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## Systematic Literature Review

# Understanding Patients' Preferences: A Systematic Review of Psychological Instruments Used in Patients' Preference and Decision Studies

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## ABSTRACT

**Background:** Research has been mainly focused on how to elicit patient preferences, with less attention on why patients form certain preferences. **Objectives:** To assess which psychological instruments are currently used and which psychological constructs are known to have an impact on patients' preferences and health-related decisions including the formation of preferences and preference heterogeneity. **Methods:** A systematic database search was undertaken to identify relevant studies. From the selected studies, the following information was extracted: study objectives, study population, design, psychological dimensions investigated, and instruments used to measure psychological variables. **Results:** Thirty-three studies were identified that described the association between a psychological construct, measured using a validated instrument, and patients' preferences or health-related decisions. We identified 33 psychological instruments and 18 constructs, and categorized the instruments into 5 groups, namely, motivational factors, cognitive factors, individual differences, emotion and mood, and health beliefs. **Conclusions:** This review provides an overview of the psychological factors and related

instruments in the context of patients' preferences and decisions in healthcare settings. Our results indicate that measures of health literacy, numeracy, and locus of control have an impact on health-related preferences and decisions. Within the category of constructs that could explain preference and decision heterogeneity, health locus of control is a strong predictor of decisions in several healthcare contexts and is useful to consider when designing a patient preference study. Future research should continue to explore the association of psychological constructs with preference formation and heterogeneity to build on these initial recommendations.

**Keywords:** decision making, instruments, measurements, patient preference, psychological variables, stated preferences

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## Introduction

Patient preferences (PPs) are defined by the US Food and Drug Administration as the “relative desirability or acceptability to

patients of specified alternatives or choices among outcomes or other attributes that differ among alternative health interventions.”<sup>1</sup> In medical settings, patients are often asked to decide from various treatments or services. In these cases,

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patients are asked to engage in informed deliberation of the risks, benefits, and other aspects of alternate interventions and decide between them. Researchers have developed various methods for eliciting preferences.<sup>1,2</sup> Although studies using these methods can provide an indication of what patients prefer, they often provide little information about why patients form certain preferences.

Although little is known about the influence of psychological variables on the construction of individuals' preferences in health-related fields,<sup>3,4</sup> there has been more investigation of their role in the field of consumer behaviors.<sup>5</sup> The relationship between personality and economic preferences is notoriously spurious and no clear picture emerges from literature.<sup>5-7</sup> Evidence on the link between social preferences and personality is somewhat stronger. Significant associations have been found between trust, as well as positive and negative reciprocity and personality traits.<sup>7</sup>

Evidence on the link between locus of control and economic preferences is equally mixed.<sup>8</sup> Basic emotions that are directly related to the decision or may be anticipated from its outcome seem to play an important role in economic decision making.<sup>9,10</sup> Less clear is whether incidental emotions, which occur at the moment of the decision but are irrelevant to the payoffs, affect economic preferences. Incidental emotions have been shown to influence stock market performance,<sup>11,12</sup> but no effect has been found on preferences for public goods.<sup>13</sup>

Beliefs, attitudes, and personal values seem to offer important insights into drivers of consumer preferences. Values resulted to be correlated with preferences for product category, and individual differences in values significantly predicted product preference in the supermarket.<sup>14</sup>

Evaluating patients' psychological profile may therefore reveal critical determinants of the decisional processing of patients and may detect crucial factors to explain and predict PPs and health-related decisions.

No systematic review has been performed to provide a framework of psychological constructs that have been assessed in PP and decision studies. The aims of this review were therefore to provide an overview and categorization of the psychological variables and instruments used in PP and decision studies conducted in healthcare settings; to assess which psychological constructs have been shown to affect PPs and decisions; to identify areas where further research is needed; and to provide the first important steps toward setting up a framework that can guide researchers with directions on which psychological tools they can use in their future PP studies.

## Methods

### Search Strategy and Selection of Articles

An exploratory search on psychological constructs and instruments used in PP studies was performed in PubMed to create a terminological framework and identify suitable search terms for a subsequent comprehensive search. The following search string was used: ((patient preference\$ OR decision making) AND (psychological factor\$ OR psychological determinant\$ OR psychological variable\$)).

Following this exploration, an extended bibliographic search was conducted in MEDLINE, PubMed, PsycINFO, EMBASE, and Google Scholar (see [Supplemental Materials](https://doi.org/10.1016/j.jval.2018.12.007) found at <https://doi.org/10.1016/j.jval.2018.12.007> for the used search strings). We progressed with a further citation search through Scopus and Web of Science. The articles identified were screened according to the following inclusion criteria:

1. studies that incorporated a psychological instrument in relation to PPs or health-related decisions;

2. studies that presented instruments' psychometric information or used previously validated instruments;
3. quantitative method studies;
4. studies that focused on human beings;
5. studies published from January 1, 1980, to December 30, 2016;
6. studies in English; and
7. full-text articles.

The manual review was performed in 2 phases. Abstracts and titles were screened to identify those relevant to the research question. When too little information was available to determine eligibility, full articles were screened. Relevant articles were then selected by cross-examining the articles. Disagreements in article selection were resolved through discussion between the researchers.

### Data Collection and Extraction Process

A data extraction form was developed on the basis of the Centre for Reviews and Dissemination templates.<sup>15</sup> Three reviewers independently extracted the data. Disagreements in data extraction were resolved through discussion with a fourth reviewer. The quality of the studies was evaluated independently by 2 researchers with the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies.<sup>16</sup> This tool provides a standardized method to assess study quality, leading to an overall methodological rating of *strong*, *moderate*, or *weak* on the basis of selection bias, study design, confounders, blinding, data collection methods, withdrawals and dropouts, intervention integrity, and analysis. The tool has been proven to be both valid and reliable and has demonstrated the ability to adapt the most current methods of systematic literature reviews to questions related to public health.<sup>16-18</sup> Moreover, the broad adaptability of the tool to different study designs made it the most suitable for our quality assessment. Discordances in quality rating were resolved through discussion between the researchers. These evaluations were used to create, for each construct, an overall rating of the quality of the empirical evidence emerging from this review ([Table 1](#)).

### Categorization of Constructs and Instruments

A categorization of constructs and instruments detected in the review was developed on the basis of the classification proposed by Appelt et al<sup>3</sup> in their *Decision Making Individual Differences Inventory*, a resource that categorizes and describes the most common individual difference measures used in decision-making research.

The framework of Appelt et al<sup>3</sup> was revised to suit the needs of this review. First, we introduced a category for health beliefs because we contend that beliefs are a key factor to answering questions about preference formation, as was already shown in different fields.<sup>19</sup> Second, risk attitudes were taken into consideration in so far that they influence risk assessment, which is the evaluation of the chance of an undesired outcome. Because risk assessment is a cognitive activity, risk attitudes are considered as factors influencing the cognitive activities underlying the decision-making process and preference formation and thus listed under cognitive factors. Third, we believe that locus of control, which Appelt et al considered as a personality factor, does not indisputably belong to just 1 category. We accepted Appelt's suggestion to treat it as related to personality, but found it necessary to assign it to its own category, listed parallel to the "personality trait" category under the more comprehensive "individual differences" category.

