



Motivation and attitudes toward changing health (MATCH): A new patient-reported measure to inform clinical conversations

Danielle M. Hessler^{a,*}, L. Fisher^a, W.H. Polonsky^b, V. Bowyer^a, M. Potter^a

^a Department of Family & Community Medicine, University of California-, San Francisco, United States

^b Behavioral Diabetes Institute, United States

ARTICLE INFO

Article history:

Received 8 February 2018

Received in revised form 19 April 2018

Accepted 20 April 2018

Available online 27 April 2018

Keywords:

Motivation

Behavior change

Patient reported outcome

Type 2 diabetes

Pragmatic measure

ABSTRACT

Objective: To identify and assess patient motivation to initiate or maintain behavior changes.

Methods: Attitudinal statements were developed from structured patient interviews and translated into 18 survey items. Items were analyzed with exploratory factor analysis (EFA).

Results: An EFA with 340 type 2 diabetes patients identified three areas of patient attitudes toward changing health behaviors: (1) willingness to make changes (3 items; $\alpha = 0.69$), (2) perceived ability to make or maintain changes (3 items; $\alpha = 0.74$), and (3) and feeling changes are worthwhile (3 items; $\alpha = 0.61$). Greater perceived ability and feelings of worthwhileness were associated with positive psychosocial and behavioral management indicators. All three areas were associated with confidence and attitudes toward making a specific behavioral change (e.g., improve diet).

Conclusions: MATCH is an internally consistent and valid 9-item scale that provides a profile of factors influencing motivation that can be used in clinical and research settings.

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1. Introduction

Making and sustaining positive behavioral changes in one's management of a chronic disease like diabetes is tough. Many patients struggle to achieve self-management goals, including eating a healthy diet, engaging in regular physical activity, taking medications as directed, limiting or stopping substance and tobacco use, and maintaining regular self-monitoring behaviors (e.g., blood sugar, blood pressure).^{1,2} When placed within a larger life context and the competing demands of patients' lives, the number of tasks can be overwhelming, with many people feeling unable to keep up with their diabetes routine or self-management demands.^{1,3}

Given that the vast majority of management decisions are undertaken by patients outside of a healthcare setting, there is great interest in supporting patients to be more engaged with their own self-care and motivated to make and sustain behavior changes over time.^{4,5} Many well-known frameworks focus on understanding and addressing patient motivation to enhance behavioral self-management. These

include, but are not limited to: the theory of planned behavior (TPB), self-efficacy theory, self-determination theory, motivational interviewing, empowerment-based communication, and the COM-B model.^{6–11} In turn, these frameworks have generated a host of descriptive terms including: patient activation, empowerment, engagement, self-motivation, and readiness to change. For example, at the heart of self-determination theory (SDT) are patient needs for competence, relatedness and autonomy that give rise to intrinsic self-motivation,⁸ while the theory of planned behavior (TPB) posits that an individual's attitude toward behavior, subjective norms, and perceived behavioral control shape their behavioral intentions and behaviors.⁶ While distinct, these frameworks and their associated terminologies, share a small set of common elements, such as perceived capacity or ability (psychologically and physically), and consideration of thoughts, feelings and ambivalence about change.

Something that often gets overlooked in clinical settings, however, is a basic understanding of the very good reasons patients have for *not* making or maintaining a positive behavior change in the first place. While all patients would prefer to live long and healthy lives with their diabetes, there are often very legitimate reasons why effective self-management behaviors are not undertaken, such as a perceived lack of urgency, fear of failure, lack of resources, and/or a belief that they will not be helpful or will cause harm. These reflect a complicated ambivalence concerning change that is rarely considered in clinical conversations, but which is crucial to consider if behavior change is to occur.⁹

Conflicts of interest: No author reported a conflict of interest. Lawrence Fisher: consultant or advisory board with Roche Diagnostics, Elli Lilly Abbott Diabetes Care; William Polonsky: consultant or advisory board with Sanofi, Novo Nordisk, Eli Lilly, Dexcom, Abbott, Johnson & Johnson, Boehringer Ingelheim, Takeda, Roche.

* Corresponding author at: Box 0900, Department of Family & Community Medicine, University of California, San Francisco, San Francisco, CA 94143, United States.

E-mail address: danielle.hessler@ucsf.edu. (D.M. Hessler).

