Published in final edited form as:
Med Decis Making. 2015 January ; 35(1): 114–131. doi:10.1177/0272989X14551638.

Where is the evidence? A systematic review of shared decision making and patient outcomes

L. Aubree Shay, Ph.D.[1] and **Jennifer Elston Lafata, Ph.D.**[2]

[1]University of Texas School of Public Health, Center for Health Promotions and Research

[2]Virginia Commonwealth University, Massey Cancer Center and Department of Social and Behavioral Health

Abstract

Background—Despite widespread advocacy for shared decision making (SDM), the empirical evidence regarding its effectiveness to improve patient outcomes has not been systematically reviewed.

Purpose—To systematically review the empirical evidence linking patient outcomes and SDM, when the decision-making process has been explicitly measured, and to identify under what measurement perspectives SDM is associated with which types of patient outcomes (affective-cognitive, behavioral, and health).

Data Sources—PubMed (through December 2012) and hand search of article bibliographies.

Study Selection—Studies were included if they empirically (1) measured SDM in the context of a patient-clinician interaction, and (2) evaluated the relationship between SDM and at least one patient outcome.

Data Extraction—Study results were categorized by SDM measurement perspective (patient-reported, clinician-reported, or observer-rated) and outcome type (affective-cognitive, behavioral, or health).

Data Synthesis—Thirty-nine studies met inclusion criteria. Thirty-three used patient-reported measures of SDM, six used observer-rated, and two used clinician-reported. Ninety-seven unique patient outcomes were assessed; 51% affective-cognitive, 28% behavioral, and 21% health. Only 43% of assessments (n=42) found a significant and positive relationship between SDM and the patient outcome. This proportion varied by SDM measurement perspective and outcome category. 52% of outcomes assessed with patient-reported SDM were significant and positive, compared to 21% with observer-rated and 0% with clinician-reported SDM. Regardless of measurement perspective, SDM was most likely to be associated with affective-cognitive patient outcomes (54%), compared to 37% of behavioral, and 25% of health outcomes.

Corresponding author information: L. Aubree Shay, Ph.D., University of Texas School of Public Health, Center for Health Promotions and Research, 7411 John Smith Drive, Suite 1100, San Antonio, TX 78229, 210-276-9047, Laura.Aubree.Shay@uth.tmc.edu.

An earlier version of the manuscript was presented as a poster at Annual Meeting of the American Society of Preventive Oncology in March 2013 and at the DC Health Communication Conference in March 2013.

Conflicts of Interest: The authors have no conflicts of interest.

Limitations—The relatively small number of studies, precludes meta-analysis. The study inclusion and exclusion criteria requiring both an empirical measure of SDM as well as an assessment of the association between that measure and a patient outcome, resulted in most included studies being observational in design.

Conclusions—SDM, when perceived by patients as occurring, tends to result in improved affective-cognitive outcomes. Evidence is lacking for the association between empirical measures of SDM and patient behavioral and health outcomes.

Introduction

Since the early 1980s, shared decision making (SDM) has been suggested as an optimal approach to making health care decisions.(1–3) Both the Institute of Medicine and the U.S. Preventive Services Task Force have advocated for clinicians to use SDM when making preventive health and treatment recommendations.(4, 5) Most recently, language contained in the Affordable Care Act specifically calls for programs to facilitate shared decision making and the establishment of the Patient Centered Outcomes Research Institute.(6) Furthermore, a recent systematic review of patient decision-making preferences found that the majority of patients prefer to be actively involved in decision-making and that the trend for a preference for shared decisions has increased over time.(7)

While historically, SDM was advocated as a means of protecting patient autonomy (8, 9) and of understanding regional variation in medical treatment use (10), there has been a shift in focus over time to investigating the effects of SDM and other communication processes on health-related patient outcomes. (11) For example, the National Cancer Institute published a monograph in 2007 that specifically focuses on how patient-centered communication may help to promote health and reduce suffering. (12) Additionally, many evaluations of SDM interventions cite the possible benefits of SDM on patient outcomes as a justification for the study (e.g. (13–15)). Furthermore, models have been developed that specifically hypothesize the way that SDM and other patient-provider communication may impact health-related patient outcomes. (16, 17) Thus, although the aim of SDM has not always been to improve patient health outcomes, it is valuable to systematically evaluate the empirical evidence supporting the impact of SDM on a range of patient outcomes.

Previous systematic reviews have pointed to the effectiveness of decision aids for improving patient outcomes,(18) but as evidenced by these reviews, use of a decision aid does not ensure that SDM occurred. For example, in the most recent Cochrane review of decision aids (2011), only 16 of the 86 randomized trials reviewed explicitly measured the effects of decision aids on patient participation in decision-making. Among these studies, there were no differences in patient reports of having participated in SDM between those given a decision aid or those receiving usual care.(18) Thus, the positive effects of decision aids on patient outcomes may not be attributable to SDM. Moreover, the empirical evidence surrounding SDM is not confined to studies of decision aids only.

Despite widespread advocacy for SDM and a growing body of literature evaluating its use, the empirical evidence regarding its effectiveness as a mechanism to improve patient outcomes has not been systematically summarized. Additionally, SDM has been measured

in a variety of ways across studies, and these measurement perspectives may represent different perceptions about the meaning of SDM. With the current lack of synthesis of the literature, whether these different measurement perspectives are differentially associated with patient outcomes is not known. The objectives of this systematic review are twofold. First, to describe the patient outcomes that have been studied in relation to SDM, when the decision-making process has been explicitly measured with a SDM measurement tool and the relationship between that measure of SDM and at least one patient outcome was evaluated. Second, to identify under what measurement perspectives (patient-reported, clinician-reported, or observer-rated) SDM is associated with which types of patient outcomes.

Methods

Conceptual Framework

The conceptual framework guiding this systematic review was adapted from models by Street and colleagues (16) and Kreps and colleagues (17) (Figure 1). In their model of pathways in which clinician-patient communication can lead to better health, Street and colleagues posit that while communication between clinicians and patients, including SDM, can lead to improved health outcomes directly, in most cases communication affects health indirectly through proximal and intermediate outcomes. As proposed by Kreps and colleagues in their Transformation Model of Communication and Health Outcomes.(17) We change the categorization of outcomes from a temporal classification to a conceptual classification. This latter model asserts that patient outcomes should be categorized by their impact on the individual across three categories: affective-cognitive, behavioral, and physiological. Affective-cognitive outcomes include knowledge, attitudinal, and affective/emotional effects. Behavioral outcomes include both adherence to recommended treatments and adoption of health behaviors. Physiological outcomes (which we have broadened to label as health outcomes) include measures quality of life, self-rated health, and biological measures of health (e.g. blood pressure).(17)

Inclusion and Exclusion Criteria

Studies were included in this review if they empirically (1) measured the decision-making process with a SDM measurement tool in the context of a patient-clinician interaction, and (2) evaluated the relationship between SDM and at least one explicitly measured patient outcome. Excluded studies were those that reported only qualitative data or were reviews or commentaries. Also excluded were studies that did not explicitly measure both the decision making process using a SDM measure and at least one patient outcome, as well as those that did not quantitatively model the relationship between measured SDM at least one patient outcome.

Search Strategy

We began with the primary search strategy outlined by Makoul and Clayman (2006) in their systematic review of the SDM literature.(19) Specifically, in January 2013, we conducted a PubMed search for English-language articles published through December 31, 2012 with the words *shared decision making* in the title or abstract. Makoul and Clayman reasoned that

this search strategy captured articles with a clear focus on shared decision making in the medical literature and that the simple approach allows for reproducibility for future studies.(19) Due to the lack of agreement across studies regarding how to best define, and thus measure, the occurrence of SDM, we opted to include all studies that explicitly measured shared decision-making, regardless of the tool used. In so doing, we do not prescribe an operational definition of SDM per se, but assessed all studies that specifically mentioned "shared decision making" in the abstract. No start date was specified so that all studies published up through the end of 2012 would be included. One reviewer (L.A.S.) screened the resulting abstracts for the inclusion and exclusion criteria. The full text of all potentially eligible articles were read and reviewed and any non-redundant references to SDM were collected. A second reviewer (J.E.L.) reviewed any articles for which eligibility was not clear and a final inclusion/exclusion decision was made by consensus. Because a number of study eligible articles evaluated more than one patient outcome in relation to SDM, the unit of analysis for this review is a patient outcome.

Classification framework

There are multiple ways that SDM can be measured.(19, 20) A priori we expected the measurement of SDM to fall into two primary categories: patient self-reports of SDM or observer-ratings of the use of SDM (usually via structured coding of audio-recordings). Our review of the literature also revealed a third category: clinician reports of using SDM with patients. In addition to considering the SDM measurement perspective, as indicated in the conceptual framework (Figure 1) we also considered the type of outcome evaluated. Because there have been a diversity of outcomes assessed in association with SDM, it is helpful to categorize these outcomes to provide for more meaningful discussion of results across studies. Thus, we used an adaptation of the three classifications proposed in the Transformation Model of Communication and Health Outcomes:(17) affective-cognitive, behavioral, or health outcome. Combined, these categorizations resulted in a 3×3 classification framework that was used to structure the results of the systematic review (Figure 2).