Constructs and instruments identified in this review were organized into 5 categories: motivational factors, cognitive

**Table 1 – List of psychological constructs and instruments identified during the systematic literature review.**

Category/ subcategory	Construct	Description of construct	Overall quality of studies*	Number of studies	Instruments
Motivational factors	Self-efficacy	Self-efficacy is an individual's belief in his or her capacity to master the cognitive, motivational, and behavioral resources required to perform in a given situation. <sup>22</sup>	Moderate to strong	4	Self-Efficacy Scale Decision-Making Participation Self-Efficacy Scale Decision Self-Efficacy Scale General Perceived Self-Efficacy Scale
	Resilience	Resilience is defined as the process of adapting well in the face of trauma, adversity, threats, tragedy, and sources of stress. <sup>109</sup>	Strong	1	Connor-Davidson Resilience Scale
	Coping style	Coping style is defined as the habitual pattern of the way individuals react to stress either across different situations or over time. <sup>32</sup>	Strong	1	The COPE Inventory
Cognitive factors Cognitive abilities	Patient activation	Patient activation refers to the degree to which an individual possesses knowledge, motivation, skills, and confidence to make effective health-related decisions. <sup>36</sup>	Moderate	3	Patient Activation Measure Questionnaire
	Health literacy	Health literacy is the patient's ability to read, understand, and use healthcare information appropriately. <sup>44</sup>	Moderate	7	Rapid Estimate of Adult Literacy in Medicine Short test of Functional Health Literacy in Adults eHealth Literacy Scale Chew's Set of Brief Screening Questions
	Numeracy	Numeracy refers to the ability to apply and manipulate numerical concepts. <sup>56,110</sup>	Strong	2	Subjective Numeracy Scale
	Decision-making styles	Decision-making style is the "habitual pattern individuals use in decision making," or characteristic mode of perceiving and responding to decision-making tasks. <sup>40,41</sup>	Strong	1	General Decision-Making Inventory
Risk attitudes	Risk propensity	Risk propensity is described as a function of the person's perception of risk and the person's willingness to take on this risk. <sup>105</sup>	Moderate to weak	2	Domain-specific risk task Balloon Analog Risk Task
Individual differences Personality and dispositions	Personality	Personality is "the dynamic organisation within the individual of those psychophysical systems that determine his characteristic behaviour and thought." <sup>62</sup>	Moderate to strong	6	NEO Five-Factor Inventory Big Five Inventory Millon Clinical Multiaxial Inventory Tridimensional Personality Questionnaire Temperament and Character Inventory
	Dispositional optimism	Dispositional optimism is defined as generalized expectancy for positive future events. <sup>111</sup>	Moderate to strong	2	Life Orientation Test-Revised
	Health orientation	Health orientation is an individual-differences concept defined as an individual's motivation to engage	Strong	1	Health Orientation Scale

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Table 1 – continued

Category/ subcategory	Construct	Description of construct	Overall quality of studies*	Number of studies	Instruments
	Assertiveness	in healthy attitudes, beliefs, and behaviors. <sup>112</sup> Assertiveness is a proactive response in difficult situations to contrast with passive or aggressive reactions. <sup>77,78</sup>	Moderate	1	The Assertive-Behavior Competence Inventory
	Conservatism	Conservatism is defined as the disposition to preserve tradition and established institutions; to resist and oppose change. <sup>79,80</sup>	Moderate	1	The Right-Wing Authoritarianism Scale
Health locus of control	Health locus of control	Health locus of control is defined as a generalized expectation about whether one's health is controlled by one's own behavior or forces external to oneself. <sup>82</sup> An individual with an internal locus of control believes that outcomes are a direct result of his or her own behavior. An individual with an external locus of control believes that outcomes are a result of either chance or powerful other people, such as physicians.	Strong	8	Health Locus of Control Scale Form B of the Multidimensional Health Locus of Control Scale Form C of the Multidimensional Health Locus of Control Scale Health Internal Control subscale of the Health Orientation Scale
Emotion and mood factors	Mood states	In contrast to emotion, mood is defined as a transient, low-intensity, nonspecific, and subtle affective state that often has no definite cause. <sup>89</sup>	Strong	1	Profile of mood states
	Anxiety	A distinction between state and trait anxiety has become commonplace. <sup>92</sup> State anxiety is defined as an unpleasant emotional arousal in face of threatening demands or dangers. A cognitive appraisal of threat is a prerequisite for the experience of this emotion. <sup>93</sup> Trait anxiety, on the other hand, reflects the existence of stable individual differences in the tendency to respond with state anxiety in the anticipation of threatening situations.	Strong	3	Hospital Anxiety and Depression Scale The Spielberger State-Trait Anxiety Inventory
	Depression	Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings, and sense of well-being. <sup>91</sup>	Strong	4	Hospital Anxiety and Depression Scale The Center for Epidemiological Studies-Depression Scale
Health beliefs	Treatment- related beliefs	Treatment-related beliefs are defined as the specific patient's perception of the need to take medication and concerns about it as well as the general beliefs about pharmacotherapy. <sup>101</sup>	Moderate	1	The Beliefs about Medicines Questionnaire

\* Each study received a score on the basis of its quality ranging from 1 to 3 (1 = weak; 2 = moderate; 3 = strong), then summed to the score of the other studies investigating the same construct; the mathematical average of the resulting value was categorized as follows: from 1 to 1.4, weak; from 1.41 to 1.8, weak to moderate; from 1.81 to 2.2, moderate; from 2.21 to 2.6, moderate to strong; from 2.61 to 3, strong.

factors, individual differences, emotion and mood factors, and health beliefs. The category of cognitive factors was organized into 2 subcategories, *cognitive ability and health literacy/numeracy* and *risk attitude*. Individual differences were organized into *personality and dispositional factors* and *health locus of control, autonomy, and control preference*. The categorization of constructs and instruments detected in the review was performed independently by 3 researchers. Discordances in categorization were resolved through discussion with a fourth reviewer until consensus was reached.

**Results**

**Study Selection**

The results of the systematic search are shown in Figure 1 in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.<sup>20</sup> Of the 2460 articles detected, 33 unique studies were identified that met the inclusion/exclusion

