If I travel to work on a working day, I will use my bicycle.”

### 3.3. Practical recommendations

Both fields may benefit from collaboration and integration of knowledge and expertise. In fact, hybrid interventions could potentially help patients achieve goals that reflect what they find personally important. Knowledge generated by researching PtDAs could be used to facilitate decisional processes that enable patients to choose goals that are in line with their values and preferences, while insights from researching BCIs could be used to facilitate engagement with, and implementation of those goals. However, it may be that different intervention types are more effective at different points in healthcare (e.g., choosing between options, versus management). To achieve integration, the fields need to recognise their similarities and differences in order to develop more effective interventions. We propose four recommendations to achieve this goal:

**(1) Bring both fields together and promote interprofessional discussions**

Because the fields operate largely independently of each other, it is important to create awareness for the two fields, but also to create space for integrative discussions. For example, expert meetings could be held as part of ongoing projects where both fields may be able to contribute important expertise (e.g., [49]) or at scientific conferences that are of interest to both fields (e.g., the annual conference of the European Health Psychology Society [50]).

**(2) Train (health) professionals to recognise strengths of both approaches**

In order to increase joint activity and fully integrate insights, it could be helpful to train people, such as future health services researchers and practitioners, in the intersection between behaviour change and medical decision making. For example, doctoral projects supervised by professionals from both fields could be set up that fall within this area, resulting in a new generation of researchers benefitting from this combined expertise. Such projects should be both theoretical (e.g., focussed on how integration could actually take place) and practical (e.g., developing hybrid interventions for different health decisions) – or a combination of the two.

**(3) Investigate the synergy of the two fields**

At present, theories reflect the independence of both fields, with behaviour change theories not making explicit how patients make decisions and theories of decision making not making explicit how patients can be supported in adopting an option they prefer. New theories that integrate insights from both fields are therefore very important to clarify how the one process relates to the other. Integrated theories could for example be used to support understanding how informed and reasoned decision making could lead to actual behaviour change by making use of behaviour change techniques, as illustrated in **Example 2**, but also could be used to inform intervention design (guidelines).

**(4) Be prepared for and try to mitigate a culture shock when the fields start to interact**

As we have made clear that the two intervention types and their backgrounds are different, it would not be surprising if the integration can evoke a kind of ‘culture shock’ which could impact on direct collaborative efforts. Various strategies might be used to mitigate this culture shock. For example, by hosting ‘dual-field’ expert meetings. A recent project in which a smoking cessation DA was developed [49], proved this approach to be successful. Another interesting avenue to reduce friction could be to establish a common ontology that includes definitions, but also what contexts are required to ensure effectiveness.

We hope this article helps researchers and healthcare providers reflect on the insights gained through decades of valuable research into BCIs and PtDAs and develop interventions to increase the benefits for people engaging with healthcare and health behaviours across pathways of care, as health states change.

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### References

- [1] Claessen JP, Bates S, Sherlock K, Seeparsand F, Wright R. Designing interventions to improve tooth brushing. *Int Dent J* 2008;58(5):307–20. <https://doi.org/10.1111/j.1875-595X.2008.tb00208.x>
- [2] Sainsbury K, Mullan B, Sharpe L. A Randomized Controlled Trial of an Online Intervention to Improve Gluten-Free Diet Adherence in Celiac Disease. *Am J Gastroenterol* 2013;108(5):811–7. <https://doi.org/10.1038/ajg.2013.47>
- [3] Bekker H, Thornton JG, Airey CM, Connolly JB, Hewison J, Robinson MB, Lilleyman J, MacIntosh M, Maule AJ, Michie S, Pearman AD. Informed decision making: an annotated bibliography and systematic review. *Health Technol Assess* 1999;3(1):1–156.
- [4] Klaassen LA, Dirksen CD, Boersma LJ, Hoving C. A novel patient decision aid for aftercare in breast cancer patients: A promising tool to reduce costs by individualizing aftercare. *Breast* 2018;41:144–50. <https://doi.org/10.1016/j.breast.2018.06.015>
- [5] Mathers N, Ng CJ, Campbell MJ, Colwell B, Brown I, Bradley A. Clinical effectiveness of a patient decision aid to improve decision quality and glycaemic control in people with diabetes making treatment choices: a cluster randomised