Assessment of the quality of studies

We used a modified version of the Systematic Appraisal of Quality in Observational Research (SAQOR) tool to assess the quality of included studies.(21) SAQOR was created for use in systematic reviews to assess the quality of observational studies. Each study was rated as adequate, inadequate, or unclear across six categories: sample, research design, quality of measures, follow-up, distorting influences (confounders), and reporting of data. A total score for each study is computed by counting the number of categories marked adequate. Thus the total quality score has a range of 0 to 6, with higher scores indicating higher quality studies. Total scores of 5 or 6 represent high quality, scores of 3 or 4 represent moderate quality, and 0 to 2 represent low quality observational studies.(22) After training together on three studies, two reviewers independently rated each remaining study according to the above criteria. Cohen's kappa was calculated as a measure of interrater reliability of quality ratings at the category level for each study. Interrater reliability of the independent rating of quality scores was high (Cohen's kappa = 0.7). Any discrepancies in scoring were discussed until consensus was reached.

The results of our review are presented below in accordance with the Institute of Medicine's standards for reporting reviews. (23)

Results

Overview of studies

Forty-one publications, (24–64) representing 39 unique studies, met the inclusion criteria (Figure 3; Table 1). Thirty-four of the 41 articles meeting inclusion criteria were published in the last ten years and the earliest study meeting the inclusion criteria was published in 1989.(24)

The 39 studies were conducted across a variety of clinical contexts. Fourteen studies (36%) were conducted in the context of cancer care, and almost three-quarters of these (n=10) focused specifically on breast cancer treatment and surgery decisions. Other clinical contexts studied included mental health (n=5), diabetes (n=5), serious injury (n=3), heart disease (n=2), HIV (n=2), and general primary care (n=2) among others (n=6).

Quality assessment

The SAQOR quality scores ranged from 2 to 6, with a median score of 4 (Table 1). Across the 39 studies, three (8%) received a high quality rating, 30 (77%) moderate, and six (15%) low. Most of the studies were either a cross-sectional or prospective survey in which data were collected either before and after, or only after, a consultation with a clinician. Only nine of the studies utilized a pre-test, post-test design (24, 27, 39, 40, 42, 44, 60–62) and 19 studies measured SDM at the same time as measuring the outcome of interest (25, 26, 28, 29, 31–34, 37, 41, 45–47, 49–53) Nine of the 39 studies were conducted in the context of a clinical trial.(27, 32, 38, 39, 42, 44, 46, 51, 56) Eight of these were a secondary analysis of a previous RCT.(27, 32, 38, 46, 51, 56) In these studies, the analysis either was conducted without regard to group assignment, (51, 56) group assignment was used as a predictor variable in the model,(32, 38, 42, 46) or the results were tested separately to see if group assignment confounded the relationship between measured SDM and patient outcomes.(27, 39) The ninth study included a patient self-report of participation in SDM, but only tested the association of patient-reported SDM with a patient outcome among those in the experimental group.(44) Thus, none of the included RCTs evaluated the association between SDM and a patient outcome with a randomized design.

SDM Measurement Perspective

Eighty-five percent of studies measured SDM from the patient's perspective (n=33), 15% (n=6) via observer rating, and two (8%) used clinician-reports to measure SDM. In two studies, (48, 55) the same patient outcome was assessed for its association with SDM from different SDM measurement perspectives and these analyses are considered separately.

Patient-reported SDM was measured in a variety of ways across studies. The most commonly used measure was a modified version of the Control Preference Scale(65) in which patients rate their perceptions about their level of involvement in decision-making (n=13 studies). In its original form, the Control Preference Scale measures an individual's

preferences for his or her role in decision-making, and has been validated across several different patient and clinical contexts and shown to have good reliability.(69, 70) The second mostly commonly used patient-reported measure of SDM was the multi-item Patient Involvement in Care Scale,(25) which was used in four studies. The Patient Involvement in Care Scale has been validated across a number of studies, most commonly in the context of cancer care.(69, 70) A variety of other single and multi-item measures of SDM were used (n=16 studies), including five studies which developed new measures of SDM for their study.

Five of the six studies that included observer ratings of SDM used the OPTION scale in which observers rate the communication between patient and clinician on 12 items.(66) The OPTION scale is either completed by an in-person observer in real time or is used to rate audio-recordings of patient/clinician interactions.

Clinician-reported SDM was used in two studies, both in the context of diabetes.(55, 58) One of these used a modified version of the Control Preference Scale(65) and the other used a 9-item Self-Assessment Questionnaire.(67)

Patient Outcomes Evaluated

The number of patient outcomes evaluated per study ranged from 1 to 7 with a total of 95 unique patient outcomes and 97 unique patient outcome-SDM measurement pairs assessed across the 39 studies (Table 2). Among the 97 outcome assessments, 51% (n=50) were affective-cognitive, 28% (n=27) behavioral, and 21% (n=20) health outcomes. Half of the affective-cognitive variables studied were around patient satisfaction (n=25). Beyond satisfaction, affective-cognitive variables included concerns/anxieties about the illness (n=5), decisional conflict (n=4), anxiety following the consultation (n=4), confidence in the decision (n=2), and knowledge (n=2) among others. The most frequent behavioral variable assessed was around the treatment decision itself (n=10), with nine of these regarding breast cancer treatment decisions. Other behavioral variables include treatment/medication adherence (n=7), health behaviors (n=3), and others. Health outcomes included patient ratings of overall health (n=6) and quality life (n=3), depressive symptoms (n=5) and other patient-reported measures (n=2), as well as a blood pressure (n=2) and other physiological measures (n=2).

Associations between SDM and patient outcomes

As can be seen in Table 3, less than half (n=42; 43%) of assessments found a statistically significant and positive relationship between SDM and the patient outcome. Results varied by both the SDM measurement perspective and the category of patient outcome. When SDM was measured from the perspective of the patient, regardless of the outcome category, assessments were more likely to result in significant associations. Across all outcomes assessed, 52% were significantly and positively associated with patient-reported SDM, compared to only 21% of outcomes when SDM was observer-rated and 0% when SDM was clinician-reported.

Similarly, regardless of how SDM was measured, affective-cognitive patient outcomes were most likely to be associated with SDM. Because a full half of the affective-cognitive

outcomes were patient satisfaction variables, we compared the results and conclusions between satisfaction outcomes and those using other affective-cognitive outcomes (online Appendix Table A-1). As neither the results nor conclusions were altered we continue to categorize the outcome variables according to our original categorization framework throughout the remainder of the review. In total, fifty-four percent of affective-cognitive outcomes were positively associated with SDM, compared to 37% of behavioral, and 25% of health patient outcomes. Three studies found negative effects of SDM on patient outcomes including an increase in decisional conflict,(32) a decrease in patient satisfaction,(37) and an increase in patient reports of the impact of breast cancer on their life.(41) All three were affective-cognitive patient outcomes in the context of patient self-reports of SDM.

All five health outcomes that were found to be associated with SDM were patient self-reported outcomes, including a one-item ratings of general health rating,(46) discomfort,(24) symptom improvement,(24) general medical improvement,(24) and measure of depressive symptoms rated on the Center for Epidemiologic Studies-Depression scale.(39) Among these, only depressive symptoms were measured using a multi-item, previously validated scale.(39) None of the four physiological measures assessed were associated with SDM.(44, 58)

Discussion

Relatively few evaluations have been conducted between SDM and patient outcomes when both the decision-making process and patient outcome have been empirically measured. We found a total of 39 unique studies, which included 97 assessments of the relationship between an empirical measure of SDM and a subsequent empirical measure of a patient outcome. Affective-cognitive outcomes were assessed most often and were primarily patient reports of satisfaction, decisional conflict, or other perceptions immediately after an interaction with a clinician. Furthermore, relative to behavioral and health outcomes, affective-cognitive outcomes were most often found to be significantly and positively associated with SDM. While affective-cognitive outcomes are important and represent SDM's origins as an ethical call to increase patient autonomy,(3, 8) there has been a shift towards understanding how patient-clinician communication, including SDM, may be associated with more distal behavioral and health outcomes(12, 16, 68)

Although there are strong ethical and interpersonal reasons to advocate for SDM, our findings illustrate the continued uncertainty surrounding SDM as a mechanism to improve patient outcomes. Regardless of the type of patient outcome considered or the SDM measurement employed, empirical evaluations that have included an explicit measure of the shared decision-making process and a patient outcome more often than not have found no positive and statistically significant relationship between SDM and the patient outcome. The one exception is among assessments that evaluated an affective-cognitive patient outcome in relation to patient-reported SDM. Within these assessments, the majority (66%) found a significant and positive relationship between SDM and a subsequent patient outcome. Notably lacking were any studies that evaluated the association between observer-rated SDM and patient health outcomes. Clinician reports of SDM were also rare, with the eight

such associations evaluated here coming from only two independent studies, with none found to have a significant association with a patient outcome.