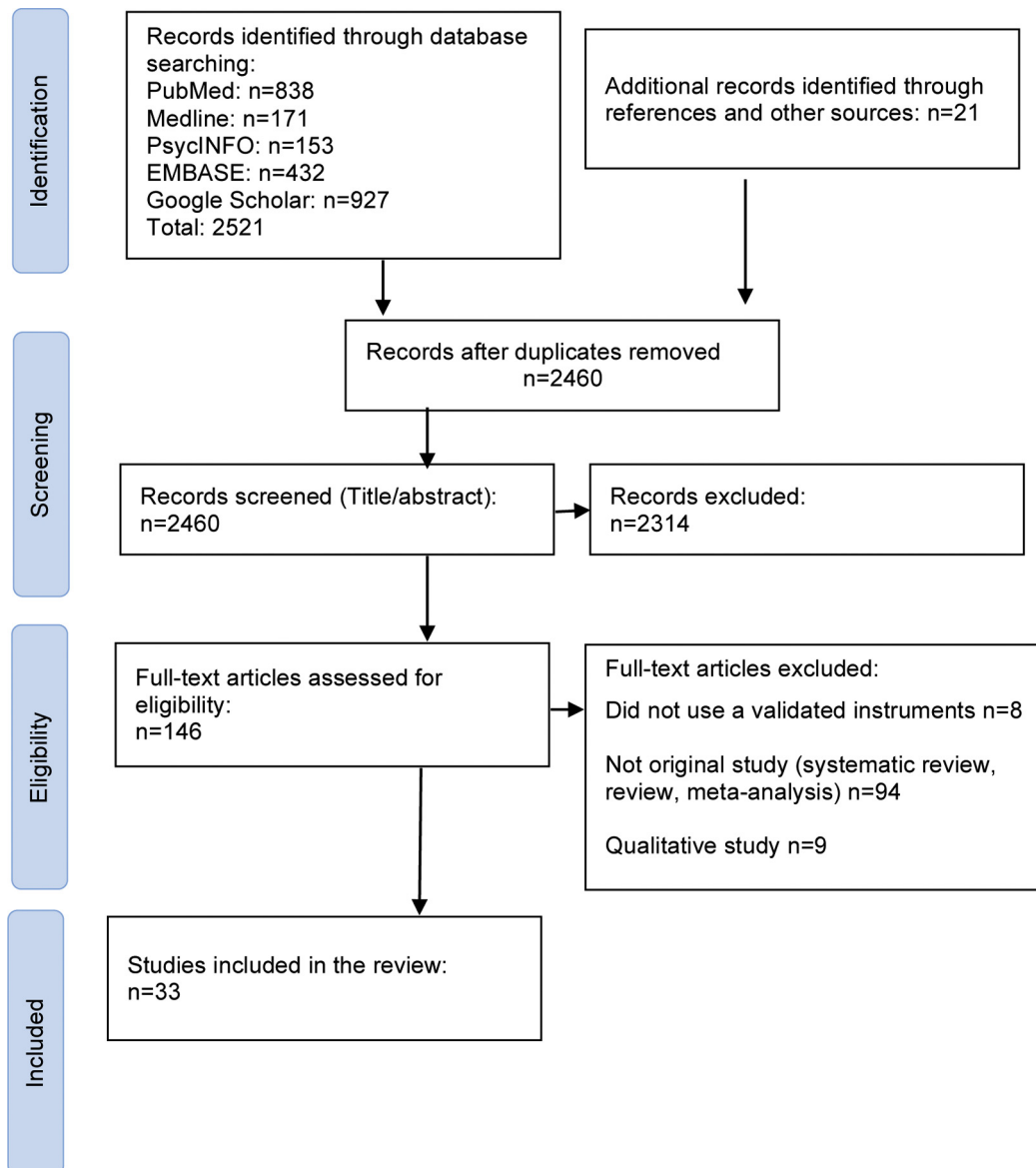
criteria<sup>107,108</sup> (see Appendix Table 1 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2018.12.007>). These publications included 33 instruments that measured 18 psychological constructs within a PP study or health-related decision-making study (Table 1).

**Characteristics of the Included Studies**

The samples included in the studies reported on adult participants. Twenty-seven studies included patients, and 8 studies included participants from the general population.

Twenty-five studies used a cross-sectional design, 3 were prospective cohorts, 2 were interventional, and 3 were experimental. Using the EPHPP Quality Assessment Tool for Quantitative Studies,<sup>16</sup> 17 studies were rated as strong, 12 as moderate, and 4 as weak. The overall evaluations for constructs derived from these quality assessments are presented in Table 1.

The 18 constructs and the 33 instruments identified were organized into 5 categories: 3 constructs and 6 instruments were



**Fig. 1 – PRISMA flowchart of search, identification, and screening of studies for inclusion in the review. PRISMA indicates Preferred Reporting Items for Systematic Reviews and Meta-Analyses.**

included in motivational factors; 5 constructs and 9 measures in cognitive factors; 6 constructs and 13 measures in individual differences; 3 constructs and 4 instruments in emotion and mood factors; and 1 construct and 1 measure in health beliefs. The psychological constructs and measures identified are presented and defined in Table 1 and Appendix Table 2 (see Supplemental Materials found at <https://doi.org/10.1016/j.jval.2018.12.007>)<sup>112-125</sup>, respectively.

### Motivational factors

Motivation is an individual's drive to engage in a specific behavior.<sup>3</sup> It pushes individuals to fulfill their goals and influences their decisions.<sup>21</sup> Three motivational constructs were detected: self-efficacy, coping style, and resilience.

*Self-efficacy* refers to people's beliefs about their ability to effect outcomes and exert influence on their life events.<sup>22</sup> Four validated questionnaires measuring self-efficacy were identified: the Self-Efficacy Scale,<sup>23</sup> the General Self-Efficacy Scale,<sup>24,25</sup> the Decision Self-Efficacy Scale,<sup>26</sup> and the Decision-Making Participation Self-Efficacy Scale.<sup>27</sup> The latter 2 questionnaires are specific to the decision-making domain, because they examine PP for involvement in the decision-making process.<sup>27-29</sup> Braman and Gomez<sup>30</sup> found that in the general population, self-efficacy measured with the Self-Efficacy Scale did not correlate with preferences for information and involvement for decision making after demographic variables were controlled. In psychiatric outpatients it has been found that the higher the patients' self-efficacy measured with the General Self-Efficacy Scale, the greater their preference and their perception of participation in decision making in psychiatric consultations.<sup>29</sup> Miller et al<sup>31</sup> noticed that higher self-efficacy measured with the Decision Self-Efficacy Scale<sup>26</sup> reduces decisional conflict and increases active decision participation, which could result in higher participation rates in clinical trials. Using the Decision-Making Participation Self-Efficacy Scale, Chawla and Arora<sup>28</sup> found that compared with the other groups, cancer survivors preferring physician control over decision had similar self-efficacy for engaging in the decision-making process and lower self-efficacy for taking responsibility over decisions.<sup>28</sup> *Coping strategies* are defined as the habitual patterns of the way individuals react to stress either across different situations or over time,<sup>32</sup> whereas *resilience* is the ability to thrive in the face of adversity.<sup>30</sup> Two instruments measuring these constructs were detected: the Coping Orientation to Problems Experienced (COPE) inventory<sup>33</sup> and the Connor-Davidson Resilience Scale.<sup>34</sup> Colley et al<sup>35</sup> found that patients with cancer preferring active involvement in medical decision making more frequently used coping strategies such as positive reframing, planning, and humor, compared with patients who preferred a more passive role. Moreover,<sup>35</sup> patients preferring a collaborative approach were more likely to consider themselves to be resilient.

### Cognitive factors

*Cognitive abilities, health literacy, and numeracy.* Four factors and 7 instruments concerning cognitive abilities, health literacy, and numeracy were identified.

*Patient activation* refers to the degree to which an individual possesses knowledge, motivation, skills, and confidence to make effective health-related decisions.<sup>36</sup> Higher activation measured with the Patient Activation Measures Questionnaire<sup>36</sup> is associated with preferences for involvement in medical decision making,<sup>37,38</sup> and is associated with better reported healthcare experiences and with preference for sex-concordant care in women veterans.<sup>39</sup>

*Decision-making style* is the characteristic mode of perceiving and responding to decision-making tasks.<sup>40,41</sup> The General Decision-Making Inventory<sup>42</sup> categorizes individuals' decision-

making styles. It consists of 5 subscales describing a rational, avoidant, dependent, intuitive, or spontaneous decision style. Fischer et al<sup>43</sup> applied this instrument to patients who had undergone elective joint surgery to evaluate their decision style with respect to the provider choice. They found that the prevailing decision style displayed by respondents was the dependent decision style and likewise the intuitive style, followed by the rational style. In contrast, respondents hardly approached provider choice in an avoidant manner.