There are few practical, well-validated tools to assist clinicians in identifying both sides of patients' ambivalence (i.e., assessing a patient's current motivation, interests, and feelings concerning the reasons for making a specific change vs. the reasons for not making that change). Currently available validated instruments used in healthcare primarily focus on assessment of general barriers or obstacles to self-management change.^{12,13} For example, the Patient Activation Measure (PAM)¹⁴; is a widely used scale that assesses patient knowledge, goal orientation, and perceived ability to make and maintain health-related behavioral changes, defined broadly. Thus, while theory suggests motivation and readiness to engage in behavior change is multifaceted and that feelings about enacting change is often conflicted,⁸ many instruments often boil this down to a single dimension, ultimately leaving out important areas for assessment and hindering clinical application in the care planning process. Furthermore, there is a lack of pragmatic measures that target patient stakeholder identified issues and are viewed as acceptable and actionable for patients and healthcare teams.¹⁵

To fill this gap, we asked patients with type 2 diabetes (T2DM) in qualitative interviews about their reasons both for and for not making needed behavior change and, from these, developed the Motivations and Attitudes Toward Changing Health scale (MATCH). Open-ended questions were guided by constructs of several common motivational frameworks, and were designed to elicit both desires for change (e.g., will improve my health) and concerns about change (e.g., not certain it is worth doing, won't make a difference, lack of bandwidth). In contrast to item development approaches used by other measures, this approach allowed for the identification of dimensions of the motivational process driven directly by patient perspectives. This report describes: (1) the construction, and validation of MATCH, and (2) how MATCH scores were linked with patient characteristics and diabetes status.

2. Methods

Structured interviews were conducted with 10 adults with T2DM and five diabetes health care providers. Recruitment for interviewees came from referrals by health care providers at five diabetes clinics serving diverse patient populations. The sample was selected to ensure a mixed gender, ethnicity and age. In phone and face-to-face meetings, interviewees were asked about the management of their health conditions (including T2DM), focusing on their attitudes toward and interest in self-management activities, especially as they related to why they would or would not be able to make needed behavioral changes. Respondent descriptions were recorded verbatim, reviewed by the authors for duplication, and converted into 18 survey items to capture specific patient statements. Eight additional adults with T2DM and five additional diabetes providers then reviewed the items for clarity and thoroughness. Response options for each item were provided on a 5-point scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither agree nor disagree", 4 = "agree", 5 = "strongly agree").

A larger sample of T2D adults was then recruited from the Taking Control of Your Diabetes (TCOYD) Research Registry, an online platform for individuals recruited primarily from TCOYD's one-day diabetes education events in the United States who had previously agreed to be contacted for participation in diabetes-related research. For the current study, participants were required to be ≥ 19 years old and diagnosed with T2DM for at least 12 months. Respondents were asked to complete a brief, HIPAA-protected eligibility questionnaire, an informed consent and the survey battery online. They received a \$25 electronic gift card for participation. The research protocol was approved by Ethical and Independent Review Services, a community-based, institutional review board.

2.1. Measures

In addition to the 18 preliminary MATCH items, the following were included in the online survey:

Demographic measures: age, gender, ethnicity, education (years).

Diabetes status was assessed by: insulin use (yes/no), number of diabetes-related complications (from a list of 12), and body mass index (BMI, calculated from self-reported weight and height).

Diabetes behavioral management was assessed via the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA)¹⁶; to assess healthy diet, physical activity, and medication taking. Items assessed the frequency over the prior 7 days of following a recommended diet, exercised at least 30 min, and missed taking one or more medications.

Psychosocial measures included the Regimen Distress subscale from the Diabetes Distress Scale (DDS)¹⁷ which assesses worries and concerns specifically related to ability to manage diabetes on a six point Likert scale (5 items; $\alpha = 0.913$). The Diabetes Self-Efficacy was assessed by a 15-item scale developed by Lorig et al.¹⁸ ($\alpha = 0.88$), with each item rated on a 10-point Likert scale. The Personal Control subscale from the Revised Illness Perception Questionnaire (IPQ-R)¹⁹ includes items that assess disease-related cognitions and perceived control as well outcome expectancy ($\alpha = 0.80$). It is a 6-item scale on a 5 point Likert scale with items such as, "I have the power to influence my disease" and "Nothing I do will affect my illness". Also included was the Patient Health Questionnaire-8 (PHQ-8),²⁰ an 8-item scale that assesses symptoms linked to DSM-V criteria for Major Depressive Disorder ($\alpha = 0.89$), with each item rated on a four point scale ranging from 0 = "not at all" to 3 = "nearly every day". The suicide item was omitted, which does not affect scale distribution or utility of cut-points.²¹