Notably, 85% of the studies identified for review measured SDM via a patient self-report. As previously reported, (19, 20) within the patient-reported SDM measurement category, a wide range of measures of patient perceptions of SDM are currently being used. While variations of the Control Preference Scale(65) are most commonly used, we found 16 different instruments used across the 33 studies that measured SDM via patient self-report. Whether the Control Preference Scale or some other instrument is used to capture patient-reported use of SDM, more often than not, items contained in these instruments do not enable an understanding of what it is about the decision-making process that leads a patient to report that it was shared. Additionally many of the patient-reported measures of SDM used were not previously validated, or were not validated for the population for which they were being used. Taken together, this is particularly troubling as several recent studies have found that observer ratings of SDM do not predict patient reports of having participated in a shared decision.(48, 69, 70) These findings may represent differences in conceptual definitions of SDM or may highlight problems with the current tools for measuring SDM. Regardless, these results, combined with our findings that when positively associated with a patient outcome it is patient-perceived SDM, and not observer-rated SDM that is important, highlight the importance of understanding the patient's perspective as critical to the science of measuring SDM. As better tools are developed to measure SDM, it will be critical understand what leads a patient to label a decision as "shared." Without such an understanding, our ability to foster SDM processes in practice will continue to be hindered as will our ability to fully understand the impact of SDM on patient outcomes.

Our review highlights several important points regarding the assessment of SDM and patient health outcomes. First, health outcomes were least studied. Second, when health outcomes have been assessed in relation to SDM, the outcomes have most often been measured via patient self-report, and often with un-validated instruments. In total, only five of the 20 (25%) health outcomes evaluated were found to be associated with SDM, and four of these used single-item un-validated measures. Furthermore, we identified only four physiological measures of patient health (blood pressure, hemoglobin A1C, and lipid level) that have been evaluated for their association with SDM, and none of these evaluations identified a statistically significant relationship.(44, 58) Results from this review, thus, indicate that the link between SDM and health patient outcomes, in particular, has yet to be fully established.

Notably lacking among the SDM literature are randomized trials evaluating the impact of a communication/decision-making intervention on patient outcomes that empirically measure the communication/decision-making process used. There have been many RCTs in recent years that have evaluated the effects of some type of communication or decision-making intervention on patient outcomes. These interventions most often center on a decision aid, but also include patient or clinician communication training interventions. (71, 72) Decision aid studies, in particular, have shown decision aids to be effective at improving patient outcomes. (18) However, many of these intervention studies have not included an empirical measure of SDM, instead assuming SDM to have occurred based upon group assignment, or have included a measure of SDM as means of quality control but have not modeled the

empirical measure of SDM with patient outcomes. Without an evaluation of the empirical measure of SDM with patient outcomes, it is not clear that SDM (or something else) is what lead to an improvement in the patient outcome. The Cochrane review's finding that there were no differences in patient self-reports of SDM by group assignment among decision aid studies that included an empirical measure of SDM highlights the uncertainty of what led to the changes in patient outcomes.(19) Our review identified only 9 studies conducted in the context of a randomized trial, (27, 32, 38, 39, 42, 44, 46, 51, 56) and despite the design of the parent study, none reported the association of SDM and a patient outcome in the context of the randomized design.

Until now, SDM has almost always been measured cross-sectionally in the context of one interaction or discussion. This may, in part, explain the general lack of association between SDM and patient outcomes. That is, one discussion between a clinician and patient may not lead to improved health outcomes. Instead, a long-standing relationship between a clinician and patient marked by patient-centered care and SDM may impact outcomes over time. To compliment thoughtful conceptual models that hypothesize the paths between patient and clinician communication behaviors and patient outcomes (e.g.16), well designed studies are needed that measure multiple patient and physician interactions and patient outcomes over time to formally test whether decision-making and communication interventions lead to increased SDM, and then whether it is these increases in SDM (or something else) that are associated with health outcomes. SDM may mediate, or even moderate the relationship between communication or decision-making interventions and patient outcomes. For example, SDM may improve patient satisfaction, which over time may lead to trust in the physician, followed by adherence to physician recommendations and ultimately improved health. (73) However, as of yet these relationships remain largely untested in the empirical literature.

In the meantime SDM may be better advocated on ethical grounds. Patient centered care, including SDM, is important outside of its potential effect on patient health outcomes. The U.S. Preventive Task Force highlighted the multiple perspectives on which SDM can be recommended. These included an ethical mandate to protect patient autonomy and self-determination, an interpersonal benefit of promoting trust in the patient-clinician relationship, and an educational gain of increasing patient knowledge about treatment options, benefits, and harms through a SDM process. (5) Thus, despite only limited evidence that shared decision making improves patient outcomes, there are still important reasons to advocate for a SDM process when making healthcare decisions.

Limitations

Our conceptual framework examines the impact of SDM when explicitly measured on patient outcomes across two important domains – the perspective from which SDM was measured and the type of patient outcome. However, there are undoubtedly other dimensions that are important to understanding the relationship between SDM and patient outcomes. For example, the clinical context in which the decision was made and the nature of the decision itself (prevention vs. acute treatment vs. chronic treatment decisions, etc.) may influence the impact of SDM on patient outcomes. Given the relatively small number of

studies identified as eligible for study inclusion, we were not able to further categorize studies for this first systematic review.

We recognize that SDM (particularly patient perceptions of SDM) may not be limited to the context of one visit between a patient and clinician, but rather patient reports of SDM may be influenced by the prior relationship between the patient and clinician or by the influence of other parties in the decision.(69) This is especially likely to be true in primary care and chronic disease contexts in which patients and their clinicians often make multiple decisions over the course of many visits. However, none of the studies identified here measured SDM across a long-standing relationship, and thus we are unable to discuss how SDM may affect patient outcomes over time. Additionally, all of the studies reviewed here examined SDM in the context of a patient and clinician only, limiting our ability to examine the effects of having family members or others participate in decision-making.

The study inclusion and exclusion criteria may have also impacted our findings. Our aim in the current review was to understand how SDM is currently measured and how SDM using these different measures are (or are not) associated with various patient outcomes. As such we the study inclusion criteria required both an empirical measure of SDM as well as an assessment of the association between that measure and a patient outcome. Based on these criteria, most of the included studies were observational studies rather than randomized clinical trials, as most intervention studies did not include an evaluation of the association of an empirical measure of SDM and patient outcomes. Rather, if those studies choose to draw conclusions specific to shared decision making, they did so by evaluating the effect of intervention group assignment on patient outcomes. Thus, there may be additional patient outcomes that have been assessed in relationship to a SDM intervention that are not discussed in this review. Our findings are also limited by the psychometric properties of both the SDM and outcome measures used in the studies meeting our inclusion criteria. Although we cannot formally assess the impact of such measurement limitations on our findings, it is important to acknowledge that the psychometric properties of both the SDM and outcome measures were varied or, at times, not reported.

Finally, the results and conclusions presented here may be influenced by publication biases. Although we were careful to review articles identified as eligible for inclusion for additional non-redundant references, we did not attempt to identify and include results from unpublished studies. Additionally, due to the diversity of patient outcomes assessed across studies combined with the relative paucity of studies, we were not able to use meta-analysis methods. As consensus is built around the measurement of SDM and the patient outcomes most salient to SDM, future systematic reviews may be able to use a meta-analysis to formally combine and assess the evidence across studies.

Conclusion

Our review suggests that when patients report that they have participated in shared decision making, they are likely to enjoy better affective-cognitive outcomes, such as improved satisfaction and less decisional conflict. Furthermore, patient reports are the only SDM measurement perspective found to be associated with patient health outcomes, albeit in a

minority of those studies. The challenge with these findings is that we do not know what leads a patient to report a decision as shared, and thus do not know how to foster SDM and its associated benefits in practice. Thus, not only should future studies continue to address the impact of SDM across a continuum of patient outcomes and clinical settings, they should also address the methodological challenges associated with such evaluations, including how best to measure shared decision making. Patients increasingly report a desire to engage in shared decision making, and SDM remains an important tool to promote patient autonomy and satisfaction. However, our findings indicate that with the measures of SDM currently available the link between SDM and patient behavioral and health outcomes has yet to be fully established.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

Dr. Shay is supported by a post-doctoral fellowship, University of Texas School of Public Health Cancer Education and Career Development Program (National Cancer Institute/NIH Grant R25 CA57712). Financial support for this study was provided by a grant from the National Institute on Aging (1F31AG040923-01) and developmental projects award from the Center for Health Communications Research at the University of Michigan (5P50CA101451-09). The funding agreement ensured the authors' independence in designing the study, interpreting the data, writing, and publishing the report.