- controlled trial (PANDAs) in general practice. *BMJ Open* 2012;2(6). <https://doi.org/10.1136/bmjopen-2012-001469>
- [6] Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: What does it mean? (or it takes at least two to tango). *Soc Sci Med* 1997;44(5):681–92. [https://doi.org/10.1016/S0277-9536\(96\)00221-3](https://doi.org/10.1016/S0277-9536(96)00221-3)
- [7] Crowley J, O'Connell S, Kavka A, Ball L, Nowson CA. Australian general practitioners' views regarding providing nutrition care: results of a national survey. *Public Health* 2016;140:7–13. <https://doi.org/10.1016/j.puhe.2016.08.013>
- [8] Shahsavari H, Matourypour P, Ghiasvandian S, Nejad MRG. Medical Research Council framework for development and evaluation of complex interventions: A comprehensive guidance. *J Educ Health Promot* 2020;9:88. [https://doi.org/10.4103/jehp.jehp\\_649\\_19](https://doi.org/10.4103/jehp.jehp_649_19)
- [9] Murray JM, Brennan SF, French DP, Patterson CC, Kee F, Hunter RF. Effectiveness of physical activity interventions in achieving behaviour change maintenance in young and middle aged adults: A systematic review and meta-analysis. *Soc Sci Med* 2017;192:125–33. <https://doi.org/10.1016/j.socscimed.2017.09.021>
- [10] Stacey D, Légaré F, Lewis K, Barry MJ, Bennett CL, Eden KB, Holmes-Rovner M, Llewellyn-Thomas H, Lyddiatt A, Thomson R, Trevena L. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev* 2017;4:CD001431. <https://doi.org/10.1002/14651858.CD001431.pub5>
- [11] Cahill K, Stevens S, Perera R, Lancaster T. Pharmacological interventions for smoking cessation: an overview and network meta-analysis. *Cochrane Database Syst Rev* 2013(5):CD009329. <https://doi.org/10.1002/14651858.CD009329.pub2>
- [12] Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. *Cochrane Database Syst Rev* 2017(3):CD001292. <https://doi.org/10.1002/14651858.CD001292.pub3>
- [13] Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implement Sci* 2011;6:42. <https://doi.org/10.1186/1748-5908-6-42>
- [14] Smit ES, de Vries H, Hoving C. Effectiveness of a Web-Based Multiple Tailored Smoking Cessation Program: A Randomized Controlled Trial Among Dutch Adult Smokers. *J Med Internet Res* 2012;14(3):e82. <https://doi.org/10.2196/jmir.1812>
- [15] Côté J, Godin G, Garcia PR, Gagnon M, Rouleau G. Program Development for Enhancing Adherence to Antiretroviral Therapy among Persons Living with HIV. *AIDS Patient Care STDs* 2008;22(12):965–75. <https://doi.org/10.1089/apc.2008.0124>
- [16] Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;50(2):179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- [17] Hardeman W, Johnston M, Johnston D, Bonetti D, Wareham N, Kinmonth AL. Application of the Theory of Planned Behaviour in Behaviour Change Interventions: A Systematic Review. *Psychol Health* 2002;17(2):123–58. <https://doi.org/10.1080/08870440290013644a>
- [18] Kok G, Gottlieb NH, Peters GJY, Mullen PD, Parcel GS, Ruiter RAC, Fernández ME, Markham C, Bartholomew LK. A taxonomy of behaviour change methods: an Intervention Mapping approach. *Health Psychol Rev* 2016;10(3):297–312. <https://doi.org/10.1080/17437199.2015.1077155>
- [19] Eldredge LKB, Markham CM, Ruiter RAC, Fernández ME, Kok G, Parcel GS. *Planning Health Promotion Programs: An Intervention Mapping Approach*. 4 ed. San Francisco: Jossey-Bass Inc.; 2016.
- [20] Peters GJY. *A practical guide to effective behavior change: How to identify what to change in the first place*. *Eur Health Psychol* 2014;16(5):142–55.