Attitudes toward specific behavioral management change. From a list of seven behavior change options, participants were asked to select specific areas where they felt they currently needed to make a change: diet, physical activity, medication taking, checking glucose, stress, tobacco use, and alcohol use. They were then asked to identify the one area of change that was most important to them. Four items then assessed attitudes toward making a specific change in the selected area including: overall confidence regarding making this change (1 to 10 scale commonly used as part of behavioral action planning).²²

2.1.1. Data analysis

An exploratory factor analysis (EFA) with Promax rotation was conducted to determine whether the 18 preliminary MATCH items could be reduced or grouped into meaningful subscales. Based on the factor analytic results, subscales were created by averaging item responses for the items included in each subscale. Internal consistency of the subscales was determined by Cronbach's alpha statistic.

Validity of the MATCH was assessed with measures of convergent, and discriminant validity. First, convergent validity was examined through associations between MATCH total and subscales with measures of regimen diabetes distress, diabetes self-efficacy, illness perception personal control, behavioral self-management and patient confidence and specific attitudes toward a specific health areas (e.g., improving diet or smoking cessation). Measures of current healthy diet, physical activity and medication taking were selected to represent the most common areas of behavioral management for most patients with diabetes. While attitudes toward a specific health area allowed for examining the degree to which the MATCH scales are linked with targeted items based on each dimension as well as examining the linkage between global attitudes regarding change (MATCH) and with attitudes about a specific behavior change. Discriminant validity was assessed through associations between MATCH scales and depression symptoms, where low to moderate associations were expected. Associations were tested with Pearson correlations between each MATCH subscale with the validity variables. Multiple regression analyses also

examined associations between the MATCH scales and two groups of variables: participant demographics and diabetes status.

3. Results

Three hundred and forty-seven T2D patients began the survey, and 340 (98%) completed it. Participants were on average 59.2 (± 12.0) years of age, 55% female, and almost half of the sample had an education level equivalent to an undergraduate degree (average education of 15.7 years) (Table 1). Approximately two-thirds of participants identified themselves as non-Hispanic white (67.6%). The average, self-reported HbA1c was $7.3\% \pm 1.4\%$ ($56 \text{ mmol/mol} \pm 15.3 \text{ mmol/mol}$) with nearly half (48.7%) reporting using insulin.

When asked to identify which health problems they were considering when answering the MATCH items, 95% of the sample answered T2DM. The next most frequent health conditions considered when responding included: obesity (75%), heart disease (47%), hyperlipidemia (48%), and hypertension (37%). Most participants ($n = 327$, 96%) identified at least one area of self-management they felt they needed to address (from the list of seven presented). When asked to select the area they felt was most important to act upon, the most common areas were: increasing physical activity (45%) and diet [cutting down on food, adding foods, or changing diet (36%)].

3.1. Factor analysis of MATCH

An exploratory factor analysis of the 18 preliminary MATCH items yielded a four-factor solution (eigenvalues ≥ 1.00) that accounted for 60.7% of the common item variance. Inspection of the scree plot of successive eigenvalues indicated that three factors provided a good description of the data. Items that loaded < 0.50 on all factors or were cross-loaded on multiple factors (i.e., 0.30 or greater) were dropped, and the remaining items were submitted to a second EFA. This analysis, with nine items, yielded three coherent and meaningful factors that accounted for 61.5% of the variance. Factor loadings ranged from 0.60 to 0.92 (Table 2). Separate EFAs were then conducted for participants currently using insulin and for those not using insulin, resulting in an almost identical three factor solution for both groups.

Based on the item content, the three MATCH subscales were labeled as follows: *Willingness* centered on participants' willingness to do more to manage their health problems, e.g. "I am interested in finding new ways to better manage my health problems" (3 items, Cronbach's alpha = 0.69); *Ability* focused on participants currently feeling able or capable of making and sustaining these changes, e.g., "I am able to make the changes in my life that are needed to improve my health" (3 items, Cronbach's alpha = 0.74); and *Worthwhileness* related to participants' view that the change was worth the effort, e.g., "I see few benefits to putting time and energy into managing my health problems now" (3 items, reverse coded so that all three subscales would be scored in the same direction, Cronbach's alpha = 0.61).

