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Segmentation Screening Tool to Identify Health-Related Decision-Making Audience Segments

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Abstract

Health communication and intervention activities aim to support a range of health-related behaviors, including health risk and protective behaviors, health insurance and provider choices, and health care and treatment decisions. These communication and intervention activities employ a range of modes, including media campaigns, direct interactions, and educational materials. To improve the effectiveness of communication and intervention activities, the Segmentation Screening Tool (SST) was developed to identify audience segments for assessment of health-related decision making and to support the development of customized communication or intervention activities to support decision making, using two items. The Revised SST was developed for a broader adult audience; therefore, the revised tool (rather than the original tool) should generally be used moving ahead. For research purposes, the two items can be included in a screener to place individuals into focus groups based on segment or included in a survey instrument or interview protocols to permit assessment of differences across segments; the research findings can then be used to inform or improve customized communication or intervention activities. This paper summarizes the research to date on the development and validation of the SST, synthesizing findings from multiple studies.

I. Introduction

Health communication and intervention activities aim to support a range of health-related behaviors, including health risk and protective behaviors (such as smoking and weight loss), health insurance and provider choices, and health care and treatment decisions (such as surgery versus watch-and-wait and medication adherence). These communication and intervention activities employ a range of modes, including media campaigns by public, private, or not-for-profit organizations to promote products, services, or resources; direct interactions (such as educational sessions, individual counseling by a care manager, and shared decision making with a provider); and educational materials for individuals to read on their own or to be used as part of a direct interaction. Individuals vary greatly with regard to their ability and desire to engage in health-related decision making. Therefore, the objective of the research summarized in this paper was to develop and validate an evidence-based assessment tool to ensure the effectiveness of health communication and intervention activities for diverse individuals.

Identifying homogeneous mutually-exclusive subgroups or segments of people that vary on key characteristics can inform and improve the effectiveness of health communication and intervention activities (Slater 1996; Smith 2017); a technique to identify these subgroups, called audience segmentation, has been adopted increasingly in the field. With this technique, both outreach and communication activities can be customized for different segments using targeting and tailoring (Kreuter and Wray 2003; Teeny et al. 2020). Targeting involves conducting different outreach activities for different segments, and tailoring involves providing different messages or materials or supports to different segments (Kreuter and Wray 2003; Teeny et al. 2020). The extent to which customization enhances effectiveness depends on the quality of the segmentation approach.

Several limitations of segmentation approaches have been noted. For example, segmentation is typically conducted using demographic categories, which, although relatively inexpensive to implement, are only loosely associated with individual characteristics—unlike empirically-derived categories based on multivariate classification techniques to identify segments that vary on individual characteristics such as knowledge, skills, attitudes, motivations, and behavior. Furthermore, segmentation in the area of health-related decision making has generally assessed a single dimension, assuming that knowledge or skills and attitudes or motivation increase together, and has generally required administration of relatively lengthy scales (Williams and Heller 2007).

To address these limitations, Williams and Heller (2007) developed the Segmentation Screening Tool (SST) to identify audience segments for the assessment of health-related decision making and to support the development of targeted and tailored communication or intervention activities to support decision making. The tool is two-dimensional; it assesses an individual's health care decision-making skills and motivation using two items. For research purposes, the two items can be included in a screener to place individuals into focus groups based on segment or included in a survey instrument or interview protocols to permit segmentation analysis. The research findings can then be used to inform or improve targeted and tailored communication or intervention activities to support health-related decision making.

Once different segments are identified via segmentation research, communication messages, materials, and interventions can then be tailored to them. Unfortunately, outreach activities do not permit assessment of individual characteristics and, therefore, targeting must be conducted based on proxy variables. Some proxy variables can be derived from non-demographic group-level characteristics, which are less precise than individual characteristics but more precise than demographic categories. For example, members of a given organization or consumers of a given media source, many of whom may share pertinent

perspectives or motivations, can be targeted. However, for activities for which pertinent group-level characteristics do not exist, proxy variables must be derived from demographics—for example, residents in a lower-income geographic location (income), readers of a high-literacy publication (education), or patients at clinics within a health system who have multiple chronic conditions (health status), many of whom may have similar levels of resources, needs, or skills. Segmentation research can identify demographic variables from which proxy variables can be derived to inform the development of targeted outreach activities.

The Original SST tool was developed using data from Medicare beneficiaries, who may be older and less healthy than the general adult population and thus more likely to be taking prescription medications. Because one of the items asks about bringing a list of prescription medications to doctor visits, those who do not take any prescription medications cannot be assigned to a segment using the original tool. In addition, since the tool was developed, electronic health records (EHRs) have become widespread; many patients are aware that EHRs track medications and know that they do not need to bring a list of their medications to a doctor visit.

The Revised SST was developed for a broader adult audience and in consideration of the proliferation of EHRs that rendered the item about bringing a list of medications to a doctor visit a poorer indicator of motivation. Therefore, the revised tool (rather than the original tool) should generally be used moving ahead. The Revised SST uses the same item to assess skills, but a different item to assess motivation; that item was identified based on the original psychometric analyses (Williams and Heller 2007).

Exhibit 1 presents the skills and motivation items for the Original and Revised SST. Exhibit 2 presents the algorithm for placing individuals into one of four audience segments: Active, Passive, High Effort, and Complacent. For the motivation items, when administering orally, some patients ask whether the list can be a mental list; therefore, the alternative wording below should generally be used.

Exhibit 1. SST items

SKILLS (Original and Revised)—*How confident are you that you can identify when it is necessary for you to get medical care?*
4 = very confident
3 = confident
2 = somewhat confident
1 = not at all confident

MOTIVATION (Original)—*How often do you bring a [written or mental] list of your prescribed medicines with you to your doctor visits?*
4 = always
3 = usually
2 = sometimes
1 = never
0 = not applicable/I do not take any prescription medications

MOTIVATION (Revised)—*How often do you bring a [written or mental] list of questions you want to cover with you to your doctor visits?*
4 = always,
3 = usually
2 = sometimes
1 = never

Exhibit 2. Segmentation algorithm

	Active	Passive	High Effort	Complacent
Skills	4	1, 2, or 3	1, 2, or 3	4
Motivation	3 or 4	1 or 2	3 or 4	1 or 2

Exhibit 3 presents the segments generated by the algorithm—by motivation and skill levels. Active individuals are skilled and motivated. Passive individuals are unskilled and unmotivated. High Effort individuals are motivated but unskilled; they are similar to Active individuals in ways pertinent to motivation and similar to Passive individuals in ways pertinent to skills. Complacent individuals are skilled but unmotivated; they are similar to Passive individuals in ways pertinent to motivation and similar to Active individuals in ways pertinent to skills.

Exhibit 3. Segments generated by algorithm

		Motivation	
		Low	High
Skills	Low	Passive	High Effort
	High	Complacent	Active

This paper summarizes the research to date on the development and validation of the SST, synthesizing findings from multiple studies. Both the Original and Revised SST were developed by the author of this paper with federal funds and are therefore in the public domain and non-proprietary.[1]

[1] Pursuant to 42 U.S.C. 1320b-10(a)(2)(B), "[n]o person may, for a fee, reproduce, reprint, or distribute any item consisting of a form, application, or other publication of the Department of Health and Human Services unless such person has obtained specific, written authorization for such activity in accordance with regulations that the secretary shall prescribe."

II. Method

This paper synthesizes findings from 14 analysis sets, which include studies led by the author of this paper, studies led by the author's colleagues at CMS or Mathematica, and studies conducted independently without the author's knowledge. Appendix A provides details of the analysis sets, presented in chronological order.

Exhibit 4 summarizes the populations and types of data by analysis set. Most of the analyses were conducted with Medicare beneficiaries, some of which were limited to seniors or individuals with low-income status; two analysis sets were conducted with adults with chronic conditions. Types of data included large surveys (N > 9,000), medium-size surveys (N = 600–2,500), a small survey (N < 100), and qualitative studies.