References

1. Weston WW. Informed and shared decision-making: the crux of patient-centred care. Canadian Medical Association journal. 2001; 165(4):438–439. [PubMed: 11531054]
2. Godolphin W. The role of risk communication in shared decision making. BMJ. 2003; 327(7417): 692–693. [PubMed: 14512449]
3. Research PsCftSoEPiMaBaB. Making health care decisions. Washington DC: 1982.
4. Berwick DM. A user's manual for the IOM's 'Quality Chasm' report. Health Aff (Millwood). 2002; 21(3):80–90. [PubMed: 12026006]
5. Sheridan S, Harris R, Woolf S. Shared decision making about screening and chemoprevention. a suggested approach from the U.S Preventive Services Task Force. American Journal of Preventive Medicine. 2004; 26(1):56–66. [PubMed: 14700714]
6. Emanuel EJ, Pearson SD. Physician autonomy and health care reform. JAMA. 2012; 307(4):367–368. [PubMed: 22274681]
7. Chewning B, Bylund CL, Shah B, Arora NK, Gueguen JA, Makoul G. Patient preferences for shared decisions: a systematic review. Patient Educ Couns. 2012; 86(1):9–18. [PubMed: 21474265]
8. Brody DS. The patient's role in clinical decision-making. Ann Intern Med. 1980; 93(5):718–722. [PubMed: 7212484]
9. 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). Social science medicine. 1997; 44(5):681–692. [PubMed: 9032835]
10. Wennberg JE. Dealing with medical practice variations: a proposal for action. Health affairs. 1984; 3(2):6–32. [PubMed: 6432667]
11. Frosch DL, Kaplan RM. Shared decision making in clinical medicine: past research and future directions. American Journal of Preventive Medicine. 1999; 17(4):285–294. [PubMed: 10606197]
12. Epstein, RM.; Street, RL. NIH Publication No 07–6225. Bethesda, MD: National Cancer Institute; 2007. Patient-Centered Communication in Cancer Care: Promoting Healing and Reducing Suffering.

13. Hamann J, Mendel R, Meier A, Asani F, Pausch E, Leucht S, et al. “How to speak to your psychiatrist”: shared decision-making training for inpatients with schizophrenia. Psychiatr Serv. 2011; 62(10):1218–1221. [PubMed: 21969650]
14. Wilkins EG, Lowery JC, Copeland LA, Goldfarb SL, Wren PA, Janz NK. Impact of an educational video on patient decision making in early breast cancer treatment. Med Decis Making. 2006; 26(6):589–598. [PubMed: 17099197]
15. Légaré F, Labrecque M, LeBlanc A, Njoya M, Laurier C, Côté L, et al. Training family physicians in shared decision making for the use of antibiotics for acute respiratory infections: a pilot clustered randomized controlled trial. Health Expect. 2011; (14 Suppl 1):96–110. [PubMed: 20629764]
16. Street R, Makoul G, Arora N, Epstein R. How does communication heal? Pathways linking clinician-patient communication to health outcomes. Patient education and counseling. 2009; 74(3):295–301. [PubMed: 19150199]
17. Kreps G, O'Hair D, Clowers M. The Influences of Human Communication on Health Outcomes. American Behavioral Scientist. 1994; 38:248–256.
18. Stacey D, Bennett CL, Barry MJ, Col NF, Eden KB, Holmes-Rovner M, et al. Decision aids for people facing health treatment or screening decisions. Cochrane Database Syst Rev. 2011; (10):CD001431. [PubMed: 21975733]
19. Makoul G, Clayman M. An integrative model of shared decision making in medical encounters. Patient education and counseling. 2006; 60(3):301–312. [PubMed: 16051459]
20. Scholl I, Koelewijn-van Loon M, Sepucha K, Elwyn G, Legare F, Harter M, et al. Measurement of shared decision making - a review of instruments. Zeitschrift fur Evidenz, Fortbildung und Qualitat im Gesundheitswesen. 2011; 105(4):313–324.
21. Ross LE, Grigoriadis S, Mamisashvili L, Koren G, Steiner M, Dennis CL, et al. Quality assessment of observational studies in psychiatry: an example from perinatal psychiatric research. Int J Methods Psychiatr Res. 2011; 20(4):224–234. [PubMed: 22113965]
22. Betancourt TS, Borisova I, Williams TP, Meyers-Ohki SE, Rubin-Smith JE, Annan J, et al. Psychosocial adjustment and mental health in former child soldiers--systematic review of the literature and recommendations for future research. J Child Psychol Psychiatry. 2013; 54(1):17–36. [PubMed: 23061830]
23. Medicine, Io. Finding What Works in Health Care: Standards for Systematic Reviews. Washington DC: Institute of Medicine; 2011.
24. Brody DS, Miller SM, Lerman CE, Smith DG, Caputo GC. Patient perception of involvement in medical care: relationship to illness attitudes and outcomes. J Gen Intern Med. 1989; 4(6):506–511. [PubMed: 2585158]
25. Lerman CE, Brody DS, Caputo GC, Smith DG, Lazaro CG, Wolfson HG. Patients' Perceived Involvement in Care Scale: relationship to attitudes about illness and medical care. J Gen Intern Med. 1990; 5(1):29–33. [PubMed: 2299426]
26. Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. Respir Med. 1999; 93(2): 88–94. [PubMed: 10464858]
27. Gattellari, M.; Butow, PN.; Tattersall, MH. Soc Sci Med. Vol. 52. England: 2001. Sharing decisions in cancer care; p. 1865-1878.
28. Golin C, DiMatteo MR, Duan N, Leake B, Gelberg L. Impoverished diabetic patients whose doctors facilitate their participation in medical decision making are more satisfied with their care. J Gen Intern Med. 2002; 17:857–866. United States. [PubMed: 12406358]
29. Heisler M, Bouknight RR, Hayward RA, Smith DM, Kerr EA. The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management. J Gen Intern Med. 2002; 17:243–252. United States. [PubMed: 11972720]
30. Keating NL, Guadagnoli E, Landrum MB, Borbas C, Weeks JC. Treatment decision making in early-stage breast cancer: should surgeons match patients' desired level of involvement? J Clin Oncol. 2002; 20(6):1473–1479. [PubMed: 11896094]

31. Heisler M, Vijan S, Anderson RM, Ubel PA, Bernstein SJ, Hofer TP. When do patients and their physicians agree on diabetes treatment goals and strategies, and what difference does it make? J Gen Intern Med. 2003; 18:893–902. United States. [PubMed: 14687274]
32. Legare, F.; Tremblay, S.; O'Connor, AM.; Graham, ID.; Wells, GA.; Jacobsen, MJ. Health Expect. Vol. 6. England: 2003. Factors associated with the difference in score between women's and doctors' decisional conflict about hormone therapy: a multilevel regression analysis; p. 208-221.
33. Ananian P, Houvenaeghel G, Protiere C, Rouanet P, Arnaud S, Moatti JP, et al. Determinants of patients' choice of reconstruction with mastectomy for primary breast cancer. Ann Surg Oncol. 2004; 11:762–771. United States. [PubMed: 15249342]
34. Lantz PM, Janz NK, Fagerlin A, Schwartz K, Liu L, Lakhani I, et al. Satisfaction with surgery outcomes and the decision process in a population-based sample of women with breast cancer. Health Serv Res. 2005; 2005; 40:745–767. United States.
35. Katz SJ, Lantz PM, Janz NK, Fagerlin A, Schwartz K, Liu L, et al. Patient involvement in surgery treatment decisions for breast cancer. J Clin Oncol. 2005; 23:5526–5533. United States. [PubMed: 16110013]
36. Bleicher RJ, Abrahamse P, Hawley ST, Katz SJ, Morrow M. The influence of age on the breast surgery decision-making process. Ann Surg Oncol. 2008; 15(3):854–862. [PubMed: 18058182]
37. Nekhlyudov L, Bower M, Herrinton LJ, Altschuler A, Greene SM, Rolnick S, et al. Women's decision-making roles regarding contralateral prophylactic mastectomy. J Natl Cancer Inst Monogr. 2005:55–60. United States. [PubMed: 16287886]
38. Thapar, AK.; Roland, MO. BMC Fam Pract. Vol. 6. England: 2005. General practitioner attitudes to the care of people with epilepsy: an examination of clustering within practices and prediction of patient-rated quality of care; p. 9
39. Clever SL, Ford DE, Rubenstein LV, Rost KM, Meredith LS, Sherbourne CD, et al. Primary care patients' involvement in decision-making is associated with improvement in depression. Med Care. 2006; 44:398–405. United States. [PubMed: 16641657]
40. Loh, A.; Leonhart, R.; Wills, CE.; Simon, D.; Harter, M. Patient Educ Couns. Vol. 65. Ireland: 2007. The impact of patient participation on adherence and clinical outcome in primary care of depression; p. 69-78.
41. Mandelblatt J, Kreling B, Figeuriedo M, Feng S. What is the impact of shared decision making on treatment and outcomes for older women with breast cancer? J Clin Oncol. 2006; 24:4908–4913. United States. [PubMed: 16983102]
42. Swanson KA, Bastani R, Rubenstein LV, Meredith LS, Ford DE. Effect of mental health care and shared decision making on patient satisfaction in a community sample of patients with depression. Med Care Res Rev. 2007; 64:416–430. United States. [PubMed: 17684110]
43. Mahone IH. Shared decision making and serious mental illness. Arch Psychiatr Nurs. 2008; 22:334–343. United States. [PubMed: 19026922]
44. Deinzer A, Veelken R, Kohnen R, Schmieder RE. Is a shared decision-making approach effective in improving hypertension management? J Clin Hypertens (Greenwich). 2009; 11(5):266–270. [PubMed: 19534034]
45. Hawley ST, Griggs JJ, Hamilton AS, Graff JJ, Janz NK, Morrow M, et al. Decision involvement and receipt of mastectomy among racially and ethnically diverse breast cancer patients. J Natl Cancer Inst. 2009; 101:1337–1347. United States. [PubMed: 19720966]
46. Janssen C, Ommen O, Pfaff H, Lefering R, Neugebauer E. Pre-traumatic, trauma- and treatment-related determinants of self-rated health after a severe trauma. Langenbecks Arch Surg. 2009; 394(3):539–546. [PubMed: 19214559]
47. van den Bergh RC, Essink-Bot ML, Roobol MJ, Wolters T, Schroder FH, Bangma CH, et al. Anxiety and distress during active surveillance for early prostate cancer. Cancer. 2009; 115(17): 3868–3878. [PubMed: 19637245]
48. Burton, D.; Blundell, N.; Jones, M.; Fraser, A.; Elwyn, G. Patient Educ Couns. Vol. 80. Ireland: 2009 Elsevier Ireland Ltd; 2010. Shared decision-making in cardiology: do patients want it and do doctors provide it?; p. 173-179.