Inter-correlations among subscales ranged from $r = \pm 0.22$ to $r = \pm 0.35$, suggesting somewhat related, but distinct attitudinal areas. Each MATCH subscale was calculated as the mean of the contributing items (with possible scores ranging from 1.00 to 5.00), and the mean score per subscale for the entire sample was: Willingness, 4.25 (± 0.68); Ability, 3.81 (± 0.76), Worthwhileness, 3.96 (± 0.90). Thus, the majority of participants expressed relatively high Willingness to make a change or do more to manage their health, whereas they were somewhat less certain that a change was Worthwhile or that they were Able to make or sustain a change.

3.2. Convergent and discriminant validity of MATCH

Each of the three subscales were significantly related to the criterion variables, with the pattern of associations between MATCH scales and

specific convergent validity measures in line with expectations (Table 3). All three MATCH scales were associated with the Illness Perception Personal Control scale (all $p < 0.001$), with the strongest associations found for the Ability and Worthwhileness scales. Higher Ability and Worthwhileness scores were significantly associated with lower levels of diabetes regimen distress, and higher diabetes self-efficacy with the strongest associations for Ability. Associations between all three MATCH scales and attitudes toward a specific behavioral management change, as selected by participants, were significant (Table 3), providing further support for a connection between MATCH scores and attitudes around specific behavioral change. Furthermore, the patterns of associations were in line with expectations based on the face validity of the items. For example, "interest in learning good ways to make this change" was associated most strongly with Willingness ($r = 0.48$, $p < 0.001$), compared to Ability and Worthwhileness ($r = 0.28$ and 0.10 respectively); while "I don't think it will do any good to make this change" was most closely aligned with ratings of Worthwhileness ($r = -0.43$, $p < 0.001$) compared to Ability and Willingness ($r = -0.27$ and $r = -0.23$ respectively). Overall confidence in making a change in the selected prioritized area was associated with higher MATCH ratings of Ability ($r = 0.44$), followed by Willingness ($r = 0.22$) and Worthwhileness ($r = 0.20$). MATCH scales were additionally associated with better behavioral self-management. Higher Ability ratings were significantly and positively associated with eating a healthy diet ($r = 0.31$, $p < 0.001$) and engaging in more physical activity ($r = 0.20$, $p < 0.001$). Both higher Ability and Worthwhileness were associated with fewer missed medication doses ($r = -0.15$ to $r = -0.21$, $p < 0.01$). Finally, in support of discriminant validity MATCH scales had weak to moderate associations with symptoms of depression ($r = -0.08$ to -0.31).

To further explore the combined impact of the MATCH subscales and their association with the validity measures, we created a cut-point for each MATCH subscale based on the face validity of the scale response options (low = mean subscale score of 1.0 to 3.4; high = 3.5 to 5.0). Forty-eight percent of the current sample reached the threshold for "high" on all three subscales. In comparison to those who reported low MATCH scores in one or more subscales, participants reporting high MATCH scores across all three subscales differed on all validity measures (Table 3) including: significantly higher on psychosocial and behavioral management measures, and higher positive attitude toward making specific behavior changes.

Table 1
Participant characteristics.

	<i>n</i> = 340
Age (years)	59.1 (12.0)
Gender (% female)	55.0%
Ethnicity (%)	
Asian	8.8%
African American/Black	7.9%
Latino/Hispanic	4.7%
Non-Hispanic White	67.6%
Other or mixed ethnicity	11.0%
Education (years)	15.7 (2.6)
HbA1c	7.3 (1.4)
BMI	32.9 (7.6)
Insulin (%)	48.7%
Number of Diabetes Complications	2.4 (2.3)
Diabetes Distress	2.3 (1.0)
Depression Symptoms	6.9 (5.3)
Diabetes self-efficacy	6.9 (1.7)
General healthful diet (days/week)	3.3 (2.1)
Physical Activity (days of 30+ min/week)	2.8 (2.2)
Number of days with missed medication(s)	0.9 (1.7)

Table 2
Factor loadings of final MATCH items.