Exhibit 4. Populations and types of data

	Analysis set													
Population and type of data	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
Medicare beneficiaries (large survey)	X	X	X			X		X			X	X	X	
Medicare beneficiaries (small survey)					X									
Medicare beneficiaries ages 65–80 (medium-size surveys)				X[a]					X					
Low-income Medicare beneficiaries ages 65–80 (medium-size survey)				X			X							
Medicare beneficiaries (qualitative)					X									
Adults with chronic conditions (medium-size survey)										X				
Adults with chronic conditions (qualitative)														X

[a]Three separate surveys.

Exhibit 5 provides an overview of the types of analysis and how they relate to one another. In their initial research, Williams and Heller (2007) developed the SST and conducted validation of the cluster segments upon which the SST is based. Several studies conducted validation of the Original SST segments; two of these studies also assessed the value of the Original SST versus demographics. Finally, several studies conducted validation of the Revised SST segments. The analyses examined two types of construct validity: (1) criterion-related validity, which is the association with measures with which the indicator measure should be associated (in this case, expected differences among segments); and (2) convergent validity, which is agreement among different measures of the same or similar construct (in this case, different assessments of segments).

Exhibit 5. Overview of types of analysis

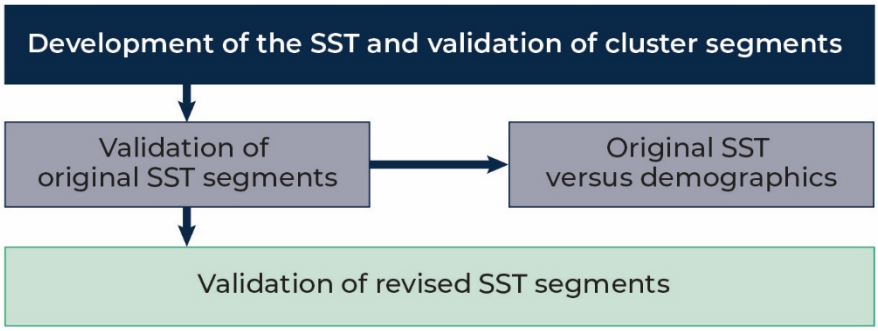

Exhibit 6 summarizes the types of analyses by analysis set. Analysis Set I included the original factor analysis and cluster analysis, criterion-related validity and convergent validity of the cluster segments, and development of the Original and Revised SST segmentation tools. Four analysis sets (three of which were independent) replicated the factor analysis, and one replicated the cluster analysis. Seven analysis sets[2] (one of which was independent) examined the criterion-related validity of the Original SST, and four examined the criterion-related validity of the Revised SST. Three analysis sets examined the convergent validity of the Original SST, and four examined the convergent validity of the Revised SST. Finally, two analysis sets examined the value of the SST versus demographics.

[2] One of the analysis sets included four separate surveys and another included both a focus group and a mini-survey. Therefore, a total of 11 studies examined the criterion-related validity of the Original SST.

Exhibit 6. Types of analyses by analysis set

Type of analysis	Analysis set													
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
Development of the SST														
Original factor analysis and Cronbach's α	X													
Factor analysis and Cronbach's α replication		X												
Independent factor analysis replication								X			X	X		
Original cluster analysis	X													
Cluster analysis replication		X												
Development of the Original and Revised SST	X													
Cluster segments validity														
Criterion-related validity of cluster segments	X													
Convergent validity of cluster segments	X													
Original SST segments criterion-related validity														
Criterion-related validity of Original SST segments			X	X[a]	X[b]	X	X		X					
Independent criterion-related validity of Original SST segments													X	
Original SST segments convergent validity														
Convergent validity of Original SST segments versus cluster segments	X													
Other convergent validity of Original SST segments			X		X									
Revised SST criterion-related validity														
Criterion-related validity of Revised SST segments			X						X	X				X
Revised SST convergent validity														
Convergent validity of Revised SST segments versus Original SST segments			X						X					X
Other convergent validity of Revised SST segments			X											
SST versus demographics														
Original SST segments versus demographics				X[c]		X								

[a]Four separate surveys.

[b]Two studies (focus groups and mini-survey).

[c]One of the four surveys (branding survey).

III. Results

In alignment with Exhibits 5 and 6, above, findings are presented in 7 sections: (1) development of the SST, (2) cluster segments validity (both criterion-related validity and convergent validity), (3) Original SST segments criterion-related validity, (4) Original SST segments convergent validity, (5) Revised SST segments criterion-related validity, (6) Revised SST segments convergent validity, and (7) SST versus demographics.

A. Development of the SST

1. Original factor analysis and Cronbach's α

Williams and Heller (2007) conducted factor analysis on the 22 items in the 2001 Medicare Current Beneficiary Survey (MCBS) patient activation module. The best solution identified 5 factors using 15 of the 22 items (all of which have good internal consistency reliability): Self-Efficacy (4 items, Cronbach's α = .72), Doctor Relationship (4 items, Cronbach's α = .73), Assertiveness (3 items, Cronbach's α = .55), Shared Decision Making (2 items, Cronbach's α = .51), and Information Seeking (2 items, Cronbach's α = .69). The first three factor subscales assess health-related decision making skills and the last two assess health-related decision making motivation.

2. Factor analysis and Cronbach's α replication

Williams (2008) replicated factor analysis on the 15 items in the 2004 MCBS patient activation module that were retained in the module based on the factor analysis reported in Williams and Heller (2007). The replication of the factor analysis was near perfect (see Exhibit B.1), with nearly identical factor loadings. Replication of the internal consistency reliability was near perfect (see Exhibit B.2), with nearly identical Cronbach's αs.

3. Independent factor analysis replication

Three additional studies conducted independent replication of the factor analysis; one of the three studies also replicated the Cronbach's αs.

1. Confirmatory factor analysis conducted independently by Butler (2010) on 2004 MCBS data showed that the 5-factor solution proposed by Williams and Heller (2007) and replicated by Williams (2008) had a better fit than an alternative 4-factor solution that combined Assertiveness and Shared Decision Making.
2. Factor analysis was replicated independently by Parker et al. (2014) on the items in the 2012 MCBS patient activation module that were retained in the module based on the factor analysis reported in Williams and Heller (2007). The authors reference an earlier 3-factor solution that combined Information Seeking and Shared Decision Making and retained 16 items rather than 15 items. Despite these differences, the factor structure replicated well. The Doctor Relationship factor domain (renamed communication) and the Self-Efficacy factor domain (renamed confidence) replicated exactly; the combined Information Seeking factor and the Assertiveness domain (renamed other, as it was not identified in the factor analysis) were nearly identical, with one item shifting from Assertiveness to Information Seeking and one item added to Information Seeking.

3. Factor analysis was replicated independently by Ashford (2020) on the items in the 2011 MCBS patient activation module that were retained in the module based on the factor analysis reported in Williams and Heller (2007) and replicated by Williams (2008). The author selected the 4-factor solution that combined Information Seeking and Shared Decision Making rather than the original 5-factor solution and retained 14 items rather than 15 items. Despite these differences, the factor structure and internal consistency reliability replicated well, with very similar factor loadings and Cronbach's αs.

4. Original cluster analysis

Williams and Heller (2007) conducted K-means clustering on the 5 factor subscales using 2001 MCBS data. The best solution identified 4 cluster segments—Active (skilled and motivated), Passive (unskilled and unmotivated), High Effort (motivated, but unskilled), and Complacent (skilled, but unmotivated).

5. Cluster analysis replication

Williams (2008) conducted K-means clustering on the 5 factor subscales using both 2001 and 2004 MCBS data. The replication was very good. The differences among the clusters on the factor subscales were very similar (see Exhibit B.3).

6. Development of the original and revised SST

Using 2001 MCBS data, Williams and Heller (2007) conducted a series of analyses to identify the best single-item indicators for skills and motivation and determine the best cut-points for distinguishing between those who are low versus high on each item. The best skills item was "How confident are you that you can identify when it is necessary for you to get medical care?" with a cut-point between 1–3 and 4; that item was selected for both the Original and Revised SST. The best motivation item was "How often do you bring a [written or mental] list of your prescribed medicines with you to your doctor visits?" with a cut-point between 1–2 and 3–4; that item was selected for the Original SST. The next best motivation item was "How often do you bring a [written or mental] list of questions you want to cover with you to your doctor visits?" Therefore, for the Revised SST, the medicines list question was replaced with the questions list question, which is more appropriate for a broader audience that may not be taking prescription medications. Exhibit B.4 provides more detail regarding the steps involved in the development of the SST.