*Health literacy* refers to a patient's ability to read, understand, and use healthcare information appropriately.<sup>44</sup> Four health literacy questionnaires emerged from our review: the Short Test of Functional Health Literacy in Adults,<sup>45</sup> the Rapid Estimate of Adult Literacy in Medicine<sup>46</sup> and its revised version,<sup>47</sup> the Chew's Set of Brief Screening Questions,<sup>48</sup> and the eHealth Literacy Scale.<sup>49</sup> Patients with lower health literacy are more likely to rely on their physicians for health information as opposed to individuals with an adequate level of health literacy who additionally use the Internet and other sources of information.<sup>50</sup> When able to choose, parents with lower health literacy are more likely than parents with higher health literacy to vaccinate their newborn against the rotavirus.<sup>51</sup> Higher health literacy predicts preference for maximizing comfort and relieving pain as opposed to aggressive, life-prolonging care.<sup>52</sup> Also, patients with higher levels of health literacy prefer to have more involvement in decision making than do patients with lower levels.<sup>53</sup> Higher ehealth literacy suggested higher willingness to adopt a computerized personal health record and was a better predictor than socioeconomic variables.<sup>54</sup>

The assessment of numeracy is used to understand the patient's ability to apply and manipulate numerical concepts.<sup>55,56</sup> Low numeracy measured with the Subjective Numeracy Scale<sup>55</sup> was found to be associated with biased medical decisions and may negatively influence the degree of participation in medical decision making.<sup>52,53</sup>

*Risk attitude.* Risk assessment is defined as the evaluation of the chance of an undesired outcome.<sup>3,57</sup> Patients' assessment of risk is related to one's risk attitude or propensity.<sup>57</sup> Two instruments measuring risk propensity were identified in this review: Balloon Analog Risk Task<sup>58</sup> and the Domain-Specific Risk Task.<sup>59</sup> Risk-taking behavior measured with the Balloon Analog Risk Task has been found to be associated with older adults' preferences for independent living compared with residential care.<sup>60</sup> The Domain-Specific Risk Task<sup>59</sup> assesses risk taking in 5 domains: financial decisions, health/safety, recreational, ethical, and social decisions. Recreational risk-taking has been associated with PP for innovative surgical techniques rather than conventional surgery.<sup>61</sup>

### Individual differences

*Personality and dispositional factors.* We identified 10 psychological instruments used to measure 5 dispositional constructs: personality, dispositional optimism, health orientation, assertiveness, and conservatism.

*Personality* is "the dynamic organisation within the individual of those psychophysical systems that determine his characteristic behaviour and thought."<sup>62</sup> The NEO Five-Factor Inventory, the Big Five Inventory (BFI), and the BFI-54 are based on the Big Five personality traits model<sup>63</sup> and describe each respondent's personality on 5 dimensions: extroversion, agreeableness, conscientiousness, neuroticism, and openness. Patients with cancer who prefer a more passive role in health-related decisions displayed lower levels of openness to experience measured with the NEO Five-Factor Inventory than did those patients who preferred a more active role in decision making.<sup>35</sup> In a study of patients with prostatic cancer, small variations in personality traits measured

with the BFI were associated with satisfaction with treatment decision, but no significant differences in personality were observed in groups with different treatment choice.<sup>64</sup> Flynn and Smith<sup>65</sup> used 29 items of the BFI-54 in a cohort of older adults. They found that higher conscientiousness and higher openness to experience and conjointly lower agreeableness and neuroticism were associated with the most active decision-making style when deciding about health.

The Tridimensional Personality Questionnaire<sup>66</sup> is based on the Temperament and Character Model of Cloninger,<sup>66</sup> which postulates the existence of 7 personality dimensions: 4 temperamental dimensions (novelty-seeking, harm-avoidance, reward dependence, and persistence) and 3 character dimensions (self-directedness, cooperativeness, and self-transcendence). Kesari et al<sup>67</sup> found that patients' treatment preferences differed according to their score on the reward dependence dimension. Conrad et al<sup>68</sup> compared the personality profile of kidney donor candidates with that of nondonor controls using the Temperament and Character Inventory,<sup>69</sup> which is an adaptation of the Tridimensional Personality Questionnaire. They found that the reward dependence dimension has important implications for decision making, because it was associated with underestimating potential risk of donation.

Wolberg et al<sup>70</sup> assessed the influence of patients' personality attributes on preferred options in primary breast cancer treatment in women using the Millon Clinical Multiaxial Inventory.<sup>71</sup> Three subscales of this inventory, namely, psychotic thinking, avoidance, and narcissism, had a stronger association with preference for the less conservative option of the elected mastectomy.

The Health Orientation Scale<sup>72</sup> assesses 10 health-related personality features. Oliveri et al<sup>73</sup> found that people who scored high on the personal health consciousness subscale (the tendency to think about one's physical health and fitness) were more interested and willing to gather information about genetic risk and genetic testing.

Dispositional optimism is defined as a generalized tendency to expect positive experiences in life.<sup>33</sup> Steginga and Occhipinti<sup>74</sup> found that in patients with prostate cancer, greater optimism measured with the Life Orientation Test Revised<sup>75</sup> was associated with less distress related to making a treatment decision. Orom et al<sup>76</sup> found that patients with prostate cancer with low optimism were more likely to report that making treatment decisions was difficult and stressful.

Assertiveness involves a proactive response in difficult situations to contrast with passive or aggressive reactions.<sup>77</sup> In volunteers from the general population, assertiveness measured with the Assertive-Behavior Competence Inventory for Older Adults<sup>78</sup> was predictive of desire for information and for an active role in doctor-patient interaction.<sup>30</sup>

Conservatism is defined as the disposition to preserve tradition and established institutions—to resist and oppose change.<sup>79</sup> The Right-Wing Authoritarianism Scale<sup>80</sup> was designed to evaluate political conservatism. Right-wing authoritarians are people who have a high degree of willingness to submit to authorities they perceive as legitimate, who adhere to societal conventions, and who are hostile and punitive in their attitudes toward people who do not adhere to them.<sup>81</sup> No correlation was found between political conservatism and preferences for information and involvement for decision making in the general population.<sup>30</sup>

**Health locus of control, autonomy, and control preference.** Health locus of control is a generalized expectation about whether one's health is controlled by one's own behavior or forces external to oneself.<sup>82</sup> An individual with an internal health locus of control believes that outcomes are a direct result of his or her own behavior. An individual with an external health locus of control believes that outcomes are a result of either chance or powerful

other people, such as physicians. Three measurements investigating a patient's health locus of control have been found: the Health Locus of Control Scale,<sup>82,83</sup> the Multidimensional Health Locus of Control Scale (Form B and Form C),<sup>82,84</sup> and the Health Internal Control subscale of the Health Orientation Scale.<sup>72</sup> From our review it emerges that high internal health locus of control measured with the Health Locus of Control Scale was associated with preferences for complementary and alternative medicine in Japanese patients with low-back pain.<sup>85</sup> General practice patients with high external health locus of control are more likely to prefer limited involvement in decision-making processes than patients with lower external health locus of control.<sup>86</sup> De las Cuevas et al<sup>29</sup> used the Multidimensional Health Locus of Control Scale-Form C and found that psychiatric outpatients with “doctor” external locus of control and negative internal locus of control were more likely to prefer a paternalist style of decision making. In a study involving volunteers from the general population, health locus of control measured with the Multidimensional Health Locus of Control Scale-Form B was a better predictor of preferences for information seeking and involvement in decisions compared with demographic variables such as age, sex, and educational level.<sup>30</sup> Higher levels of powerful others were associated with higher preferences for information and involvement in decisions. Participants scoring highly on the Health Internal Control subscale of the Health Orientation Scale<sup>72</sup> were more likely to actively gather information about genetic testing.<sup>73</sup> Health locus of control seems to be related to autonomy preferences.<sup>30,86,87</sup>

#### *Emotion and mood factors*

Emotion is defined as a complex pattern of changes, including physiological arousal, feelings, cognitive processes, and behavioral reactions, made in response to a situation perceived to be personally significant.<sup>88</sup> In contrast to emotion, mood is defined as a transient, low-intensity, nonspecific, and subtle affective state that often has no definite cause.<sup>89</sup>

Four psychological instruments investigating the relationship between emotions or mood states, anxiety, and depression and health-related preferences and decisions were identified.