	Willingness	Worthwhile	Ability
I am interested in finding new ways to better manage my health problems	0.797	0.114	0.025
I am ready to do more to better manage my health problems now.	0.775	−0.013	−0.010
I want to find a better way to take care of my health problems.	0.791	−0.131	−0.107
I see little or no benefit to putting time and energy into managing my health problems now (Reverse)	0.032	0.843	0.240
Working to manage my health problems has only a little payoff or benefit (Reverse)	−0.038	0.673	−0.112
It is not really worth it to do all the things that I am asked to do to manage my health problems (Reverse)	−0.041	0.600	−0.291
I am able to make the changes in my life that are needed to improve my health.	−0.186	0.162	0.917
I don't have enough time to take care of my health problems the way I think I should (Reverse)	0.090	0.174	0.780
I am able to fit the tasks of managing my health problems into my life.	0.042	0.198	0.673

Bold font indicates the factor each item loaded onto.

3.3. Associations between MATCH with participants characteristics and diabetes status

Overall, there were few significant associations between the three MATCH scales, participant demographic characteristics (age, gender, education) and diabetes status (time since diagnosis, complications, insulin status). Notable exceptions included significant, independent negative associations between both Ability and age ($\beta = -0.20, p < 0.001$). Higher BMI was negatively associated with Willingness ($\beta = -0.12, p = 0.05$). Finally, more diabetes complications were associated with lower ratings of Worthwhileness ($\beta = -0.12, p = 0.05$).

4. Discussion

MATCH is an internally consistent and valid 9-item scale that can be used in clinical and research settings as a pragmatic measure of three crucial, patient-identified motivational factors that form an important and often neglected part of the clinical conversation around behavior change: (1) Willingness for making a change, (2) perceived Ability for making or maintaining a change, and (3) belief regarding whether or not a change is truly Worthwhile. The MATCH scale was formed starting with patient perspectives and priorities to ensure its importance to patient stakeholders, is brief and low burden to complete, and provides actionable entry points for clinical conversations.¹⁵ The three subscales identify critical components of the change process that need to be addressed in clinical conversations as planning for behavior change proceeds. The different patterns among the three subscale scores for individual patients suggests that “motivation” for change, from the patient perspective, is composed of at least three elements, all of which are crucial to the planning process; they address the various needs, beliefs and attitudes of individual patients as they consider making changes to their

own disease management efforts. Development of MATCH included something that largely goes unaddressed in clinical practice – the importance of addressing the often contradictory attitudes and expectations around behavior change that are often the primary drivers for making or maintaining changes over time.^{9,24} In doing so, each MATCH subscale provides an entry point for clinical discussion and exploration, and can be used practically to target specific areas of concern in unique, patient-directed ways. For example, a patient displaying high Willingness and Worthwhileness but low perceived Ability may benefit from exploring life circumstances that make it difficult to implement the specific change. In contrast, a patient reporting high Ability and Willingness, but low Worthwhileness may benefit from discussing previous experiences making similar behavior changes to identify reasons why such a change may not be worthwhile as well as additional contributing factors to their evaluation of worthwhileness. Thus, differences among the profiles of MATCH scores suggest differences in clinical strategies to more effectively address individual patient needs and concerns.

While rooted in and developed from patient perspectives, the resulting MATCH subscales strongly align with elements of established theory; including the theory of planned behavior (TPB)⁶ and self-efficacy theory.²³ For example, the MATCH Willingness scale may reflect intentions, the MATCH Worthwhileness scale aligns with instrumental attitudes or outcome expectancy, and the MATCH Ability scale may reflect self-efficacy and perceived behavioral control. When considering pragmatic interventions designed to improve these aspects of motivation, this existing larger body of literature can be leveraged to provide strategies for changing attitudes as well as provide insight into how these dimensions of motivation may conceptually inter-relate and ultimately contribute to behavior change.

MATCH displays adequate convergent validity: individual subscales are associated with psychosocial factors (Ability, Worthwhileness),

Table 3
Associations between MATCH and validity measures.