49. Ommen O, Thuem S, Pfaff H, Janssen C. The relationship between social support, shared decision-making and patient's trust in doctors: a cross-sectional survey of 2,197 inpatients using the Cologne Patient Questionnaire. Int J Public Health. 2011; 56(3):319–327. [PubMed: 21076932]
50. Glass, KE.; Wills, CE.; Holloman, C.; Olson, J.; Hechmer, C.; Miller, CK., et al. Patient Educ Couns. Vol. 88. Ireland: 2012 Elsevier Ireland Ltd; 2012. Shared decision making and other variables as correlates of satisfaction with health care decisions in a United States national survey; p. 100-105.
51. Johnson, MO.; Sevelius, JM.; Dilworth, SE.; Saberi, P.; Neilands, TB. Patient Prefer Adherence. Vol. 6. New Zealand: 2012. Preliminary support for the construct of health care empowerment in the context of treatment for human immunodeficiency virus; p. 395-404.
52. Lim JW, Baik OM, Ashing-Giwa KT. Cultural health beliefs and health behaviors in Asian American breast cancer survivors: a mixed-methods approach. Oncol Nurs Forum. 2012; 39:388–397. United States. [PubMed: 22750897]
53. Mo, HN.; Shin, DW.; Woo, JH.; Choi, JY.; Kang, J.; Baik, YJ., et al. Palliat Med. Vol. 26. England: 2012. Is patient autonomy a critical determinant of quality of life in Korea? End-of-life decision making from the perspective of the patient; p. 222-231.
54. Schleife H, Sachtleben C, Finck Barboza C, Singer S, Hinz A. Anxiety, depression, and quality of life in German ambulatory breast cancer patients. Breast Cancer. 2012
55. Schoenthaler AM, Schwartz BS, Wood C, Stewart WF. Patient and physician factors associated with adherence to diabetes medications. Diabetes Educ. 2012; 38:397–408. United States. [PubMed: 22446035]
56. Thum S, Janssen C, Pfaff H, Lefering R, Neugebauer EA, Ommen O. The association between psychosocial care by physicians and patients' trust: a retrospective analysis of severely injured patients in surgical intensive care units. Psychosoc Med. 2012; 9:Doc04. Germany. [PubMed: 23049644]
57. Wallen GR, Brooks AT. To Tell or Not to Tell: Shared Decision Making, CAM Use and Disclosure Among Underserved Patients with Rheumatic Diseases. Integrative medicine insights. 2012; 7:15–22. [PubMed: 23071389]
58. Heisler M, Tierney E, Ackermann RT, Tseng C, Narayan KM, Crosson J, et al. Physicians' participatory decision-making and quality of diabetes care processes and outcomes: results from the triad study. Chronic Illn. 2009; 5:165–176. United States. [PubMed: 19675116]
59. Goossensen, A.; Zijlstra, P.; Koopmanschap, M. Patient Educ Couns. Vol. 67. Ireland: 2007. Measuring shared decision making processes in psychiatry: skills versus patient satisfaction; p. 50-56.
60. Singh, S.; Butow, P.; Charles, M.; Tattersall, MH. Health Expect. Vol. 13. England: 2010. Shared decision making in oncology: assessing oncologist behaviour in consultations in which adjuvant therapy is considered after primary surgical treatment; p. 244-257.
61. Politi MC, Clark MA, Ombao H, Dizon D, Elwyn G. Communicating uncertainty can lead to less decision satisfaction: a necessary cost of involving patients in shared decision making? Health Expect. 2011; 14(1):84–91. [PubMed: 20860780]
62. Smith, A.; Juraskova, I.; Butow, P.; Miguel, C.; Lopez, AL.; Chang, S., et al. Patient Educ Couns. Vol. 82. Ireland: 2010 Elsevier Ireland Ltd; 2011. Sharing vs. caring--the relative impact of sharing decisions versus managing emotions on patient outcomes; p. 233-239.
63. Butow P, Juraskova I, Chang S, Lopez AL, Brown R, Bernhard J. Shared decision making coding systems: how do they compare in the oncology context? Patient Educ Couns. 2010; 78(2):261–268. [PubMed: 19647966]
64. Langseth, MS.; Shepherd, E.; Thomson, R.; Lord, S. Patient Educ Couns. Vol. 87. Ireland: 2011 Elsevier Ireland Ltd; 2012. Quality of decision making is related to decision outcome for patients with cardiac arrhythmia; p. 49-53.
65. Degner LF, Sloan JA, Venkatesh P. The Control Preferences Scale. The Canadian journal of nursing research = Revue canadienne de recherche en sciences infirmieres. 1997; 29(3):21–43. [PubMed: 9505581]

66. Elwyn G, Hutchings H, Edwards A, Rapport F, Wensing M, Cheung WY, et al. The OPTION scale: measuring the extent that clinicians involve patients in decision-making tasks. Health Expect. 2005; 8(1):34–42. [PubMed: 15713169]

67. Symons AB, Swanson A, McGuigan D, Orrange S, Akl EA. A tool for self-assessment of communication skills and professionalism in residents. BMC Med Educ. 2009; 9:1. [PubMed: 19133146]

68. Stewart MA. Effective physician-patient communication and health outcomes: a review. Canadian Medical Association Journal CMAJ. 1995; 152(9):1423–1433.

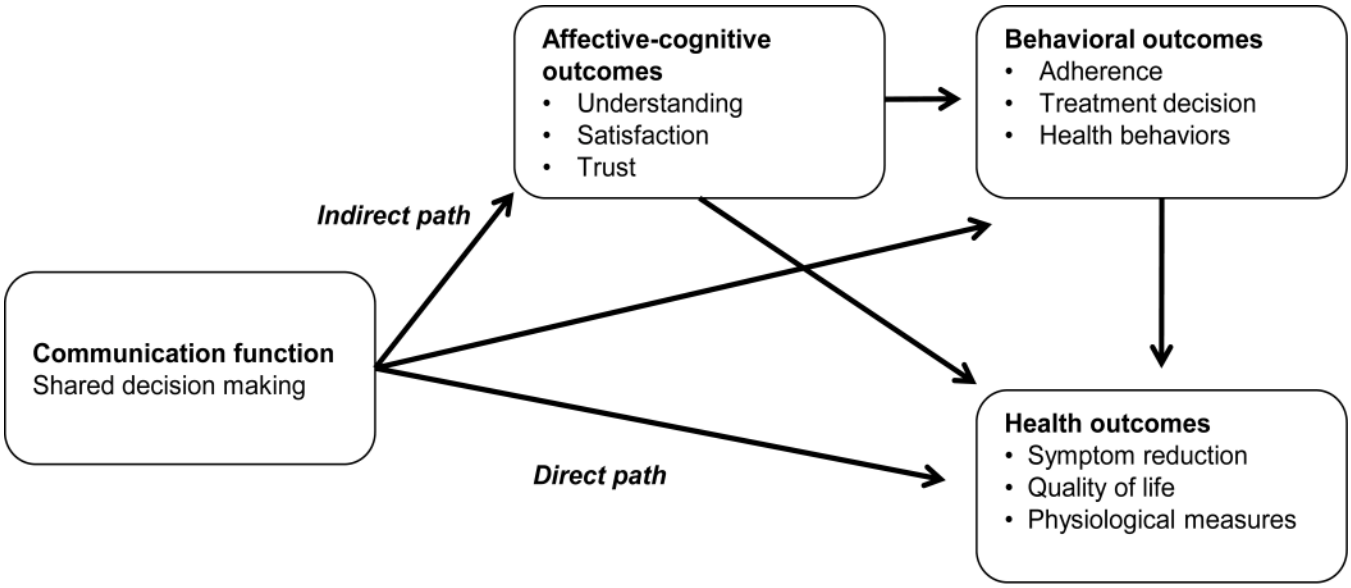
69. Wunderlich, T.; Cooper, G.; Divine, G.; Flocke, S.; Oja-Tebbe, N.; Stange, K., et al. Inconsistencies in patient perceptions and observer ratings of shared decision making: The case of colorectal cancer screening; Miami Special Issue: AACH Conference 2009, Miami, USA; 2010. p. 358-363.