- [21] Cheung KL, de Ruijter D, Hilgismann M, Elfeddali I, Hoving C, Evers SMAA, de Vries H. Exploring consensus on how to measure smoking cessation. A Delphi study. *BMC Public Health* 2017;17:890. <https://doi.org/10.1186/s12889-017-4902-7>
- [22] Bekker HL. *Genetic Screening: Facilitating Informed Choices*. eLS; 2006.
- [23] International Patient Decision Aids Standards (IPDAS) Collaboration, International Patient Decision Aids Standards (IPDAS) Collaboration. <http://ipdas.ohri.ca/what.html>. Accessed 20 November 2020.
- [24] Bekker HL, Hewison J, Thornton JG. Applying decision analysis to facilitate informed decision making about prenatal diagnosis for Down syndrome: a randomised controlled trial. *Prenat Diagn* 2004;24(4):265–75. <https://doi.org/10.1002/pd.851>
- [25] Janis IL, Mann L. *Decision Making: A Psychological Analysis of Conflict, Choice, and Commitment*. Free Press; 1977.
- [26] Durand MA, Stiel M, Boivin J, Elwyn G. Where is the theory? Evaluating the theoretical frameworks described in decision support technologies. *Patient Educ Couns* 2008;71(1):125–35. <https://doi.org/10.1016/j.pec.2007.12.004>
- [27] Coulter A, Stilwell D, Kryworuchko J, Mullen PD, Ng CJ, van der Weijden T. A systematic development process for patient decision aids. *BMC Med Inform Decis Mak* 2013;13:S2. <https://doi.org/10.1186/1472-6947-13-S2-S2>
- [28] Cook C, Sheets C. Clinical equipoise and personal equipoise: two necessary ingredients for reducing bias in manual therapy trials. *J Man Manip Ther* 2011;19(1):55–7. <https://doi.org/10.1179/106698111X12899036752014>
- [29] O'Connor AM. Validation of a Decisional Conflict Scale. *Med Decis Mak* 1995;15(1):25–30. <https://doi.org/10.1177/0272989X9501500105>
- [30] Ammendolia C, Côté P, Cancelliere C, Cassidy JD, Hartvigsen J, Boyle E, Soklaridis S, Stern P, Amick III B. Healthy and productive workers: using intervention mapping to design a workplace health promotion and wellness program to improve presenteeism. *BMC Public Health* 2016;16:1190. <https://doi.org/10.1186/s12889-016-3843-x>
- [31] Sepucha KR, Borkhoff CM, Lally J, Levin CA, Matlock DD, Ng CJ, Ropka ME, Stacey D, Joseph-Williams N, Wills CE, Thomson R. Establishing the effectiveness of patient decision aids: key constructs and measurement instruments. *BMC Med Inform Decis Mak* 2013;13:S12. <https://doi.org/10.1186/1472-6947-13-s2-s12>
- [32] Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol* 2000;55(1):68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- [33] Bekker HL. Using decision-making theory to inform clinical practice. *Shar. Decis.-Mak. Health Care Achiev. Evid.-Based Patient Choice*, 2, 2009, 45–51.
- [34] Loneck BM, Kola LA. Using the Conflict-Theory Model of Decision Making to Predict Outcome in the Alcoholism Intervention. *Alcohol Treat Q* 1989;5(3–4):119–36. [https://doi.org/10.1300/J020V05N03\\_09](https://doi.org/10.1300/J020V05N03_09)
- [35] Abhyankar P, Volk RJ, Blumenthal-Barby J, Bravo P, Buchholz A, Ozanne E, Vidal DC, Col N, Stalmeier P. Balancing the presentation of information and options in patient decision aids: an updated review. *BMC Med Inform Decis Mak* 2013;13:S6. <https://doi.org/10.1186/1472-6947-13-s2-s6>
- [36] Fagerlin A, Pignone M, Abhyankar P, Col N, Feldman-Stewart D, Gavaruzzi T, Kryworuchko J, Levin CA, Pieterse AH, Reyna V, Stiggelbout A, Scherer LD, Wills C, Wittman HO. Clarifying values: an updated review. *BMC Med Inform Decis Mak* 2013;13:S8. <https://doi.org/10.1186/1472-6947-13-S2-S8>