	Willingness		Ability		Worthwhile		MATCH			Effect size d
	r	p	r	p	r	p	High	Low	p	
Convergent										
Psychosocial										
Diabetes distress (regimen distress)	0.05	0.58	−0.48	<0.001	−0.31	<0.001	2.0 (0.8)	2.8 (1.0)	<0.001	0.89
Diabetes self-efficacy	0.07	0.18	0.55	<0.001	0.17	0.004	7.6(1.5)	6.4(1.7)	<0.001	0.75
Illness perception: personal control	0.23	<0.001	0.40	<0.001	−0.40	<0.001	4.4 (0.5)	3.9 (0.6)	<0.001	0.91
Attitudes toward specific change										
Confidence making this change	0.22	<0.001	0.44	<0.001	0.20	<0.001	7.4 (2.0)	5.8 (2.2)	<0.001	0.76
Interested in learning good ways to make this change.	0.48	<0.001	0.28	<0.001	−0.10	0.10	4.7 (0.7)	4.2 (0.8)	<0.001	0.67
I don't think it will do any good to make this change.	−0.27	<0.001	−0.25	<0.001	0.40	<0.001	1.4 (0.5)	1.9 (0.7)	<0.001	0.82
I have too many other things going on in my life to make this change now.	−0.20	<0.001	−0.49	<0.001	−0.23	<0.001	2.1 (0.9)	2.8 (1.1)	<0.001	0.70
Behavioral Self-management										
Healthy General Diet	0.09	0.12	0.31	<0.001	0.01	0.81	3.7 (2.2)	3.0 (2.0)	0.03	0.33
Physical Activity	0.06	0.28	0.20	<0.001	0.07	0.22	3.0 (2.2)	2.5(2.2)	0.02	0.22
Missed Medication days (past week)	−0.08	0.16	−0.21	<0.001	−0.15	0.008	0.6 (1.1)	1.1 (2.1)	0.005	0.30
Discriminant										
Depression symptoms (PHQ-8)	−0.08	0.15	−0.31	<0.001	−0.22	<0.001	5.5 (4.3)	8.3 (5.5)	<0.001	0.57

Note: Cut-point for each MATCH subscale based on the face validity of the scale response options (low = mean subscale score of 1.0 to 3.4; high = 3.5 to 5.0); with “high MATCH” scores defined as reaching the threshold for “high” on all three subscales. Bold font indicates MATCH areas hypothesized to associate with specific convergent validity variables.

behavioral management (Ability), and attitudes and confidence for making a specific change (Ability, Worthwhileness, Willingness). Furthermore, considering the subscales in combination yields significant and clinically meaningful differences between participants who scored relatively high on all three subscales compared to those with lower scores on one or more subscales. While the results suggest that the majority of participants are willing to consider making a change, there is considerable variability across patient ratings of Ability and Worthwhileness regarding actually making that change happen. Furthermore, the low to moderate inter-correlations among the subscales and with depression symptoms suggest the scales reflect related but distinct areas of patient motivation that are distinct from depression. Thus, the pattern of MATCH scores, rather than the use of a single “motivational score” can direct unique clinical conversations for individual patients.

There were no consistent associations occurred between MATCH scores and patient demographic characteristics, thus making the scale useful for diverse patient populations. One notable exception is the association between age and perceived ability. Younger adults reported lower perceived ability to make or maintain behavioral change than older adults. This is in line with literature pointing to the greater challenges of relatively younger adult patients regarding the management of chronic disease, including greater stress and lack of support, compared to older adults.^{25,26} In addition, several statistically significant, though modest, associations are found between MATCH and diabetes disease status variables.

The current study has several strengths: the MATCH items were derived directly from patient-reported attitudes around behavior change; they provide well-defined, targeted entry points for clinical conversations around behavioral change; and the sample was community based and drawn from the nation as a whole. However, several limitations are noteworthy. First, although efforts were made to recruit a diverse group of patients, recruitment utilized an online registry and the resulting sample was primarily college educated and English speaking, thus potentially limiting the generalizability of the findings. Second, the study focused on patients diagnosed with T2DM. While the majority of participants reported having one or more comorbid chronic conditions (e.g., hypertension), MATCH has not been validated for use with other conditions, like type 1 diabetes. Third, the Worthwhileness subscale items focus on a lack of worthwhileness and were then reverse coded. While this decision was purposeful to reduce potential respondent social desirability and bias, high worthwhile scores may in part reflect the absence of issues around worthwhileness rather than perception of high worthwhileness. Fourth, as diabetes status variables were limited to self-report in the current study, associations with clinical measures deserve further attention with laboratory and chart data. Last, as the data are cross-sectional, the direction of associations cannot be determined, nor can we present test–retest data or the degree of sensitivity to change for the MATCH in this initial report. In current work we are examining how specific patterns of scores across the three subscales are linked to specific indicators of disease management (e.g., laboratory HbA1c values, blood pressure), sensitivity to change, and assessment of predictive validity for MATCH.