70. Kasper J, Heesen C, Kpke S, Fulcher G, Geiger F. Patients' observers' perceptions of involvement differ Validation study on inter-relating measures for shared decision making. PLoS ONE. 2011; 6(10):e26255–e26255. [PubMed: 22043310]

71. Bernhard J, Butow P, Aldridge J, Juraskova I, Ribi K, Brown R. Communication about standard treatment options and clinical trials: can we teach doctors new skills to improve patient outcomes? Psychooncology. 2012; 21(12):1265–1274. [PubMed: 23208837]

72. Dwamena F, Holmes-Rovner M, Gaulden CM, Jorgenson S, Sadigh G, Sikorskii A, et al. Interventions for providers to promote a patient-centred approach in clinical consultations. Cochrane Database Syst Rev. 2012; 12:CD003267. [PubMed: 23235595]

73. Lafata JE, Morris HL, Dobie E, Heisler M, Werner RM, Dumenci L. Patient-reported use of collaborative goal setting and glycemic control among patients with diabetes. Patient Educ Couns. 2013; 92(1):94–99. [PubMed: 23433777]



Adapted from Patient Education and Counseling, 74/3, Street, Makoul, Arora, Epstein, How does communication heal? Pathways linking clinician–patient communication to health outcomes, 295-301, Copyright (2009), with permission from Elsevier

Kreps, O'Hair, and Clowers, American Behavioral Scientist (38;2) pp. 248-256, copyright © 1994 by (SAGE Publications) Adapted by Permission of SAGE Publications

Figure 1.
Conceptual framework linking SDM to patient outcomes

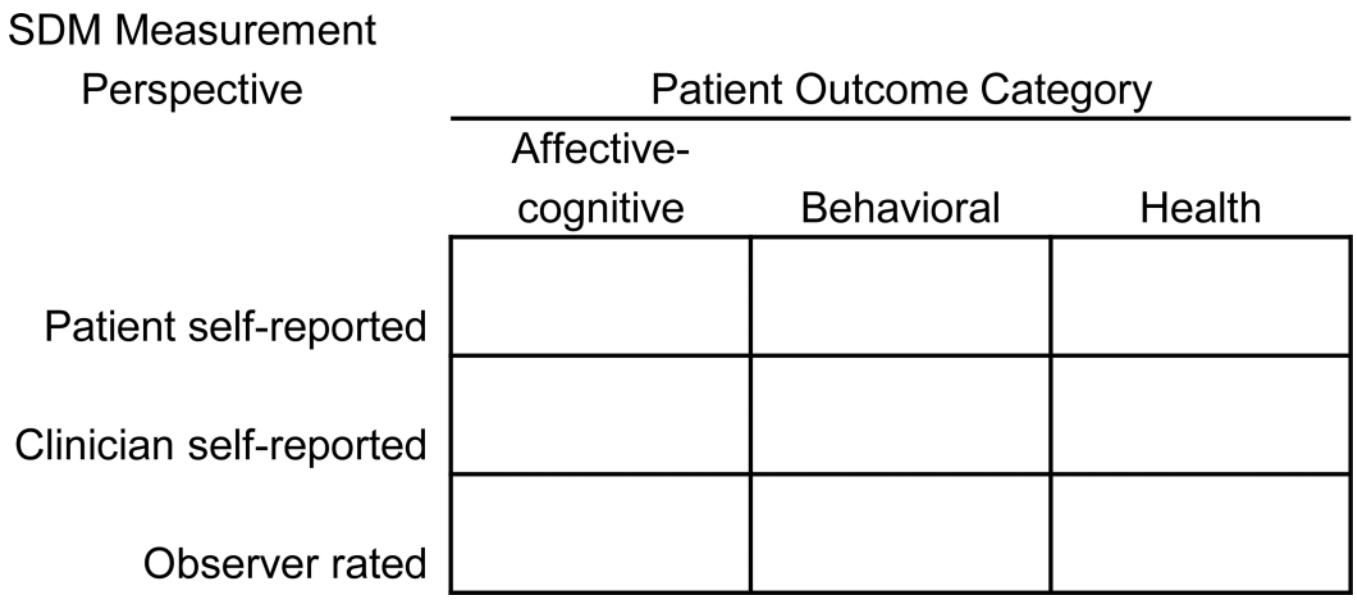


Figure 2.
Categorization framework of patient outcome categories by SDM measurement type