B. Cluster Segments Validity

1. Criterion-related validity of cluster segments

Criterion-related validity is the association with measures with which the indicator measure should be associated—in this case, expected differences among segments. Active and Complacent individuals are expected to show greater skills than Passive and High Effort individuals, and Active and High Effort individuals are expected to show greater motivation than Passive and Complacent individuals.

To assess criterion-related validity of the cluster segments, Williams and Heller (2007) conducted analysis of variance (ANOVA) comparing the cluster segments. The results showed that the segments differed in expected ways with regard to individual characteristics (see Exhibit C.1). Active Medicare beneficiaries (skilled and motivated) had the highest levels of knowledge and skills, and they were most likely to engage in healthful and preventive behavior. Passive beneficiaries (unskilled and unmotivated)

were the opposite of Active beneficiaries. High Effort beneficiaries (motivated, but unskilled) had relatively low knowledge and skills, and they were relatively more likely to engage in healthful and preventive behavior. Complacent beneficiaries (skilled, but unmotivated) were the opposite of High Effort beneficiaries.

The results also showed that the segments differed with regard to demographic variables. Active and Complacent beneficiaries had relatively high educational attainment and income—not surprising, given their greater skill—and were relatively healthy; for Complacent beneficiaries, being healthy may contribute to their lower motivation. Passive and High Effort beneficiaries had relatively low educational attainment and income—again, not surprising given their lower skill—and were relatively unhealthy; for High Effort beneficiaries, being unhealthy may contribute to their greater motivation.

2. Convergent validity of cluster segments

Convergent validity is agreement among different measures of the same or similar construct—in this case, different assessments of segments. Using 2001 MCBS data, Williams and Heller (2007) conducted ANOVA comparing the cluster segments on stages of change (Prochaska and DiClemente 1983), using an algorithm developed by Levesque et al. (2001) to classify Medicare beneficiaries into pre-contemplation, contemplation, preparation, and action stages of readiness for making health plan choices. This classification assesses a single developmental dimension, assuming that skills and motivation progress together from 1 (pre-contemplation) to 4 (action). As expected, those in the Active segment (skilled and motivated) are highest (3.35) and those in the Passive segment (unskilled and unmotivated) are lowest (2.63) on the stages of change variable. Those in the High Effort segment (motivated, but unskilled) and Complacent segment (skilled, but unmotivated) are at higher stages than those in the Passive segment and lower than those in the Active segment (3.16 for High Effort and 3.13 for Complacent).

C. Original SST Segments Criterion-Related Validity

1. Criterion-related validity of original SST segments

Ten studies demonstrated the criterion-related validity of the Original SST segments, showing expected patterns of differences among the segments in terms of both individual characteristics and demographics.

1. As a follow-up to Williams and Heller (2007), ANOVA was conducted with 2001 MCBS data comparing the Original SST segments. The results showed that the segments differed in expected ways (see Exhibit D.1), showing a pattern very similar to that reported for the cluster segments in section 2 (above).
2. Williams (2008) conducted cross-tabulations comparing the Original SST segments for the Medicare beneficiary campaign tracking survey. The results showed that the segments differed in expected ways (see Exhibit D.2). Complacent beneficiaries are the most healthy, and Passive and High Effort beneficiaries are the least healthy. Complacent beneficiaries are the most educated and Passive beneficiaries are the least educated.
3. Funderburk et al. (2008) used linear regression to predict Medicare beneficiary perceptions of the Medicare brand from the Original SST segments. The results showed that the segments differed in expected ways. Active beneficiaries (skilled) had more positive assessments of the Medicare brand than did Passive or High Effort beneficiaries (unskilled).

4. Williams (2008) used ANOVA to compare the Original SST segments for the Medicare beneficiary assessment survey. The results showed that the segments differed in expected ways (see Exhibit D.3). Active and High Effort beneficiaries (motivated) were most likely to have had cardiovascular or cholesterol screening in the past five years. Active beneficiaries (skilled and motivated) were more comfortable than Passive beneficiaries (unskilled and unmotivated) discussing risk for specific diseases with their doctor, screenings the doctor didn't mention, and the quality of care they get from their doctor. Complacent beneficiaries are the most healthy, and Passive and High Effort beneficiaries are the least healthy.
5. Williams (2008) compared the Original SST segments in the Medicare Part D drug plan coverage gap survey with low-income Medicare beneficiaries. The results showed that the segments differed in expected ways. Active beneficiaries (skilled and motivated) were more likely than Passive beneficiaries (unskilled and unmotivated) to be in a zero-deductible plan (63 percent versus 47 percent), suggesting that finding a zero-deductible plan takes both skill and motivation. Complacent beneficiaries (skilled, but unmotivated) are relatively healthy (59 percent were in excellent or very good health versus 41 percent across segments), more satisfied with the value of their drug plan (44 percent versus 31 percent across segments), more willing to pay full price for an uncovered prescription drug (39 percent versus 52 percent across segments), and less willing to exert the effort to seek out a prescription drug patient assistance program (3.9 versus 5.0 on a 0–10 scale across segments). Active and Complacent beneficiaries (skilled) were more likely than Passive and High Effort beneficiaries (unskilled) to be higher income (income of $80k or greater), which is a proxy for higher socioeconomic status—40 percent of Active, 48 percent of Complacent, 25 percent of Passive, and 27 percent of High Effort were classified as higher income.
6. Williams (2008) compared focus group discussions with Medicare beneficiaries across the Original SST segments. The results showed that the discussions for the segments differed in expected ways. Passive beneficiaries (unskilled and unmotivated) relied more on provider recommendations to make a decision; High Effort (motivated, but unskilled) and Complacent (skilled, but unmotivated) beneficiaries relied more on family and friends; Active beneficiaries (skilled and motivated) were most likely to rely on themselves, with input from providers. Active and High Effort (motivated) beneficiaries were more likely to use information to make a decision. Complacent and Passive (unmotivated) beneficiaries were more likely to just accept primary care practitioner referrals to choose a specialist.
7. Williams (2008) compared the Original SST segments in the Medicare beneficiary mini-survey. The results showed that the segments differed in expected ways (see Exhibit D.4). Active and Complacent beneficiaries were more educated than Passive and High Effort beneficiaries. Active and Complacent beneficiaries were also healthier than Passive and High Effort beneficiaries. High Effort beneficiaries took the most drugs and Complacent beneficiaries took the fewest.
8. Heller et al. (2009) used logistic regression to predict Consumer Assessment of Healthcare Providers and Systems (CAHPS) Medicare beneficiary survey experience responses from the Original SST segments. The results showed that the segments differed in expected ways (see Exhibit D.5). Active beneficiaries were well educated and in good self-rated mental health; Passive beneficiaries were less educated and in poor self-rated mental health; High Effort beneficiaries were less educated, poor, and unhealthy; and Complacent beneficiaries were healthy. Active beneficiaries (skilled) reported the most positive experiences with their health care, health plan, and doctors, and Complacent beneficiaries (skilled) reported experiences nearly as positive—showing that positive experiences are associated with skills. Active beneficiaries (motivated) reported the highest rates of flu and

pneumonia immunization, and High Effort beneficiaries (motivated) reported rates nearly as high—showing that immunization rates are associated with motivation.