The Profile of Mood States<sup>90</sup> measures 6 different dimensions of mood swings over a period of time. The dimensions investigated include tension or anxiety, anger or hostility, vigor or activity, fatigue or inertia, depression or dejection, and confusion or bewilderment. Higher levels in the tension and anxiety dimension have been found in women opting for mastectomy compared with women who elected for a more conservative treatment option.<sup>70</sup>

Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings, and sense of well-being.<sup>91</sup> A distinction between state and trait anxiety has become commonplace.<sup>92</sup> State anxiety is defined as an unpleasant emotional arousal in face of threatening demands or dangers. Trait anxiety, on the other hand, reflects the existence of stable individual differences in the tendency to respond with state anxiety in the anticipation of threatening situations.<sup>93</sup>

Yuzbasioglu et al<sup>94</sup> did not find any relationship between preferences for impression techniques in dentistry and anxiety measured with the Turkish version of the State-Trait Anxiety Inventory.<sup>92</sup> Using the Hospital Anxiety and Depression Scale,<sup>95</sup> Schneider et al<sup>86</sup> discovered that the higher the depression scores the less likely patients in general practice were to want information, whereas Franssen et al<sup>96</sup> did not find any relation between anxiety and depression with preferences for communicating prognosis in patients with esophageal cancer. Patients with breast cancer with higher levels of depressive symptoms measured with the Center for Epidemiological Studies-Depression Scale<sup>97</sup> displayed a preference for a passive role in decision making.<sup>98</sup> In patients with cancer, no significant association between PPs for involvement in decision making and depression or



anxiety measured with the State-Trait Anxiety Inventory and the Center for Epidemiological Studies-Depression Scale was found.<sup>35</sup>

### Health beliefs

Health beliefs are defined as “the personal convictions that influence health behaviours.”<sup>99</sup> These convictions involve how people view health, health promotion, and healthcare practices.<sup>100</sup> The Beliefs About Medicines Questionnaire<sup>101</sup> assesses treatment-related beliefs, that is, the specific patient's perception of the need to take medication and concerns about it, as well as the general beliefs about pharmacotherapy.<sup>101</sup> In patients with schizophrenia, a negative attitude toward medications was related to preferring a higher involvement in decision making.<sup>102</sup>

## Discussion

Given the increasing recognition of the importance of PP in healthcare, it is important to understand which psychological dimensions and profiles associate with the formation and heterogeneity of preferences. Therefore, a systematic review was conducted to enhance the understanding of which psychological constructs and instruments have been investigated in the context of PPs or health-related decisions.

A total of 18 constructs and 33 instruments were identified and organized into 5 categories: motivational factors, cognitive factors, individual differences, emotion and mood factors, and health beliefs. There is no agreement or systematic categorization of the constructs involved in PP construction or decision making, even though researchers have been urged to explore this topic.<sup>3,4</sup> Given the interconnectedness and complexity of the constructs considered here, it is recognized that this classification may be arbitrary and some categories may overlap. All the constructs we reviewed are highly complex and should be considered as a part of a manifold system of psychological characteristics that influence each other. Our categorization is still a useful way to describe the psychological variables and the instruments detected and may function as an initial guide to encourage a constructive discussion and a synergy effort in the field.

Among motivational constructs, self-efficacy was promising. The concept of self-efficacy has been assessed consistently across decision-making studies in healthcare settings. Even though past literature has highlighted its important role in decision making,<sup>103</sup> to our knowledge there are no studies that directly assess the relationship between self-efficacy and PP construction. Coping strategies and resilience are only moderately established in PP and decisions literature. Although of high quality, only 1 study was captured by our search and therefore no strong conclusion can be drawn.

We found a few cognitive constructs to be related to PP and decisions. Patient activation and decision-making style are not so well investigated. Health literacy and numeracy are more established in health-related preference and decisions literature. These factors were found to predict PP and decisions in different scenarios throughout articles from strong to moderate quality. It is noticeable that ehealth literacy was a better predictor of PP compared with socioeconomic variables.<sup>54</sup> Because only 1 study, weak in quality, investigated this relationship, we advocate further investigation to confirm this evidence.

In the category of cognitive factors, we found a surprisingly small number of studies (2) exploring the relationship between PP and risk propensity. The low quality of the studies limits even further the conclusions we can draw. The limited research exploring the role of risk propensity in PP may be related to the difficulties associated with its operational definition. One view considers risk propensity as an unstable trait across domains.<sup>104</sup> According to this vision, the variation in risk-taking can be

ascribed to an individual perceived-risk attitude and tends to be more stable across different domains than economic risk.<sup>105</sup> Finally, in the healthcare setting, our search points out that the risk-taking attitudes might be more intrinsic to the patient because it has been shown by considering personality traits through instruments such as the Sensation Seeking Scale Form.<sup>106</sup>

Among individual differences, personality traits and dispositional factors have been studied more holistically in the context of PP and decisions. Overall, the personality measures are well known and validated across settings. Nevertheless, there is no consistent evidence regarding the influence of specific personality dimensions in PP and decisions. On the contrary, the number, quality, and findings of studies detected by our study highlight that health locus of control plays a relevant role in PP and decisions.

Concerning emotions and mood factors, the findings about the relationship between anxiety and depression and PP are still ambiguous. Even though the studies we considered were scientifically robust, so far there is not enough evidence to establish a specific relationship.

Health beliefs that have been considered with regard to PP are the ones concerning medications. A more consistent body of literature is needed to support the role of beliefs in PP and health-related decisions.

The present review gives an overview of the existing research on psychological constructs and instruments that have an impact on PP and decisions in healthcare. The most prominent results are related to health literacy, numeracy, and health locus of control, which have been shown to influence PP and decisions and whose measurements have shown consistent results. Self-efficacy and health beliefs are promising fields of study, but the amount or quality of existing results is not yet satisfactory. The impact of risk propensity is also difficult to assess. Evidence of the impact of personality traits and mood states was inconsistent. Further research is needed to ascertain the impact of such factors.

## Conclusions

It is important to clarify that many of the factors and measures identified might be relevant to some extent to enhance understanding of PP in healthcare settings; nevertheless, further evaluation of which instruments are most useful is needed. This being a relatively nascent area of research, it is important to develop a common framework to further facilitate sharing of information and the accumulation of evidence to demonstrate how specific psychological constructs relate to preference formation or preference heterogeneity. Moreover, there is a need to focus on the clinical feasibility of including psychological measurements in preference and decision studies.

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## Supplemental Materials

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.jval.2018.12.007>.