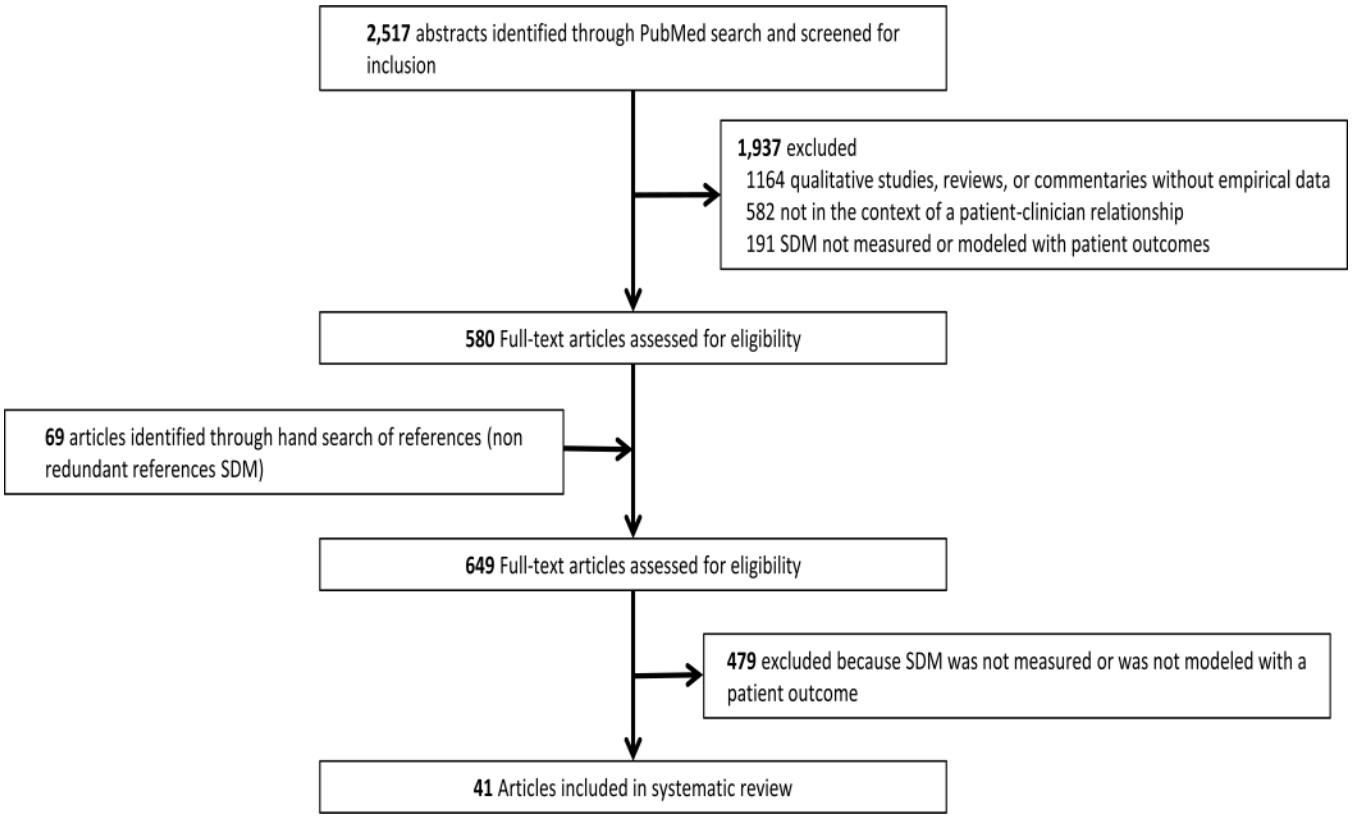


Figure 3.
Search strategy and selection results

Table 1

Summary of included studies by SDM measurement perspective

First Author	Year	Diseases context	n (patient; provider if reported)	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
							SDM associated with: (unless noted the association was significant in the expected direction in a multivariate model)	**SAQOR score and rating**
Patient self reported SDM								
Brody	1989	Primary care, various	117	Survey at baseline, 1 day, and 1 week post-consultation	1-item variant of Control Preference Scale (CPS)	Sense of personal control; concern regarding illness; satisfaction with the physician; experiencing discomfort; experiencing dysfunction; symptom improvement; general medical improvement.	SDM associated with greater sense of personal control, lower post-visit levels of concern regarding illness, less discomfort, greater symptom improvement and greater improvements in overall medical condition one week after visit. No association between SDM and experiencing dysfunction one week after visit.	4 Moderate
Lerman	1990	Primary care, various	83	Cross-sectional survey after primary care visit	13-item Perceived Involvement in Care Scale (PICS)	Satisfaction with the art of care; satisfaction with the technical aspects of care; understanding about illness; reassurance regarding health status; perceived control over medical problem; predicted discomfort; predicted functional capacity	SDM associated with satisfaction with the technical aspects of care, understanding about illness, reassurance regarding health status, perceived control over medical problem, and predicted functional capacity. No association between SDM and satisfaction with the art of care or predicted discomfort.	4 Moderate
Chambers	1999	Asthma (primary care)	394	Cross-sectional survey, SDM questions are not about one specific interaction	1-item variant of CPS	Regular use of inhaled corticosteroids	SDM associated with regular use of inhaled corticosteroids as prescribed.	4 Moderate
Gattellari	2001	Cancer, various	233; 9	Audio-recorded consultation and surveys at baseline, immediately after consultation, 1 week, and 2 weeks post-consultation	1-item variant of CPS	Anxiety immediately after the consultation; anxiety 2 weeks after the consultation; satisfaction with the consultation; satisfaction with the information and emotional support received; recall of	**SDM associated with satisfaction with the consultation and satisfaction with the information and emotional support received. No association between SDM and anxiety at either time point or recall of information.**	**6 High**

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
						information.		
Golin	2002	Diabetes	198	Face-to-face interviews before and after consultation	9-item Facilitation of Patient Involvement in Care Scale (FPI)	Satisfaction with the visit	SDM associated with satisfaction with the visit. In a subgroup analysis, this association was found to be true only for women.	5 High
Heisler	2002	Diabetes	1431	Cross-sectional mailed survey	4-item Provider Participatory Decision-Making Style Scale (PDMstyle)	Patient-reported diabetes self-management	In separate multivariate analyses, both components of SDM are positively associated with patient-reported diabetes self-management. When both components of SDM are included in one model, only information giving remains significant.	3 Moderate
Keating	2002	Breast cancer	1081	Cross-sectional phone survey	1-item rating of decision making role developed for this study	Satisfaction with treatment information provided; satisfaction with treatment choice; receipt of breast conserving surgery (versus mastectomy)	SDM associated with satisfaction with the amount of treatment information provided. There was no association between SDM and satisfaction with treatment choice or receipt of breast conserving surgery.	3 Moderate
Heisler	2003	Diabetes	127; 50	Cross-sectional survey of patient and physician	1-item variant of CPS	Number of treatment strategies agreed upon by patient and provider	No association in multivariate analysis. In a bivariate analysis, SDM is positively associated with the number of treatment strategies agreed upon by the patient and provider. After multivariate adjustment, the association was no longer significant.	4 Moderate
Legare	2003	Menopause	167	Cross-sectional survey of both the patient and physician immediately after consultation	1-item variant of CPS	Difference between physician and patient decisional conflict	SDM associated with the physician experiencing greater decisional conflict that then patient (unexpected direction).	3 Moderate
Ananian	2004	Breast cancer	181	Cross-sectional survey after decision before surgery	1-item variant of CPS	Decision about surgery (mastectomy alone or mastectomy with reconstruction); Decision about timing of reconstruction among those receiving mastectomy with breast reconstruction (immediate or delayed reconstruction)	No associations in multivariate analysis. In bivariate analysis, SDM associated with choice of having breast reconstruction.	3 Moderate

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
Lantz (Also Katz 2005; Bleicher 2008)*	2005	Breast cancer	1633	Cross-sectional mailed survey study on average 7 months after diagnosis	1-item variant of CPS	Satisfaction with surgery received; satisfaction with decision process; decisional conflict; decision about surgery (mastectomy or breast conserving surgery)	SDM associated with greater satisfaction with surgery received, greater satisfaction with the decision process, and less decisional regret. Patients who reported SDM were more likely to receive mastectomy. In a subgroup analysis, this association was only supported for white women and not for racial groups (Katz).	3 Moderate
Nekhlyudov	2005	Breast cancer	431	Cross-sectional mailed survey study	1-item variant of CPS	Satisfaction with decision 6 months after surgery; current satisfaction with decision; current breast cancer concern; current depressive symptoms	SDM (versus patient-controlled decisions) associated with lower satisfaction 6 months after surgery and lower current concern about breast cancer. No associations between SDM and current satisfaction or current depressive symptoms.	4 Moderate
Thapar	2005	Epilepsy	975; 115	Cross-sectional survey study; Secondary analysis of RCT	Not described beyond "patient-rated shared decision making"	Satisfaction with physician care of epilepsy	SDM associated with satisfaction with physician epilepsy care.	3 Moderate
Clever†	2006	Depression (primary care)	1706	Survey at baseline, 6, 18, and 24 months post-consultation; Secondary analysis of 4 RCTs combined	1-item rating of involvement in decision making developed for this study	Receipt of guideline concordant depression care (antidepressant medication or counseling); depressive symptoms	SDM associated with receipt of guideline concordant depression care and resolution of major depression symptoms over 18 months of follow up.	5 High
Loh	2006	Depression (primary care)	207; 30	Longitudinal survey study - data collected at initial consultation and 6–8 weeks later	6-item patient participation scale first used by Mah-Son-Hing et al. 1999	Depressive symptoms; treatment adherence	SDM associated with treatment adherence. No direct association between SDM and depressive symptoms, but there was an indirect effect of SDM on depressive symptoms through treatment adherence.	5 High
Mandelblatt	2006	Breast cancer	718	Cross-sectional in-person survey	4-item subscale of PICS	Decision about surgery (mastectomy or breast conserving surgery); receipt of adjuvant therapy; satisfaction with care; impact of breast cancer on life	SDM associated with adjuvant treatment use, satisfaction with care, and with impact of breast cancer on life (unexpected direction). In a subgroup analysis, SDM only associated with adjuvant treatment use among women aged 67 to 74, and not among those aged 75 and older. No association between SDM and decision about type of surgery.	4 Moderate

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
Swanson[†]	2007	Depression (primary care)	1317	Survey at baseline, 6, 18, and 24 months post-consultation; Secondary analysis of 4 RCTs combined	3-item rating of involvement in SDM developed for this study	Satisfaction with care	SDM associated with satisfaction with care.	5 High
Mahone	2008	Serious mental illness	85	Cross-sectional survey; Secondary analysis of 4 RCTs	1-item variant of CPS	Medication adherence in the past one month; medication adherence in the past 6 months; quality of life	No associations.	3 Moderate
Deinzer	2009	Hypertension (primary care)	86; 15	Prospective controlled clinical trial	Combined Outcome Measure for Risk Communication and Treatment Decision Making Effectiveness scale (COMRADE)	Blood pressure (diastolic and systolic)	No association. In a subgroup analysis, patients with a high interest in participating in SDM who reported an increase in SDM had a decrease in diastolic and systolic blood pressure.	3 Moderate
Hawley	2009	Breast cancer	1651	Cross-sectional mailed survey	1-item variant of CPS	Receipt of mastectomy as the initial surgery treatment	No association between SDM and rates of mastectomy as the initial surgery in multivariate model. In bivariate analysis, women who reported SDM were less likely to receive mastectomy initially than those who reported a patient-based decision.	4 Moderate
Janssen	2009	Serious injury, various	90	Cross-sectional survey	4-item scale measuring SDM as part of the larger Cologne-Patient-Questionnaire (CPQ)	Self-rated health: "Would you say your health in general is excellent, very good, good, fair, or poor?"	SDM associated with better self-related health.	4 Moderate
van den Bergh	2009	Prostate cancer	129	Cross-sectional mailed survey study	1-item rating of involvement in decision making developed for this study	Decisional conflict; depressive symptoms; generic anxiety; prostate cancer specific anxiety	SDM associated with decreased decision conflict. No association between SDM and depressive symptoms, generic anxiety, or prostate cancer specific anxiety.	4 Moderate
Burton [‡]	2010	Heart disease	85	Surveyed before and after consultation. Med students observed interaction and coded using OPTION scale	13-item PICS	Confidence in the decision	SDM associated with confidence in decision.	3 Moderate