9. Funderburk et al. (June 2009) used logistic regression to predict responses on the Medicare Part D low-income subsidy (LIS) survey from the Original SST segments and, as expected, found that Active beneficiaries (skilled and motivated) were 26 percent more likely to report awareness of LIS and 35 percent more likely to report having taken some action toward LIS enrollment than beneficiaries in the other segments. Funderburk et al. (November 2009) found that, as expected, Active beneficiaries (skilled and motivated) were much more likely than Passive beneficiaries (unskilled and unmotivated) and somewhat more likely than High Effort (motivated, but unskilled) and Complacent (skilled, but unmotivated) beneficiaries to be enrolled in LIS, suggesting that both skill and motivation may be more important for this behavior. In the follow-up analysis, the Original SST segments were compared in the LIS survey using ANOVA. The results showed that the segments differed in expected ways (see Exhibit D.6). Active beneficiaries (skilled) were more likely than High Effort (unskilled) to report awareness of LIS and had higher educational attainment. Complacent beneficiaries were healthier than High Effort beneficiaries.
10. The Original SST segments were compared in the Medicare beneficiary fraud messaging survey using ANOVA. The results showed that the segments differed in expected ways (see Exhibit D.7). High Effort seniors had the poorest health. Passive seniors (unmotivated) gave higher ratings than Active and High Effort seniors (motivated) on altruism toward government as a reason to report fraud to Medicare. Active and High Effort seniors (motivated) gave higher ratings than Passive seniors (unmotivated) on moral appeal as a reason.

2. Independent criterion-related validity of original SST segments

An additional independently-conducted study demonstrated the criterion-related validity of the Original SST segments. The Original SST segments were compared independently by Stuart et al. (2020), using data from 2009 MCBS respondents with diabetes. The results showed that the segments differed in expected ways. Active and Complacent beneficiaries were more educated than Passive and High Effort beneficiaries. Active beneficiaries were the wealthiest and Passive beneficiaries the poorest. Active and Complacent beneficiaries were healthier than Passive and High Effort beneficiaries. Active and High Effort beneficiaries (motivated) had higher medication adherence than Passive and Complacent beneficiaries (unmotivated).

D. Original SST Segments Convergent Validity

1. Convergent validity of original SST segments versus cluster segments

Using 2001 MCBS data, Williams and Heller (2007) conducted a cross-tabulation comparing the Original SST segments to the cluster segments. Rates of correct classification (percent of each cluster segment in the same Original SST segment) were 67 percent for Active, 62 percent for Passive, 47 percent for High Effort, and 52 percent for Complacent.

2. Other convergent validity of original SST segments

Two studies examined the convergent validity of the Original SST segments against other measures similar to the SST—stages of change and the Patient Activation Measure (PAM; Hibbard 2005).

1. As a follow-up to Williams and Heller(2007), ANOVA was conducted with 2001 MCBS data comparing the Original SST segments on stages of change, using the algorithm developed by Levesque et al. (2001). As expected, those in the Active segment (skilled and motivated) are highest (3.27) and those in the Passive segment (unskilled and unmotivated) are lowest (2.88) on the stages of change variable. Those in the High Effort segment (motivated, but unskilled) and Complacent segment (skilled, but unmotivated) are higher than those in the Passive segment and lower than those in the Active segment (3.07 for High Effort and 3.21 for Complacent).
2. Williams (2008) used ANOVA to compare the Original SST segments on the PAM in the Medicare beneficiary mini-survey. PAM assesses a single developmental dimension, assuming that skills and motivation progress together, with a score range of 0–100. As expected, Medicare beneficiaries in the Active segment (skilled and motivated) are highest (68) and those in the Passive segment (unskilled and unmotivated) are lowest (56) on the PAM score. Those in the High Effort segment (motivated, but unskilled) and Complacent segment (skilled, but unmotivated) are higher than those in the Passive segment and lower than those in the Active segment (60 for High Effort and 64 for Complacent).

E. Revised SST Segments Criterion-Related Validity

Four studies demonstrated the criterion-related validity of the Revised SST segments, showing expected patterns of differences among the segments in terms of both individual characteristics and demographics.

1. As a follow-up to Williams and Heller (2007), ANOVA was conducted with 2001 MCBS data comparing the Revised SST segments. The results showed that the segments differed in expected ways (see Exhibit E.1), showing a pattern very similar to those reported for the cluster segments in section 2 (above) and for the Original SST segments in section 3 (above).
2. The Revised SST segments were compared in the Medicare beneficiary fraud messaging survey using ANOVA. The results showed that the segments differed in expected ways (see Exhibit E.2). High Effort and Passive seniors had poorer health than Complacent seniors. High Effort seniors (unskilled) gave higher ratings than Active seniors (skilled) on personal cost as a reason to report fraud to Medicare.
3. Williams and Frost (2014) compared the Revised SST segments using ANOVA in a survey of adult patients with chronic conditions. The results showed that the segments differed in expected ways (see Exhibit E.3). Active individuals (skilled and motivated) reported the highest self-efficacy, the most positive attitudes and opinions, and the highest levels of engagement in various behaviors pertinent to comparative effectiveness research, as well as the best health and the highest levels of education. Passive individuals (unskilled and unmotivated) reported the lowest self-efficacy, the least positive attitudes and opinions, and the lowest levels of engagement in various behaviors, as well as the poorest health and the lowest levels of education. High Effort individuals (motivated) reported more positive attitudes and opinions and more engagement in various behaviors than did Complacent individuals (unmotivated).
4. Responses from interviews with patients receiving care management services were compared across the Revised SST segments (see Appendix 4.B in Orzol et al. 2021). The results showed that the segments differed in expected ways. Patients in the Complacent segment (unmotivated) were least likely—and those in the High Effort segment (motivated) most likely—to call their practice with a question or concern rather than wait for an appointment or phone conversation with their care manager. Patients in the Active segment (skilled and motivated) were more likely than those in the Passive segment (unskilled and unmotivated) to initially perceive care management services as

helpful. Patients in the Passive and High Effort segments (unskilled) were more likely—and those in the Active and Complacent segments (skilled) were least likely—to report barriers to engaging with their care manager.

F. Revised SST Segments Convergent Validity

1. Convergent validity of revised SST segments versus original SST segments

Three studies examined the convergent validity of the Revised SST segments against the Original SST segments.

1. As a follow-up to Williams and Heller (2007), separately for 2001 and 2004 MCBS data, a follow-up cross-tabulation was conducted comparing the Revised SST segments to the Original SST segments. For 2001, rates of correct classification (percent of each original segment in the revised segment) were 64 percent for Active, 76 percent for Passive, 54 percent for High Effort, and 66 percent for Complacent. For 2004, rates of correct classification (percent of each original segment in the revised segment) were 70 percent for Active, 72 percent for Passive, 61 percent for High Effort, and 61 percent for Complacent. Because the Original and Revised SST use the same item to assess skills, there were no segment shifts due to skills. Overall, more segment shifts were to lower motivation (Active to Complacent and High Effort to Passive) rather than to higher motivation, but the shifts generally offset one another.
2. A cross-tabulation was conducted comparing the Revised SST segments to the Original SST segments in the Medicare beneficiary fraud messaging survey. Rates of correct classification (percent of each original segment in the revised segment) were 55 percent for Active, 83 percent for Passive, 41 percent for High Effort, and 81 percent for Complacent. Because the Original and Revised SST use the same item to assess skills, there were no segment shifts due to skills. Overall, more segment shifts were to lower motivation (Active to Complacent and High Effort to Passive) rather than to higher motivation, but the shifts generally offset one another.
3. A cross-tabulation was conducted comparing the Revised SST segments to the Original SST segments among patients receiving care management services (see Appendix 4.B in Orzol et al. 2021). Rates of correct classification (percent of each original segment in the revised segment) were 62 percent for Active, 60 percent for Passive, 54 percent for High Effort, and 78 percent for Complacent. Because the Original and Revised SST use the same item to assess skills, there were no segment shifts due to skills. Overall, segment shifts to lower motivation and to higher motivation generally offset one another.

2. Other convergent validity of revised SST segments

As a follow-up to Williams and Heller (2007), ANOVA was conducted with 2001 MCBS data comparing the Revised SST segments on stages of change, using the algorithm developed by Levesque et al. (2001). As expected, those in the Active segment (skilled and motivated) are highest (3.32) and those in the Passive segment (unskilled and unmotivated) are lowest (2.87) on the stages of change variable. Those in the High Effort segment (motivated, but unskilled) and Complacent segment (skilled, but unmotivated) are higher than those in the Passive segment and lower than those in the Active segment (3.14 for High Effort and 3.16 for Complacent).