- [37] Wittman HO, Scherer LD, Gavaruzzi T, Pieterse AH, Fuhrel-Forbis A, Chipenda D, Danksoko S, Exe N, Kahn VC, Feldman-Stewart D, Col NF, Turgeon AF, Fagerlin A. Design Features of Explicit Values Clarification Methods: A Systematic Review. *Med Decis Mak* 2016;36(4):453–71. <https://doi.org/10.1177/0272989X15626397>
- [38] K.K.B. Peetoom, R. Crutzen, R. Verhoeven, J.M.H.A. Winkens, B. Winkens, G.J. Dinant, J.W.L. Cals, Optimizing decision-making among childcare staff on fever and common infections: clusterrandomized controlled trial, 2018. <https://doi.org/10.1093/eurpub/cky246>
- [39] O'Cathain A, Croot L, Duncan E, Rousseau N, Sworn K, Turner KM, Yardley L, Hodinott P. Guidance on how to develop complex interventions to improve health and healthcare. *BMJ Open* 2019;9(8):029954. <https://doi.org/10.1136/bmjopen-2019-029954>
- [40] Brazier JE, Dixon S, Ratcliffe J. The Role of Patient Preferences in Cost-Effectiveness Analysis: A Conflict of Values? *Pharmacoeconomics* 2009;27:705–12. <https://doi.org/10.2165/11314840-000000000-00000>
- [41] Ryan RM, Patrick H, Deci EL, Williams GC. Facilitating health behaviour change and its maintenance: Interventions based on Self-Determination Theory. *Eur Health Psychol* 2008;10(1):2–5.
- [42] Su YL, Reeve J. A Meta-analysis of the Effectiveness of Intervention Programs Designed to Support Autonomy. *Educ Psychol Rev* 2011;23:159–88. <https://doi.org/10.1007/s10648-010-9142-7>
- [43] Teixeira PJ, Marques MM, Silva MN, Brunet J, Duda J, Haerens L, La Guardia J, Lindwall M, Lonsdale C, Markland D, Michie S, Moller AC, Ntoumanis N, Patrick H, Reeve J, Ryan RM, Sebire SJ, Standage M, Vansteenkiste M, Weinstein N, Weman-Josefsson K, Williams GC, Hagger MS. A classification of motivation and behavior change techniques used in self-determination theory-based interventions in health contexts. *Motiv Sci* 2020;6(4):438–55. <https://doi.org/10.1037/mot0000172>
- [44] Feldman-Stewart D, O'Brien MA, Clayman ML, Davison BJ, Jimbo M, Labrecque M, Martin RW, Shepherd H. Providing information about options in patient decision aids. *BMC Med Inform Decis Mak* 2013;13:S4. <https://doi.org/10.1186/1472-6947-13-s2-s4>
- [45] Goossens AJM, Cheung KL, Sijstermans E, Conde R, Gonzalez JGR, Hilgismann M. A discrete choice experiment to assess patients' preferences for HIV treatment in the rural population in Colombia. *J Med Econ* 2020;23(8):803–11. <https://doi.org/10.1080/13696998.2020.1735398>
- [46] Sniehotta FF, Scholz U, Schwarzer R. Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychol Health* 2005;20(2):143–60. <https://doi.org/10.1080/08870440512331317670>
- [47] Adriaanse MA, Vinkers CDW, De Ridder DTD, Hox JJ, De Wit JBF. Do implementation intentions help to eat a healthy diet? A systematic review and meta-analysis of the empirical evidence. *Appetite* 2011;56(1):183–93. <https://doi.org/10.1016/j.appet.2010.10.012>
- [48] Bélanger-Gravel A, Godin G, Amireault S. A meta-analytic review of the effect of implementation intentions on physical activity. *Health Psychol Rev* 2013;7(1):23–54. <https://doi.org/10.1080/17437199.2011.560095>
- [49] Gültzow T, Smit ES, Hudales R, Knapen V, Rademakers J, Dirksen CD, Hoving C. An Autonomy-Supportive Online Decision Aid to Assist Smokers in Choosing Evidence-Based Cessation Assistance: Development Process and Protocol of a Randomized Controlled Trial. *JMIR Res Protoc* 2020;9(12):e21772. <https://doi.org/10.2196/21772>
- [50] EHPS.net | Home of the European Health Psychology Society. <https://ehps.net/> Accessed 9 November 2020.