Results of the current study indicate that MATCH displays good psychometric properties, including good internal consistency and both convergent, and discriminant validity. MATCH directly addresses some of the complex components of patient motivation for behavior change in

a pragmatic measure, and provides a useful starting point for a clinical conversation about the change process.

Funding

This research was funded by NIH Grant DK108039.

References

- DiMatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Med Care* 2004;42:200-9.
- Ruggiero L, Glasgow R, Dryfoos JM, et al. Diabetes self-management. Self-reported recommendations and patterns in a large population. *Diabetes Care* 1997;20:568-76.
- Fisher L, Hessler DM, Polonsky WH, Mullan J. When is diabetes distress clinically meaningful?: establishing cut points for the diabetes distress scale. *Diabetes Care* 2012;35:259-64.
- Jordan JE, Briggs AM, Brand CA, Osborne RH. Enhancing patient engagement in chronic disease self-management support initiatives in Australia: the need for an integrated approach. *Med J Aust* 2008;189:S9-S13.
- Coulter A, Ellins J. Effectiveness of strategies for informing, educating, and involving patients. *BMJ* 2007;335:24-7.
- Ajzen I. From intentions to actions: A theory of planned behavior. In: Kuhl J, Beckmann J, eds. *Action Control: From Cognition to Behavior*. Berlin, Heidelberg, New York: Springer-Verlag; 1985. p. 11-39.
- Bandura A, Adams NE. Analysis of self-efficacy theory of behavioral change. *Cogn Ther Res* 1977;1:287-310.
- Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol* 2000;55:68-78.
- Rollnick S, Miller WR, Butler CC, Aloia MS. *Motivational Interviewing in Health Care: Helping Patients Change Behavior*. 1st ed. New York, NY: Guilford Press. 2007.
- Funnell MM, Anderson RM. Empowerment and self-Management of Diabetes. *Clin Diabetes* 2004;22:123-7.
- Michie S, Atkins L, West R. *The Behaviour Change Wheel: A Guide to Designing Interventions*. Silverback Publishing. 2014.
- Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Haak T. The diabetes self-management questionnaire (DSMQ): Development and evaluation of an instrument to assess diabetes self-care activities associated with glycaemic control. *Health Qual Life Outcomes* 2013;11:138.
- Anderson RM, Funnell MM, Fitzgerald JT, Marrero DG. The diabetes empowerment scale: A measure of psychosocial self-efficacy. *Diabetes Care* 2000;23:739-43.
- Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the patient activation measure (PAM): Conceptualizing and measuring activation in patients and consumers. *Health Serv Res* 2004;39:1005-26.
- Glasgow RE, Riley WT. Pragmatic measures: What they are and why we need them. *Am J Prev Med* 2013;45:237-43.
- Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure: Results from 7 studies and a revised scale. *Diabetes Care* 2000;23:943-50.
- Polonsky WH, Fisher L, Earles J, et al. Assessing psychosocial distress in diabetes: Development of the diabetes distress scale. *Diabetes Care* 2005;28:626-31.
- Lorig K, Steward A, Riter P, Gonzalez V, Laurent D, Lynch J. *Outcome Measures for Health Education and Other Health Care*. 1st ed. Sage Publications. 1996.
- Moss-Morris R, Weinman J, Petrie KJ, Horne R, Cameron LD, Buick D. The revised Illness Perception Questionnaire (IPQ-R). *Psychol Health* 2002;17:1-16.
- Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606-13.
- Wells TS, Horton JL, LeardMann CA, Jacobson IG, Boyko EJ. A comparison of the PRIME-MD PHQ-9 and PHQ-8 in a large military prospective study, the millennium cohort study. *J Affect Disord* 2013;148:77-83.
- Bagozzi RP, Yi Y. The degree of intention formation as a moderator of the attitude-behavior relationship. *Soc Psychol Q* 1989;52:266-79.
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev* 1977;84:191-215.
- Rollnick S, Heather N, Bell A. Negotiating behaviour change in medical settings: The development of brief motivational interviewing. *J Ment Health* 1992;1:25-37.
- Hessler DM, Fisher L, Mullan JT, Glasgow RE, Masharani U. Patient age: A neglected factor when considering disease management in adults with type 2 diabetes. *Patient Educ Couns* 2011;85:154-9.
- Hessler DM, Fisher L, Naranjo D, Masharani U. Young adult African American patients with type 2 diabetes: A high risk patient sub-group with few supports for good diabetes management. *J Health Psychol* 2012;17:535-44.