G. SST Versus Demographics

Two studies examined the value of the SST over demographics.

1. Funderburk et al. (2008) used linear regression to examine the relative contributions of demographic variables and the Original SST segments toward Medicare beneficiary perceptions of the Medicare brand. The first regression model showed that demographic variables alone contributed significantly to the model assessing beneficiary perceptions; taken as a set, demographic variables contributed significantly to the model, accounting for 6 percent of the variance in Medicare perception ($F[6,386] = 4.15$, $p < .001$). The second model showed that Original SST segments contributed significantly to the model, accounting for an additional 4 percent of the variance ($F[3,379] = 5.43$, $p < .001$). However, in the second model, demographic variables were no longer significant, confirming the value of the SST over demographics.
2. Heller et al. (2009) used logistic regression to predict CAHPS Medicare beneficiary survey experience responses from the Original SST segments, both with and without case-mix adjustment. Whereas SST segments strongly predicted beneficiary experience, case-mix adjustment for a wide range of demographic variables had very little additional effect, confirming the value of the SST over demographics.

IV. Discussion

The SST was developed to identify audience segments—based on health-related decision-making skills and motivation—for assessment of health-related decision making. Audience segmentation can be used to improve the effectiveness of communication and intervention activities. The two-item tool identifies four audience segments: Active (skilled and motivated), Passive (unskilled and unmotivated), High Effort (motivated, but unskilled), and Complacent (skilled, but unmotivated). This paper summarizes the research to date on the development and validation of the SST, synthesizing findings from multiple studies.

The original study (Williams and Heller 2007) identified the four segments based on cluster analysis, demonstrated the criterion-related validity of the cluster segments (showing that the segments differed in expected ways), and provided some support for convergent validity of the cluster segments (showing that the segments varied in expected ways with regard to stages of change). Subsequently, four studies replicated the factor analysis and one replicated the cluster analysis. Taken together, these studies establish the validity of the cluster segments for the Medicare beneficiary population.

Eleven studies demonstrated the criterion-related validity of the Original SST, showing that the segments differed in expected ways, in a pattern very similar to the patterns for the cluster segments. Furthermore, a convergent validity cross-tabulation showed high rates of agreement between Original SST segment assignment and cluster segment assignment. Finally, one study showed convergent validity agreement between the Original SST and stages of change and another showed agreement with the PAM. Taken together, these studies establish the validity of the Original SST segments for the Medicare beneficiary population.

The Revised SST was developed for a broader adult audience and in consideration of the proliferation of EHRs that rendered the item about bringing a list of medications to a doctor visit a poorer indicator of motivation. Therefore, the revised tool (rather than the original tool) should generally be used moving ahead.

Four studies demonstrated the criterion-related validity of the Revised SST, showing that the segments differed in expected ways, in a pattern very similar to the patterns for the cluster segments and Original SST segments. Furthermore, four convergent validity cross-tabulations showed high rates of agreement between Revised SST segment assignment and Original SST segment assignment. Finally, one study showed convergent validity agreement between the Revised SST and stages of change. Taken together, these studies establish the validity of the Revised SST segments for the Medicare beneficiary population and provide initial evidence of validity for adults with chronic conditions. Future research should confirm the validity of the Revised SST segments for broader populations.

Two studies showed the value of the Original SST over demographics. Therefore, tailoring of communication and intervention activities should be conducted based on SST segments rather than demographics. Future research should confirm the value of the Revised SST over demographics.

None of the studies examined reliability. Future research should examine the test-retest reliability of the Revised SST. Given that this tool involves self-ratings and that the two items are not expected to be correlated, neither interrater reliability nor internal consistency reliability is pertinent; however, test-retest reliability is pertinent and should be examined.

Of the 15 criterion-related validity studies, 13 examined individual differences; those studies demonstrated the following consistent individual differences among the audience segments.

- Active individuals are relatively knowledgeable and skillful, are more likely to engage in information seeking and decision making, and are more likely to engage in healthful and preventive behavior.
- Passive individuals are relatively lacking in knowledge and skills, are less likely to engage in information seeking and decision making, and are less likely to engage in healthful and preventive behavior. Passive individuals are the opposite of Active individuals.
- High Effort individuals are relatively lacking in knowledge and skills, are more likely to engage in information seeking and decision making, and are more likely to engage in healthful and preventive behavior. High Effort individuals are similar to Active individuals in ways pertinent to motivation and similar to Passive individuals in ways pertinent to skills.
- Complacent individuals are relatively knowledgeable and skillful, are less likely to engage in information seeking and decision making, and are less likely to engage in healthful and preventive behavior. Complacent individuals are the opposite of High Effort individuals.

These consistent individual differences among the segments have implications for tailoring communication or intervention activities to support decision making. Active individuals simply need to be alerted to or provided with pertinent information or decision tools. Passive individuals should be provided with personal assistance (or alerted to the availability of such assistance) to walk them through simple materials or tools and decision support. High Effort individuals need to be provided with simple informational materials or tools and alerted to sources of assistance for decision support. Complacent individuals need messages that highlight the benefits of active engagement in decision making. Future research should involve (1) developing segment-matched approaches for media campaigns; educational sessions, individual counseling, or care management; and educational materials, and (2) conducting tests of segment-matched versus unmatched approaches.

Of the 15 criterion-related validity studies, 11 examined demographic differences; those studies demonstrated the following consistent demographic differences among the audience segments.

- Active and Complacent individuals have relatively high educational attainment and income (especially Active individuals) and are relatively healthy.
- Passive and High Effort individuals have relatively low educational attainment and income (especially Passive individuals) and are relatively unhealthy.

These consistent demographic differences among the audience segments have implications for targeting communication or intervention activities to support health-related decision making. Because outreach activities do not permit assessment of individual characteristics, targeting must be conducted based on proxy variables. Some proxy variables can be derived from non-demographic group-level characteristics; however, for activities for which pertinent group-level characteristics do not exist, proxy variables must be derived from demographics. The findings from the criterion-related validity studies show that the pertinent demographic variables for targeting those in different segments are educational attainment, (for example, targeting readers of a high-literacy publication to reach Active or Complacent individuals); income (for example, targeting residents in a lower-income geographic location to reach Passive or High Effort individuals); or health status (for example, targeting patients who have multiple chronic conditions at clinics within a health system to reach Passive or High Effort individuals). Future research should

involve (1) developing segment-matched targeting approaches, and (2) conducting tests of segment-matched versus unmatched approaches.

The SST was developed with federal funds and is therefore in the public domain and non-proprietary. Because this research program is ongoing, the author requests that you contact her if you use either the original or revised tool to share information regarding how you used the tool and any pertinent findings.

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Appendix A

Analysis Sets

Analysis Set I summarizes the development of the Original SST reported in Williams and Heller (2007) using 2001 Medicare Current Beneficiary Survey (MCBS) data. The data were from 9,520 community-dwelling Medicare beneficiaries with complete data on the analytic variables in the 2001 MCBS Access to Care file. The MCBS is administered via in-person interviews. Extracted content is presented in Exhibit B.4 and Exhibit C.1 and is included with permission from the Williams and Heller article copyright holder.

Analysis Set II summarizes the Williams (2008) replication using 2004 MCBS data of psychometric and cluster analyses reported in Williams and Heller (2007) using 2001 MCBS data. The data were from 9,420 community-dwelling Medicare beneficiaries with complete data on the analytic variables in the 2004 MCBS Access to Care file.

Analysis Set III summarizes follow-up analysis to Williams and Heller (2007) using the 2001 and 2004 MCBS data analytic files prepared for Analysis Sets I and II. Findings from this follow-up analysis have not been previously published or presented at a national conference. The Centers for Medicare & Medicaid Services (CMS) granted permission to include these findings in this paper, including content presented in Exhibit D.1 and Exhibit E.1.