## REFERENCES

- Medical Device Innovation Consortium (MDIC) patient centered benefit-risk project report: a framework for incorporating information on patient preferences regarding benefit and risk into regulatory assessments of new medical technology. Medical Device Innovation Consortium. <https://www.fda.gov/downloads/ScienceResearch/SpecialTopics/RegulatoryScience/UCM486253.pdf>. Accessed August 28, 2018.
- Ryan M, Scott DA, Reeves C, et al. Eliciting public preferences for healthcare: a systematic review of techniques. *Health Technol Assess*. 2001;5(5):1–186.
- Appelt KC, Milch KF, MJJ Handgraaf, Weber EU, Handgraaf KF. The decision making individual differences inventory and guidelines for the study of individual differences in judgment and decision-making research. *Judgm Decis Mak*. 2011;6(3):252–262.
- Mohammed S, Schwall A. Individual differences and decision making: what we know and where we go from here. *Int Rev Ind Organ Psychol*. 2009;24:249–312.
- Almlund M, Duckworth AL, Heckman J, Kautz T. Personality psychology and economics. In: Erik Hanushek, Welch F, eds. *Handbook of the Economics of Education*. Amsterdam, The Netherlands: Elsevier; 2011:1–181.
- Solomon MR, Bamossy G, Askegaard S, Hogg MK. *Consumer Behaviour Buying: An European Perspective*. 4th ed. England, UK: Pearson Education; 2010.
- Dohmen T, Falk A, Huffman D, Sunde U. Are risk aversion and impatience related to cognitive ability? *Am Econ Rev*. 2010;100:1238–1260.
- Becker A, Deckers T, Dohmen T, Falk A, Kosse F. The relationship between economic preferences and psychological personality measures. *Annu Rev Econ*. 2012;4:453–478.
- Elster J. Emotions and economic theory. *J Econ Lit*. 1998;36(1):47–74.
- Loewenstein G. Emotions in economic theory and economic behavior. *Am Econ Rev*. 2000;90(2):426–432.
- Hirshleifer D, Shumway T. Good day sunshine: stock returns and the weather. *J Finance*. 2003;58(3):1009–1032.
- Edmans A, Garcia D, Ø Norli. Sports sentiment and stock returns. *J Finance*. 2007;62(4):1967–1998.
- Boyce C, Czajkowski M, Hanley N, Noussair C, Townsend M, Tucker S. The effects of emotions on preferences and choices for public goods. <http://www.st-andrews.ac.uk/gsd/research/envecon/eediscus/>. Accessed August 28, 2018.
- Leutner F. *Profiling Consumers: The Role of Personal Values in Consumer Preferences* [doctoral dissertation]. London: University College London; 2016. <http://discovery.ucl.ac.uk/1529382/>.
- NHS Centre for Reviews and Dissemination. *Systematic Reviews: CRD's Guidance for Undertaking Reviews in Healthcare*. York, UK: Centre for Reviews and Dissemination; 2009.
- Armijo-Olivo S, Stiles CR, Hagen NA, Biondo PD, Cummings GG. Assessment of study quality for systematic reviews: a comparison of the Cochrane Collaboration Risk of Bias Tool and the Effective Public Health Practice Project Quality Assessment Tool: methodological research. *J Eval Clin Pract*. 2012;18(1):12–18.
- Thomas BH, Ciliska D, Dobbins M, Micucci S. A process for systematically reviewing the literature: providing the research evidence for public health nursing interventions. *Worldviews Evid Based Nurs*. 2004;1(3):176–184.
- Jackson N, Waters E. Guidelines for systematic reviews in health promotion and public health taskforce. Criteria for the systematic review of health promotion and public health interventions. *Health Promot Int*. 2005;20(4):367–374.
- Druckman JN, Lupia A. Preference formation. *Annu Rev Polit Sci*. 2000;3(1):1–24.
- Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Int J Surg*. 2010;8(5):336–341.
- Kavookjian J, Berger BA, Grimley DM, Villaume WA, Anderson HM, Barker KN. Patient decision making: strategies for diabetes diet adherence intervention. *Res Soc Adm Pharm*. 2005;1(3):389–407.
- Bandura A. Self-efficacy. In: Ramachaudran VS, ed. *Encyclopedia of Human Behavior*. Vol. 4. San Diego, CA: Academic Press; 1994:71–81.
- Sherer M, Maddux JE, Mercandante B, Prentice-Dunn S, Jacobs B, Rogers RW. The Self-Efficacy Scale: construction and validation. *Psychol Rep*. 1982;51(2):663–671.
- Scholz U, Gutiérrez Doña B, Sud S, Schwarzer R. Is general self-efficacy a universal construct? *Eur J Psychol Assess*. 2002;18(3):242–251.
- Schwarzer R, Jerusalem M. Generalized Self-Efficacy Scale. In: Weinman J, Wright S, Johnston M, eds. *Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs*. Windsor, UK: NFER-NELSON; 1995:35–37.
- Cranney A, O'Connor AM, Jacobsen MJ, et al. Development and pilot testing of a decision aid for postmenopausal women with osteoporosis. *Patient Educ Couns*. 2002;47(3):245–255.
- Arora NK, Weaver KE, Clayman ML, Oakley-Girvan I, Potosky AL. Physicians' decision-making style and psychosocial outcomes among cancer survivors. *Patient Educ Couns*. 2009;77(3):404–412.
- Chawla N, Arora NK. Why do some patients prefer to leave decisions up to the doctor: lack of self-efficacy or a matter of trust? *J Cancer Surviv*. 2013;7(4):592–601.
- De las Cuevas C, Peñate W, de Rivera L. Psychiatric patients' preferences and experiences in clinical decision-making: examining concordance and correlates of patients' preferences. *Patient Educ Couns*. 2014;96(2):222–228.
- Braman AC, Gomez RG. Patient personality predicts preference for relationships with doctors. *Pers Individ Dif*. 2004;37(4):815–826.
- Miller SM, Hudson SV, Egleston BL, et al. The relationships among knowledge, self-efficacy, preparedness, decisional conflict, and decisions to participate in a cancer clinical trial. *Psychooncology*. 2013;22(3):481–489.
- Compas BE. Coping with stress during childhood and adolescence. *Psychol Bull*. 1987;127(3):393–403.
- Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol*. 1989;56(2):267–283.
- Campbell-Sills L, Stein MB. Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): validation of a 10-item measure of resilience. *J Trauma Stress*. 2007;20(6):1019–1028.
- Colley A, Halpern J, Paul S, et al. Factors associated with oncology patients' involvement in shared decision making during chemotherapy. *Psychooncology*. 2017;26(11):1972–1979.
- Hibbard JH, Mahoney ER, Stockard J, Tusler M. Development and testing of a short form of the patient activation measure. *Health Serv Res*. 2005;40(6 Pt 1):1918–1930.
- Deen D, Lu W-H, Rothstein D, Santana L, Gold MR. Asking questions: the effect of a brief intervention in community health centers on patient activation. *Patient Educ Couns*. 2011;84(2):257–260.
- Smith SG, Pandit A, Rush SR, Wolf MS, Simon CJ. The role of patient activation in preferences for shared decision making: results from a national survey of U.S. adults. *J Health Commun*. 2016;21(1):67–75.
- Kimerling R, Pavao J, Wong A. Patient activation and mental health care experiences among women veterans. *Adm Policy Ment Health*. 2016;43(4):506–513.
- Harren VA. A model of career decision making for college students. *J Vocat Behav*. 1979;14(2):119–133.
- Driver M. Individual decision making and creativity. In: Kerr S, ed. *Organizational Behavior*. Columbus, OH: Grid Publishing; 1979.
- Scott SG, Bruce RA. Decision-making style: the development and assessment of a new measure. *Educ Psychol Meas*. 1995;55(5):818–831.
- Fischer S, Soye K, Gurtner S. Adapting Scott and Bruce's General Decision-Making Style Inventory to patient decision making in provider choice. *Med Decis Making*. 2015;35(4):525–532.
- Sørensen K, Van den Broucke S, Fullam J, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*. 2012;12(1):80.
- Baker DW, Williams MV, Parker RM, Gazmararian JA, Nurss J. Development of a brief test to measure functional health literacy. *Patient Educ Couns*. 1999;38(1):33–42.
- Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Fam Med*. 1993;25(6):391–395.
- Bass PF, Wilson JF, Griffith CH. A shortened instrument for literacy screening. *J Gen Intern Med*. 2003;18(12):1036–1038.
- Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. *Fam Med*. 2004;36(8):588–594.
- Norman CD, Skinner HA. eHEALS: the eHealth Literacy Scale. *J Med Internet Res*. 2006;8(4):e27.
- Gaglio B, Glasgow RE, Bull SS. Do patient preferences for health information vary by health literacy or numeracy? A qualitative assessment. *J Health Commun*. 2012;17(suppl 3):109–121.
- Veldwijk J, van der Heide I, Rademakers J, et al. Preferences for vaccination: does health literacy make a difference? *Med Decis Making*. 2015;35(8):948–958.