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
Ommen	2011	Injury or illness requiring hospitalization, various	2197	Secondary analysis of a cross-sectional, retrospective mailed survey study	4-item scale measuring SDM as part of the larger CPQ	Trust in physician	SDM associated with trust in physician.	4 Moderate
Glass	2012	Various	499	Secondary analysis of a cross-sectional survey study	9-item SDM-Q-9 scale	Satisfaction with decision	SDM associated with satisfaction with the decision.	4 Moderate
Johnson§	2012	HIV	254	Cross-sectional analysis from a longitudinal cohort study	1-item variant of CPS	Health care empowerment	SDM is positively associated with health care empowerment.	3 Moderate
Johnson§	2012	HIV	148	Cross-sectional analysis of a larger RCT	1-item variant of CPS	Health care empowerment	No association.	3 Moderate
Lim	2012	Breast cancer	206	Secondary analysis of a cross-sectional survey	1-item variant of CPS	Exercise, diet, stress management behaviors	SDM is positively associated with engagement in exercise. No association between SDM and diet or stress management.	2 Low
Mo	2012	Terminal cancer	93	Cross-sectional survey	2-item rating of involvement in decision making developed for this study	Physical functioning; emotional functioning; quality of life; quality of death	No associations.	4 Moderate
Schleife	2012	Breast cancer	107	Cross-sectional survey	1-item rating of involvement in decision making developed for this study	Anxiety and depression; quality of life	No associations.	3 Moderate
Schoenthaler ‡	2012	Diabetes	608;41	Cross-sectional mailed survey of patients and physicians and review of electronic health record	13-item PICS	Medication adherence	No association. In an additional analysis there was a significant interaction effect between social support and SDM so that the association between patient perceptions of SDM and medication adherence was stronger as social support increased.	4 Moderate
Thum	2012	Serious injury, various	91	Cross-sectional analysis of a larger RCT	3-item scale measuring SDM as part of the larger CPQ	Trust in physician	SDM associated with trust in physician.	4 Moderate
Wallen	2012	Rheumatic disease	109	Cross-sectional survey study	3-item rating of involvement in SDM as part of the larger	Use of complementary and alternative medicine (CAM); disclosure of use of	SDM associated with use of CAM and disclosure of use of CAM to provider.	3 Moderate

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
					Complementary and Alternative Medicine Use in Arthritis (I-CAMP) questionnaire	CAM to provider		
Clinician self-reported SDM								
Heisler	2009	Diabetes	4198; 1217	Cross-sectional mailed survey and medical record review	1-item variant of CPS	Satisfaction with provider communication; receipt of dilated eye exams; assessment of A1c; assessment of lipids; elevated A1c; elevated lipids; elevated systolic blood pressure	No associations.	4 Moderate
Schoenthaler‡	2012	Diabetes	608;41	Cross-sectional mailed survey of patients and physicians and review of electronic health record	9-item Self-Assessment Questionnaire	Medication adherence	No association.	4 Moderate
Observer rated SDM								
Goossensen	2007	Mental Illness	61;8	Audio-recorded visits with post-consultation surveys	OPTION scale (codes for 12 physician communication behaviors), consultation was audio recorded and coded	Satisfaction with involvement in decision	No association.	2 Low
Burton‡	2010	Heart disease	85	Surveyed before and after consultation. Med students observed interaction and coded using OPTION scale	OPTION scale, consultation was observed and coded	Confidence in the decision	No association.	3 Moderate
Singh	2010	Cancer, various	63	Audio-recorded visits with pre- and post-consultation surveys	Coding system containing 20 physician communication behaviors developed for this study	Satisfaction with consultation; anxiety	No associations.	5 High

First Author	Year	Diseases context	n	Design	SDM Measurement	Patient outcomes measured	Summary of results	Quality rating
Politi	2011	Breast surgery - both prevention and cancer treatment	57	Patient visits were observed and rated on the OPTION scale, patients completed 2 surveys (immediately after consultation and 1–2 weeks late via phone)	OPTION scale, consultation was observed and coded	1. Decision satisfaction; treatment decision consistent with recommendation from physician; aggressiveness of treatment chosen	No associations.	3 Moderate
Smith (Also Butow 2010)	2011	Breast cancer	55	Audio-recorded visits with pre-consultation surveys and then follow up mailed surveys at 2 weeks and 4 months post-consultation	OPTION scale, consultation was audio recorded and coded	Post-consultation anxiety; decisional conflict; satisfaction with the consultation; satisfaction with the physician's SDM skills; satisfaction with decision (after 2 weeks); satisfaction with the decision (after 4 months)	SDM positively associated with satisfaction with the decision after 4 months and satisfaction with the physician's SDM skills. No association between SDM and post-consultation anxiety, decisional conflict, satisfaction with the consultation, or satisfaction with decision after 2 weeks.	4 Moderate
Langseth	2012	Heart disease	49; 2	Audio-recorded visits with post-consultation surveys	OPTION scale, consultation was audio recorded and coded	Treatment decision (invasive or non-invasive)	SDM associated with choice of non-invasive treatment.	2 Low

[*] In two cases, the results from one study were published separately in two articles, but the patient outcomes evaluated as well as the measurement of SDM used overlapped entirely [Butow and Smith; Bleicher and Katz]. The results for each of these pairs of publications are considered only once in the context of this review.

[†] Two publications [Clever and Swanson] are secondary analyses of the same sample, but use different measures of SDM modeled with different outcomes. Each unique SDM measurement and patient outcome assessment is listed separately here and throughout the review.

[‡] Two studies measured SDM from multiple perspectives. Each unique SDM measurement and patient outcome assessment is listed separately here and throughout the review.

[§] Johnson et al., 2012 report the results from two separate studies in one publication. Each study is listed separately here and throughout the review.

Table 2

Patient outcomes assessed by SDM measurement perspective and outcome category (n=97)

SDM Measurement Category	Patient Outcome Category		
	Affective-cognitive (n=50)	**Behavioral (n=27)**	**Health (n=20)**
Patient reported SDM	Satisfaction with care (x7) Concern/anxiety about illness (x5) Satisfaction with decision (x5) Decisional Conflict (x3) Satisfaction with consultation (x3) Anxiety after consultation (x2) Control over medical problem (x2) Health care empowerment (x2) Knowledge (x2) Satisfaction with information received (x2) Trust in physician (x2) Confidence in decision Predicted discomfort Predicted functional capacity	Decision about breast cancer treatment (x7) Medication/treatment adherence (x6) Diet Disclosure of CAM use Exercise Number of treatment strategies agreed upon Receipt of depression care Stress management behaviors Use of CAM	Pt rated health/symptoms (x6) Depressive symptoms (x5) Quality of life (x3) Anxiety Blood pressure Emotional functioning
Clinician reported SDM	Satisfaction with provider communication	Medication adherence Receipt of dilated eye exam Receipt of hemoglobin A1c assessment Receipt of lipid assessment	Blood pressure Hemoglobin A1c Lipid level
Observer rated SDM	Satisfaction with decision (x 4) Anxiety immediately after consultation (x 2) Satisfaction with consultation (x 2) Confidence in decision Decisional conflict Satisfaction with physician's SDM skills	Decision about breast cancer treatment (x 2) Decision about treatment for arrhythmia	

Table 3

Summary of results by SDM measurement perspective and patient outcome category

SDM Measurement Perspective	Patient Outcome Category										
	Affective-cognitive			Behavioral			Health			Total		
		n	%		n	%		n	%		n	%
Patient reported	Positive*	25	66%	Positive	11	55%	Positive	5	29%	**Positive**	**39**	**52%**
	NS*	10	26%	NS	9	45%	NS	12	71%	**NS**	**33**	**44%**
	Negative*	3	8%	Negative	0	0%	Negative	0	0%	**Negative**	**3**	**4%**
	Total measured	38		Total measured	20		Total measured	17		**Total measured**	**75**	
Clinician reported	Positive	0	0%	Positive	0	0%	Positive	0	0%	**Positive**	**0**	**0%**
	NS	1	100%	NS	4	100%	NS	3	100%	**NS**	**8**	**100%**
	Negative	0	0%	Negative	0	0%	Negative	0	0%	**Negative**	**0**	**0%**
	Total measured	1		Total measured	4		Total measured	3		**Total measured**	**8**	
Observer rated	Positive	2	18%	Positive	1	33%	Positive	0	--	**Positive**	**3**	**21%**
	NS	9	82%	NS	2	67%	NS	0	--	**NS**	**11**	**79%**
	Negative	0	0%	Negative	0	0%	Negative	0	--	**Negative**	**0**	**0%**
	Total measured	11		Total measured	3		Total measured	0		**Total measured**	**14**	
Total	**Positive**	**27**	**54%**	**Positive**	**10**	**37%**	**Positive**	**5**	**25%**	**Positive**	**42**	**43%**
	NS	**20**	**40%**	**NS**	**17**	**63%**	**NS**	**15**	**75%**	**NS**	**52**	**54%**
	Negative	**3**	**6%**	**Negative**	**0**	**0%**	**Negative**	**0**	**0%**	**Negative**	**3**	**3%**
	Total measured	**50**		**Total measured**	**27**		**Total measured**	**20**		**Total measured**	**97**	

* Positive refers to a significant, positive (i.e. beneficial) association between SDM and the patient outcome. NS refers to a non-significant association. Negative refers to a significant, negative (i.e. non-beneficial) association between SDM and the patient outcome.