Analysis Set IV summarizes findings reported in Williams (2008) and Funderburk et al. (2008) from four communication research surveys with Medicare beneficiaries: (1) a campaign tracking phone survey with seniors ages 65–80 conducted in 2006 with a sample size of 606, (2) a branding phone survey with seniors ages 65–80 conducted in 2007 with a sample size of 600, (3) an assessment phone survey with seniors ages 65–80 conducted in 2007 with a sample size of 1,000, and (4) a Medicare Part D coverage gap web survey with low-income Medicare beneficiaries ages 65–80. These data are unweighted.

Analysis Set V summarizes findings reported in Williams (2008) from 12 focus groups and a mini-survey in Baltimore, Boston, and Providence with 95 Medicare beneficiaries: 27 Active, 24 Passive, 22 High Effort, and 22 Complacent. The Medicare Enrollment Database was used to identify Medicare beneficiaries in the three cities living in zip codes close to the focus group facility in each city to minimize travel burden; the zip codes are a mix of low-income and middle-income neighborhoods. Beneficiaries were removed from the sample frame if they had end-stage renal disease (because their drug insurance issues are unique), were 85 years old or older (because very old adults have greater difficulty attending and participating in focus groups), or could not be tele-matched. Participants were assigned to focus groups based on Original SST segment, with one group per segment in each city. Data from the mini-survey is unweighted.

Analysis Set VI summarizes findings from the Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) mail survey reported in Heller et al. (2009). The data were from 236,322 Medicare beneficiaries with at least one prescription drug medication who completed the 2007 Medicare Advantage or Fee-for-Service CAHPS survey. Extracted content is presented in Exhibit D.5 and is included with permission from the Heller et al. article copyright holder.

Analysis Set VII summarizes findings from the phone survey of 2,079 low-income Medicare beneficiaries eligible for the Medicare Part D low-income subsidy (LIS) reported in Funderburk et al. (June 2009, November 2009), which used multiple imputation for income and follow-up secondary analysis with 869 LIS-eligible beneficiaries identified from self-reported income and lack of credible prescription drug coverage. Findings from this follow-up analysis have not been previously published or presented at a national conference. CMS granted permission to include these findings in this paper, including content presented in Exhibit D.6. These data are unweighted.

Analysis Set VIII summarizes findings from an independently conducted study using 2004 MCBS data reported in Butler (2010); these findings are in the public domain. The data were from 9,082 community-dwelling Medicare beneficiaries with complete data on the analytic variables.

Analysis Set IX summarizes secondary analysis of the 2010 Medicare beneficiary fraud message testing phone survey with seniors ages 65–80. Sample sizes for the analysis were 897 for the Original SST and 1,002 for the Revised SST. Findings from this follow-up analysis have not been previously published or presented at a national conference. CMS granted permission to include these findings in this paper, including content presented in Exhibit D.7 and Exhibit E.2. These data are unweighted.

Analysis Set X summarizes findings from an online comparative effectiveness patient survey of 603 adults with chronic conditions (hypertension, type II diabetes, high cholesterol, and/or fibromyalgia) reported in Williams and Frost (2014). Extracted content is presented in Exhibit E.3 and is included with permission from the Williams and Frost article copyright holder.

Analysis Set XI summarizes findings from an independently conducted study using 2012 MCBS data reported in Parker et al. (2014); these findings are in the public domain. The data were from 10,650 community-dwelling Medicare beneficiaries with complete data on the analytic variables.

Analysis Set XII summarizes findings from an independently conducted study using 2011 MCBS data reported in Ashford (2020); these findings are in the public domain. The data were from 10,559 community-dwelling Medicare beneficiaries with complete data on the analytic variables.

Analysis Set XIII summarizes findings from an independently conducted study using 2009 MCBS data reported in Stuart et al. (2020). The data were from 940 community-dwelling Medicare beneficiaries with diabetes enrolled in Medicare Part D plans.

Analysis Set XIV summarizes findings from phone interviews with 40 adult care management patients reported in Appendix 4.B: In-depth patient study in Orzol et al. (2021); these findings are in the public domain.

Appendix B

Development of the SST

Exhibit B.1. Factor analysis replication (Analysis Set II)

	Factor Loading									
	Doctor Relationship		Self-Efficacy		Information Seeking		Assertiveness		Shared Decision-Making	
Survey Item	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
Confident can tell when need to get medical care			.608	.624						
Confident can identify side effects from medications			.583	.598						
Confident can follow instructions for medical care at home			.690	.667						
Confident can follow instructions for lifestyle changes			.471	.510						
Change doctors if dissatisfied with communication							.470	.537		
Tell my doctors if disagree							.672	.650		
Read information about health conditions					.675	.676				
Read information about a prescription's side effects/precautions					.638	.612				
Bring list of questions to my doctor visits									.607	.604
Leave my doctor's office feeling concerns/questions addressed	.580	.575								
Bring list of prescription medications to my doctor visits									.505	.526
Talk to my doctor about testing/treatment options	[.306]	[.329]					.301	.276		
My doctor listens to my concerns/questions	.725	.770								

Survey Item	Factor Loading									
	Doctor Relationship		Self-Efficacy		Information Seeking		Assertiveness		Shared Decision-Making	
	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
My doctor explains things in a way that I understand	.700	.791								
I can contact my doctor's office to get medical advice when needed	.507	.507								

Note: In the 2001 factor analysis on the 15 retained items reported in Williams and Heller (2007), the item "talk to my doctor about testing/treatment options" loaded on two factors. It was included in Assertiveness rather than Doctor Relationship based on loadings from the factor solution with all 22 items. The Assertiveness loading for that item was borderline in 2001 (just over .30) and dropped just below .30 in 2004.

Exhibit B.2. Cronbach's α replication (Analysis Set II)

Factor	2001 Cronbach's α	2004 Cronbach's α
Doctor Relationship	.725	.752
Self-Efficacy	.724	.734
Information Seeking	.689	.677
Assertiveness	.547	.561
Shared Decision Making	.506	.532

Exhibit B.3. Cluster analysis replication (Analysis Set II)

	Mean Score			
2001 Factor	**Cluster 2 (Active)**	**Cluster 4 (Passive)**	**Cluster 1 (High Effort)**	**Cluster 3 (Complacent)**
Skills				
Doctor Relationship	$.57_a$	$-.96_d$	$-.34_c$	$.38_b$
Self-Efficacy	$.67_a$	-1.19_d	$-.28_c$	$.31_b$
Assertiveness	$.80_a$	-1.00_d	$-.43_c$	$.32_b$
Motivation				
Information Seeking	$.72_a$	$-.99_d$	$.34_b$	$-.20_c$
Shared Decision Making	$.90_a$	$-.68_c$	$.52_b$	$-.83_d$
2004	**Cluster 2 (Active)**	**Cluster 3 (Passive)**	**Cluster 4 (High Effort)**	**Cluster 1 (Complacent)**
Skills				
Doctor Relationship	$-.18_b$	$-.52_d$	$-.41_c$	1.41_a
Self-Efficacy	$.79_a$	$-.37_d$	$-.22_c$	$.09_b$
Assertiveness	$.02_b$	$-.59_c$	1.10_a	$-.04_b$
Motivation				
Information Seeking	1.19_a	$-.45_c$	$-.21_b$	$-.15_b$
Shared Decision Making	$.68_a$	$-.56_d$	$.51_b$	$-.14_c$

Notes: Means that share subscripts do not differ significantly at $p < .05$. For ease of quick comparison, ANOVAs were conducted for both years without adjustment for weighting or complex sample design. Therefore, the 2001 means reported here are very slightly different from those reported in Williams and Heller (2007).

The one notable difference between the results for the two years is the High Effort mean for Assertiveness, which was $-.43_c$ in 2001 and 1.10_a in 2004 (boldfaced in the table). This difference could be due to the fluctuating factor loadings for "talk to my doctor about testing/treatment options" for Assertiveness and Doctor Relationship for all 22 items in 2001, the final 15 items in 2001, and the final 15 items in 2004, per the table note for Exhibit B.1, above.