52. Volandes AE, Paasche-Orlow M, Gillick MR, et al. Health literacy not race predicts end-of-life care preferences. *J Palliat Med*. 2008;11(5):754–762.
53. Goggins KM, Wallston KA, Nwosu S, et al. Health literacy, numeracy, and other characteristics associated with hospitalized patients' preferences for involvement in decision making. *J Health Commun*. 2014;19(suppl 2):29–43.
54. Noblin AM, Wan TTH, Fottler M. The impact of health literacy on a patient's decision to adopt a personal health record. *Perspect Health Inf Manag*. 2012;9(Fall):1–13.
55. Fagerlin A, Zikmund-Fisher BJ, Ubel PA, Jankovic A, Derry HA, Smith DM. Measuring numeracy without a math test: development of the Subjective Numeracy Scale. *Med Decis Making*. 2007;27(5):672–680.
56. Reyna VF, Nelson WL, Han PK, Dieckmann NF. How numeracy influences risk comprehension and medical decision making. *Psychol Bull*. 2009;135(6):943–973.
57. Harrison JD, Young JM, Butow P, Salkeld G, Solomon MJ. Is it worth the risk? A systematic review of instruments that measure risk propensity for use in the health setting. *Soc Sci Med*. 2005;60(6):1385–1396.
58. Lejuez CW, Read JP, Kahler CW, et al. Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART). *J Exp Psychol Appl*. 2002;8(2):75–84.
59. Weber EU, Blais A-R, Betz NE. A domain-specific risk-attitude scale: measuring risk perceptions and risk be. *J Behav Decis Mak*. 2002;15(4):263–290.
60. Seaman KL, Stillman CM, Howard DV, Howard JH. Risky decision-making is associated with residential choice in healthy older adults. *Front Psychol*. 2015;6:1192.
61. Sulz M, Zerz A, Sagmeister M, Roll T, Meyenberger C. Perception of preference and risk-taking in laparoscopy, transgastric, and rigid-hybrid transvaginal NOTES for cholecystectomy. *Swiss Med Wkly*. 2013;143:w13888.
62. Allport GW. *Pattern and Growth in Personality*. Oxford, UK: Holt, Reinhart & Winston; 1961.
63. McCrae RR, Costa PT. Updating Norman's "Adequate Taxonomy": intelligence and personality dimensions in natural language and in questionnaires. *J Pers Soc Psychol*. 1985;49(3):710–721.
64. Block CA, Erickson B, Carney-Doebbling C, Gordon S, Fallon B, Konety BR. Personality, treatment choice and satisfaction in patients with localized prostate cancer. *Int J Urol*. 2007;14(11):1013–1018.
65. Flynn KE, Smith MA. Personality and health care decision-making style. *J Gerontol B Psychol Sci Soc Sci*. 2007;62(5):P261–P267.
66. Cloninger CR, Przybeck TR, Svrakic DM. The Tridimensional Personality Questionnaire: U.S. normative data. *Psychol Rep*. 1991;69(3):1047–1057.
67. Kesari D, Benjamin J, Podberezsky A, et al. Influence of demography and personality on patient choice of treatment in symptomatic benign prostate hyperplasia. *Isr Med Assoc J*. 2015;17(7):433–436.
68. Conrad R, Kleiman A, Rambau S, et al. Psychosocial assessment of living kidney donors: what implications have temperament and character for decision-making? *Compr Psychiatry*. 2016;67:1–8.
69. Cloninger CR. The Temperament and Character Inventory (TCI): a guide to its development and use. Center for Psychobiology of Personality, Washington University. [https://www.researchgate.net/publication/264329741\\_TCI-Guide\\_to\\_Its\\_Development\\_and\\_Use](https://www.researchgate.net/publication/264329741_TCI-Guide_to_Its_Development_and_Use). Accessed September 8, 2017.
70. Wolberg WH, Tanner MA, Romsaas EP, Trump DL, Malec JF. Factors influencing options in primary breast cancer treatment. *J Clin Oncol*. 1987;5(1):68–74.
71. Millon T. Millon Clinical Multiaxial Inventory: I & II. *J Couns Dev*. 1992;70(3):421–426.
72. Snell WE, Johnson G, Lloyd PJ, Hoover MW. The Health Orientation Scale: a measure of psychological tendencies associated with health. *Eur J Pers*. 1991;5(2):169–183.
73. Oliveri S, Masiero M, Arnaboldi P, Cutica I, Fioretti C, Pravettoni G. Health orientation, knowledge, and attitudes toward genetic testing and personalized genomic services: preliminary data from an Italian sample. *Biomed Res Int*. 2016;2016:6824581.
74. Steginga SK, Occhipinti S. Dispositional optimism as a predictor of men's decision-related distress after localized prostate cancer. *Health Psychol*. 2006;25(2):135–143.
75. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol*. 1994;67(6):1063–1078.
76. Orom H, Penner LA, West BT, Downs TM, Rayford W, Underwood W. Personality predicts prostate cancer treatment decision-making difficulty and satisfaction. *Psychooncology*. 2009;18(3):290–299.
77. Rakos RF. *Assertive Behavior: Theory, Research, and Training*. London: Routledge; 1991.
78. Northop LME, Edelstein B. An assertive-behavior competence inventory for older adults. *Clin Geropsychol*. 1998;4:315–331.
79. Suziedelis A, Lorr M. Conservative attitudes and authoritarian values. *J Psychol*. 1973;83(2):287–294.
80. Altemeyer B. *Enemies of Freedom: Understanding Right-Wing Authoritarianism*. San Francisco, CA: Jossey-Bass; 1988.
81. Stenner K. Three kinds of "conservatism." *Psychol Inq*. 2009;20(2-3):142–159.
82. Wallston KA, Strudler Wallston B, DeVellis R. Development of the Multidimensional Health Locus of Control (MHLC) scales. *Health Educ Monogr*. 1978;6(1):160–170.
83. Wallston BS, Wallston KA, Kaplan GD, Maides SA. Development and validation of the Health Locus of Control (HLC) scale. *J Consult Clin Psychol*. 1976;44(4):580–585.
84. Wallston KA, Stein MJ, Smith CA. Form C of the MHLC scales: a condition-specific measure of locus of control. *J Pers Assess*. 1994;63(3):534–553.
85. Ono R, Higashi T, Suzukamo Y, et al. Higher internality of health locus of control is associated with the use of complementary and alternative medicine providers among patients seeking care for acute low-back pain. *Clin J Pain*. 2008;24(8):725–730.
86. Schneider A, Körner T, Mehring M, Wensing M, Elwyn G, Szecsenyi J. Impact of age, health locus of control and psychological co-morbidity on patients' preferences for shared decision making in general practice. *Patient Educ Couns*. 2006;61(2):292–298.
87. Hashimoto H, Fukuhara S. The influence of locus of control on preferences for information and decision making. *Patient Educ Couns*. 2004;55(2):236–240.
88. Gerrig Richard J, Zimbardo Philip G. *Psychology and Life*. 16th ed. Boston, MA: Pearson; 2002.
89. Kleinstäuber M. Mood. In: Gellman MD, Turner JR, eds. *Encyclopedia of Behavioral Medicine*. New York, NY: Springer; 2013:1259–1261.
90. McNair D, Lorr M, Droppleman L. *Manual for the Profile of Mood States*. San Diego, CA: Educational and Industrial Testing Services; 1971.
91. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)*. 5th ed. Arlington, VA: American Psychiatric Publishing; 2013.
92. Spielberger CD, Gorsuch RL, Lushene RE. *Manual for the State-Trait Anxiety Inventory*. <https://ubir.buffalo.edu/xmlui/handle/10477/2895>. Accessed September 8, 2017.
93. Lazarus RS. Progress on a cognitive-motivational-relational theory of emotion. *Am Psychol*. 1991;46(8):819–834.
94. Yuzbasioglu E, Kurt H, Turunc R, Bilir H. Comparison of digital and conventional impression techniques: evaluation of patients' perception, treatment comfort, effectiveness and clinical outcomes. *BMC Oral Health*. 2014;14(1):1–10.
95. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*. 1983;67(6):361–370.
96. Franssen SJ, Lagarde SM, van Werven JR, et al. Psychological factors and preferences for communicating prognosis in esophageal cancer patients. *Psychooncology*. 2009;18(11):1199–1207.
97. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas*. 1977;1(3):385–401.
98. Hyphantis T, Almyroudi A, Paika V, Degner LF, Carvalho AF, Pavlidis N. Anxiety, depression and defense mechanisms associated with treatment decisional preferences and quality of life in non-metastatic breast cancer: a 1-year prospective study. *Psychooncology*. 2013;22(11):2470–2477.
99. Anderson DM. *Mosby's Medical, Nursing, & Allied Health Dictionary*. St Louis, MO: Mosby; 2002.
100. Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior and Health Education. Theory, Research, and Practice*. 4th ed. San Francisco, CA: Jossey-Bass; 2008.
101. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *J Psychosom Res*. 1999;47(6):555–567.
102. Hamann J, Mendel R, Reiter S, et al. Why do some patients with schizophrenia want to be engaged in medical decision making and others do not? *J Clin Psychiatry*. 2011;72(12):1636–1643.
103. Reed AE, Mikels JA, Löckenhoff CE. Choosing with confidence: self-efficacy and preferences for choice. *Judgm Decis Mak*. 2012;7(2):173–180.
104. MacCrimmon KR, Wehrung DA, Stanbury WT. *Taking Risks: The Management of Uncertainty*. New York, NY: Free Press; 1986.
105. Mellers BA, Cooke ADJ. The role of task and context in preference measurement. *Psychol Sci*. 1996;7(2):76–82.
106. Zuckerman M, Eysenck SB, Eysenck HJ. Sensation seeking in England and America: cross-cultural, age, and sex comparisons. *J Consult Clin Psychol*. 1978;46(1):139–149.
107. Morrow DG, Weiner M, Steinley D, Young J, Murray MD. Patients' health literacy and experience with instructions: influence preferences for heart failure medication instructions. *J Aging Health*. 2007;19(4):575–593.