Exhibit B.4. Development of the Original and Revised SST (Analysis Set I)

Step Number	Description of Activities for Each Step
1	All subscales differentiate consistently between the Active and Passive segments. Also, the first three subscales (Self-Efficacy, Doctor Relationship, and Assertiveness) differentiate between High Effort (lower) and Complacent (higher) and are redundant (that is, segments are put in the same order from lowest to highest). Therefore, only one of the three is necessary for screening, to assess skills. Similarly, the last two subscales (Shared Decision Making and Information Seeking) differentiate between Complacent (lower) and High Effort (higher) and are nearly redundant. Therefore, only one of the two is necessary for screening, to assess motivation.
2	A series of logistic regressions was conducted, separately predicting membership in the High Effort segment and the Complacent segment, with either all three skills subscale scores as predictors or both motivation subscales as predictors. For the skills subscales, Self-Efficacy is the strongest predictor for both segments. For the motivation subscales, Shared Decision Making is the stronger predictor for both segments.
3	To select the best single-item indicator for each of the two subscales, segment group comparisons were conducted on the three Self-Efficacy items and the two Shared Decision Making items. For Shared Decision Making, the second item (how often take a list of prescribed medicines to doctor visits) provided the best discrimination among the segments and was selected; however, the first item (how often take a list of questions to doctor visits) also provided good discrimination. The second item was selected for the Original SST and the first item was selected for the Revised SST. For Self-Efficacy, the three items discriminated equivalently among the segments. Therefore, the first item (confidence can identify when necessary to get medical care) was selected, because it has excellent face validity and is a simple item.
4	Cross-tabulations between cluster segment and each of the two selected items showed that the best cut-point for the Self-Efficacy item was between scores of 1, 2, or 3 (low) and a score of 4 (high), whereas the best cut-point for the Shared Decision Making item was between scores of 1 or 2 (low) and scores of 3 or 4 (high). People high on both are Active segment, those low on both are Passive, those low on Self-Efficacy (skills) and high on Shared Decision Making (motivation) are High Effort, and those high on Self-Efficacy and low on Shared Decision Making are Complacent.

Note: Extracted content for this exhibit is provided with permission from the Williams and Heller (2007) article copyright owner.

Appendix C

Cluster Segments Validity

Exhibit C.1. Criterion-related validity of cluster segments (Analysis Set I)

Variable	Mean Score			
	Active (30 percent of sample)	Passive (17 percent of sample)	High Effort (26 percent of sample)	Complacent (27 percent of sample)
Patient activation subscales				
Skills				
Self-Efficacy	.67$_a$	-1.17$_d$	-.27$_c$	.32$_b$
Doctor Relationship	.56$_a$	-.98$_d$	-.33$_c$	.39$_b$
Assertiveness	.80$_a$	-.98$_d$	-.42$_c$	.32$_b$
Motivation				
Shared Decision Making	.90$_a$	-.68$_c$	.52$_b$	-.83$_d$
Information Seeking	.72$_a$	-.95$_d$	.34$_b$	-.17$_c$
Demographics and health status				
Income level	2.74$_a$	2.04$_c$	2.57$_b$	2.49$_b$
Educational attainment	2.53$_a$	1.88$_d$	2.31$_b$	2.18$_c$
Health status	3.30$_a$	2.77$_c$	2.99$_b$	3.24$_a$
Knowledge and skills				
Medicare quiz	3.47$_a$	2.42$_c$	3.17$_b$	3.09$_b$
Medicare knowledge	3.51$_a$	2.67$_c$	3.26$_b$	3.26$_b$
Medicare understandability	3.00$_a$	2.52$_d$	2.79$_c$	2.89$_b$
Makes own decisions	.76$_a$	.58$_c$	.70$_b$	.72$_{ab}$
Uses internet	.43$_a$	.18$_c$	.32$_b$	.31$_c$
Uses Medicare website	.04$_a$	.02$_c$	.03$_b$	.02$_c$
Health and preventive behavior				
Any weekly exercise	.52a	.30c	.41b	.44b
Flu shot in past year	.72a	.59b	.73a	.62b
Pneumonia shot ever	.72a	.54c	.72a	.60b
Women - mammogram	.65a	.48c	.60b	.56b
Women – pap smear	.44a	.34b	.40ab	.37b

Notes: Means that share subscripts do not differ significantly at $p < .05$. Extracted content for this exhibit is provided with permission from the Williams and Heller (2007) article copyright owner.

Appendix D

Original SST Segments Criterion-Related Validity

Exhibit D.1. Criterion-related validity of Original SST segments—Medicare Current Beneficiary Survey (Analysis Set III)

Variable	Mean Score			
	Active (32 percent of sample)	Passive (23 percent of sample)	High Effort (23 percent of sample)	Complacent (22 percent of sample)
Patient activation subscales				
Skills				
Self-Efficacy	.62$_a$	-.80$_c$	-.57$_b$	.60$_a$
Doctor Relationship	.28$_a$	-.38$_c$	-.12$_b$	.21$_a$
Assertiveness	.38$_a$	-.38$_d$	-.11$_c$	.21$_b$
Motivation				
Shared Decision Making	.86$_a$	-.83$_d$	.67$_b$	-.76$_c$
Information Seeking	.41a	-.35$_c$	.07$_b$	.13$_b$
Demographics and health status				
Income level	2.68$_a$	2.23$_c$	2.48$_b$	2.58$_{ab}$
Educational attainment	2.42$_a$	2.05$_c$	2.19$_b$	2.37$_a$
Health status	3.18$_b$	3.00$_c$	2.93$_c$	3.31$_a$
Knowledge and skills				
Medicare quiz	3.35$_a$	2.72$_c$	3.05$_b$	3.24$_{ab}$
Medicare knowledge	3.41$_a$	2.95$_c$	3.15$_b$	3.36$_a$
Medicare understandability	2.92$_a$	2.66$_c$	2.76$_b$	2.97$_a$
Health and preventive behavior				
Any weekly exercise	.47$_a$	.39$_b$	.40$_b$	.46$_a$
Flu shot in past year	.72$_a$	.63$_b$	.70$_a$	.63$_b$
Pneumonia shot ever	.71$_a$	.59$_b$	.70$_a$	.61$_b$
Women - mammogram	.63$_a$	.53$_b$	.59$_a$	.58ab
Women – pap smear	.43$_a$	.39$_a$	.39$_a$	.38$_a$

Notes: Means that share subscripts do not differ significantly at $p < .05$. The Centers for Medicare & Medicaid Services granted permission to include findings in this exhibit not previously published or presented at a national conference.

Exhibit D.2. Criterion-related validity of Original SST segments—campaign tracking survey (Analysis Set IV)

Variable	Percent			
	Active	Passive	High Effort	Complacent
Excellent health	31	26	18	52
Post-graduate degree	9	9	9	20
Did not graduate from high school	13	26	10	9

Exhibit D.3. Criterion-related validity of Original SST segments—assessment survey (Analysis Set IV)

Variable	Mean Score			
	Active	Passive	High Effort	Complacent
Cardiovascular/cholesterol screening in past 5 years	.91$_a$	.76$_b$	.89$_a$	.78$_b$
Comfort discussing risk for specific diseases with doctor	3.82$_a$	3.48$_b$	3.67ab	3.63$_{ab}$
Comfort discussing screenings doctor didn't mention	3.67$_a$	3.36$_b$	3.49$_{ab}$	3.55$_{ab}$
Comfort discussing quality of care get from doctor	3.80$_a$	3.55$_b$	3.60$_{ab}$	3.67$_{ab}$
Health compared to others of the same age	2.92ab	2.87$_b$	2.70$_b$	3.14$_a$

Note: Means that share subscripts do not differ significantly at $p < .05$.

Exhibit D.4. Criterion-related validity of Original SST segments—mini-survey (Analysis Set V)

Variable	Mean Score			
	Active	Passive	High Effort	Complacent
Educational attainment	3.22	2.65	2.27	2.95
Overall health compared to others your age	3.26	3.00	3.00	3.59
Number of prescriptions take on a daily basis	4.48	4.48	5.41	2.77

Exhibit D.5. Criterion-related validity of Original SST segments— Consumer Assessment of Healthcare Providers and Systems (Analysis Set VI)

Variable	Mean Score			
	Active	Passive	High Effort	Complacent
Ratings				
Personal doctor	92.2	87.7	88.8	91.0
Specialist	90.8	86.1	87.1	89.5
Health care plan	86.6	82.7	83.5	85.8
Health care	88.5	83.7	84.5	87.3
Drug plan	83.2	80.1	80.6	83.0
Composites				
Get needed care	87.6	82.2	83.0	87.0
Get care quickly	85.8	78.8	81.1	83.6
Doctor communication	92.1	85.9	87.8	90.6
Immunizations				
Flu shot in past year	75.4	66.6	74.6	66.0
Pneumonia shot ever	74.6	64.4	73.1	64.3

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Exhibit D.6. Criterion-related validity of Original SST segments—low-income subsidy survey (Analysis Set VII)

Variable	Mean Score			
	Active (38 percent of sample)	Passive (16 percent of sample)	High Effort (31 percent of sample)	Complacent (16 percent of sample)
Aware of low-income subsidy (LIS)	$.89_{a}$	$.77_{ab}$	$.75_{b}$	$.83_{ab}$
Took some action toward LIS enrollment	.07	.07	.11	.10
Enrolled in LIS	.08	.07	.11	.10
Health	2.86_{ab}	2.89_{ab}	2.60_{b}	3.01_{a}
Educational attainment	3.10_{a}	2.99_{ab}	2.82_{b}	2.89_{ab}

Notes: Means that share subscripts do not differ significantly at $p < .05$. The Centers for Medicare & Medicaid Services granted permission to include findings in this exhibit not previously published or presented at a national conference.

Exhibit D.7. Criterion-related validity of Original SST segments—fraud messaging survey (Analysis Set IX)

Variable	Mean Score			
	Active (34 percent of sample)	Passive (17 percent of sample)	High Effort (38 percent of sample)	Complacent (12 percent of sample)
Demographics				
Health Status	2.92_{a}	2.95_{a}	2.69_{b}	3.12_{a}
Education	5.58	5.61	5.36	5.36
Reasons to Report Fraud				
Altruism toward government	61.45_{a}	76.75_{b}	63.58_{a}	66.47_{ab}
Help future generations	78.85	81.25	77.65	80.99
Emotional appeal	182.52	182.05	178.70	180.77
Personal cost	95.55	115.39	101.99	107.79
Moral appeal	112.03_{a}	86.22_{b}	107.86_{a}	102.21_{ab}
Confidence building	69.80	58.51	70.42	61.98

Notes: Means that share subscripts do not differ significantly at $p < .05$. The Centers for Medicare & Medicaid Services granted permission to include findings in this exhibit not previously published or presented at a national conference.

Appendix E

Revised SST Segments Criterion-Related Validity

Exhibit E.1. Criterion-related validity of Revised SST segments—Medicare Current Beneficiary Survey (Analysis Set III)

Variable	Mean Score			
	Active (28 percent of sample)	Passive (28 percent of sample)	High Effort (18 percent of sample)	Complacent (26 percent of sample)
Patient activation subscales				
Skills				
Self-Efficacy	.65$_{a}$	-.81$_{d}$	-.49$_{c}$	.58$_{b}$
Doctor Relationship	.30$_{a}$	-.36$_{d}$	-.07$_{c}$	.20$_{b}$
Assertiveness	.47$_{a}$	-.42$_{d}$	.03$_{c}$	.13$_{b}$
Motivation				
Shared Decision Making	.90$_{a}$	-.62$_{c}$	.77$_{b}$	-.57$_{c}$
Information Seeking	.52$_{a}$	-.35$_{d}$	.21$_{b}$	.06$_{c}$
Demographics and health status				
Income level	2.77$_{a}$	2.22$_{c}$	2.58$_{b}$	2.51$_{b}$
Educational attainment	2.58$_{a}$	1.98$_{d}$	2.34$_{b}$	2.20$_{c}$
Health status	3.27$_{a}$	2.92$_{b}$	3.03$_{b}$	3.19$_{a}$
Knowledge and skills				
Medicare quiz	3.41$_{a}$	2.71$_{c}$	3.15$_{b}$	3.19$_{b}$
Medicare knowledge	3.46$_{a}$	2.92$_{c}$	3.25$_{b}$	3.32$_{b}$
Medicare understandability	2.97$_{a}$	2.65$_{c}$	2.80$_{b}$	2.91$_{a}$
Health and preventive behavior				
Any weekly exercise	.50$_{a}$	.36$_{c}$	.44$_{ab}$	.43$_{b}$
Flu shot in past year	.72$_{a}$	.63$_{b}$	.72$_{a}$	.64$_{b}$
Pneumonia shot ever	.71$_{a}$	.60$_{b}$	.72$_{a}$	.63$_{b}$
Women - mammogram	.64$_{a}$	.52$_{c}$	.61$_{ab}$	.58$_{bc}$
Women – pap smear	.43$_{a}$	.36$_{c}$	.42$_{ab}$	.37$_{bc}$

Notes: Means that share subscripts do not differ significantly at $p < .05$. The Centers for Medicare & Medicaid Services granted permission to include findings in this exhibit not previously published or presented at a national conference.

Exhibit E.2. Criterion-related validity of Revised SST segments—fraud messaging survey (Analysis Set IX)

Variable	Mean Score			
	Active (20 percent of sample)	Passive (37 percent of sample)	High Effort (18 percent of sample)	Complacent (25 percent of sample)
Demographics				
Health status	2.99ab	2.83_{b}	2.79_{b}	3.06_{a}
Education	5.70	5.32	5.68	5.41
Reasons to report fraud				
Altruism toward government	62.32	65.60	68.81	62.09
Help future generations	77.99	81.14	68.86	78.24
Emotional appeal	181.57	182.75	174.92	187.24
Personal cost	93.05_{a}	101.30_{ab}	120.14_{b}	102.27_{ab}
Moral appeal	114.77	104.12	96.75	105.18
Confidence building	70.52	65.25	70.77	65.19

Notes: Means that share subscripts do not differ significantly at $p < .05$. The Centers for Medicare & Medicaid Services granted permission to include findings in this exhibit not previously published or presented at a national conference.

Exhibit E.3. Criterion-related validity of Revised SST segments—comparative effectiveness survey (Analysis Set X)

Question	Mean Score			
	Active (22 percent of sample)	Passive (33 percent of sample)	High Effort (27 percent of sample)	Complacent (18 percent of sample)
Skills/self-efficacy				
How confident are you in your ability to use information from research evidence to make health decisions when there are multiple treatment options?	2.37[a]	1.83[c]	2.11[b]	2.11[b]
General attitudes				
Physicians and other providers have a responsibility to encourage patients to be meaningful participants in using comparative effectiveness research (CER) in treatment decisions.	4.45[a]	3.81[d]	4.16[b]	3.92[c]
Information from CER can motivate patients like me to adhere more closely to the medical therapies doctors prescribe.	4.43[a]	3.78[d]	4.09[b]	3.99[c]
Opinions				
CER will help patients to be more informed about treatment options.	8.30[a]	7.11[c]	7.76[b]	7.87[b]
Increasing patients' use of CER in their decisions will reduce patients' medical costs.	5.93[a]	5.33[d]	5.46[b]	5.61[c]
CER will be used to increase patients' access to effective new treatments.	8.25[a]	7.16[c]	7.61[b]	7.86[a]
Behaviors				
How often do you *use* information on the comparative effectiveness of different treatment approaches for you?	3.15[a]	2.30[d]	2.96[b]	2.36[c]
How often do you *look for* information on the comparative effectiveness of different treatment approaches for you?	3.28[a]	2.43[c]	3.05[b]	2.47[c]
I use information from research to guide my decisions for my own care.	3.05[a]	2.34[c]	3.00[a]	2.70[b]
During medical appointments, I bring research evidence from articles or the internet to talk to the doctor or nurse about my medical problems.	2.51[a]	1.65[c]	2.24[b]	1.65[c]
How often do you use tools [for assisting patients in their use of CER in clinical decision making] to compare the effectiveness of different treatment options for your health problems?	3.68[a]	2.84[c]	3.23[b]	2.41[d]

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