108. Seo J, Goodman MS, Politi M, Blanchard M, Kaphingst KA. Effect of health literacy on decision-making preferences among medically underserved patients. *Med Decis Making*. 2016;36(4):550–556.
109. The road to resilience. American Psychological Association. <http://www.apa.org/helpcenter/road-resilience.aspx>. Accessed September 12, 2017.
110. Zikmund-Fisher BJ, Smith DM, Ubel PA, Fagerlin A. Validation of the Subjective Numeracy Scale: effects of low numeracy on comprehension of risk communications and utility elicitation. *Med Decis Making*. 2007;27(5):663–671.
111. Scheier MF, Carver CS. Dispositional optimism and physical well-being: the influence of generalized outcome expectancies on health. *J Pers*. 1987;55(2):169–210.
112. Dutta M, Bodie G, Basu A. Health disparity and the racial divide among the nation's youth: Internet as a site for change? In: Metzger MJ, Flanagin AJ, eds. *MacArthur Foundation Series on Digital Media and Learning*. Cambridge, MA: MIT Press; 2008: 175–198.
113. Imam SS, Sherer et al. General Self-Efficacy Scale: dimensionality, internal consistency, and temporal stability. Paper presented at: Proceedings of the Redesigning Pedagogy: Culture, Knowledge and Understanding Conference; 2007:1-13; Singapore. <https://pdfs.semanticscholar.org/6cea/ccac5b67a3a700d3fa9ef330b423f1921d43.pdf>.
114. Connor KM, Davidson JRT. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety*. 2003;18(2):76–82.
115. Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Serv Res*. 2004;39(4 Pt 1):1005–1026.
116. Dumenci L, Matsuyama RK, Kuhn L, Perera RA, Siminoff LA. On the validity of the Rapid Estimate of Adult Literacy in Medicine (REALM) Scale as a measure of health literacy. *Commun Methods Meas*. 2013;7(2):134–143.
117. White TL, Lejuez CW, de Wit H. Test-retest characteristics of the Balloon Analogue Risk Task (BART). *Exp Clin Psychopharmacol*. 2008;16(6):565–570.
118. Waller NG, Lilienfeld SO, Tellegen A, Lykken DT. The Tridimensional Personality Questionnaire: structural validity and comparison with the Multidimensional Personality Questionnaire. *Multivariate Behav Res*. 1991;26(1):1–23.
119. Costa PT, McCrae RR. *NEO Five Factor Inventory (NEO-FFI) Professional Manual*. Odessa, TX: Psychological Assessment Resources Inc; 1992.
120. John OP, Srivastava S. The big-five trait taxonomy: history, measurement, and theoretical perspectives. [http://moityca.com.br/pdfs/bigfive\\_John.pdf](http://moityca.com.br/pdfs/bigfive_John.pdf). Accessed September 12, 2017.
121. Srivastava S, John OP, Gosling SD, Potter J. Development of personality in early and middle adulthood: set like plaster or persistent change? *J Pers Soc Psychol*. 2003;84(5):1041–1053.
122. Gray D, Durrheim K. The validity and reliability of measures of right-wing authoritarianism in South Africa. *S Afr J Psychol*. 2006;36(3):500–520.
123. Ross TP, Ross LT, Short SD, Cataldo S. The Multidimensional Health Locus of Control Scale: psychometric properties and form equivalence. *Psychol Rep*. 2015;116(3):889–913.
124. Wallston KA. The validity of the Multidimensional Health Locus of Control Scales. *J Health Psychol*. 2005;10(5):623–631.
125. Horne R, Chapman SCE, Parham R, Freemantle N, Forbes A, Cooper V. Understanding patients' adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *PLoS One*. 2013;8(12):e80633.