

# Usage of the SPUR Adherence Profiling Tool in depression and anxiety: Initial Findings

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## Introduction

The SPUR adherence profiling tool was developed on the basis of the SPUR behavioral framework<sup>1</sup>. The SPUR framework posits a multifactorial decision-making process to help analyze the behavior of patients with chronic disease with respect to medication adherence. The tool consists of a questionnaire with 6 to 24 items, and generates a score for risk of non-adherence and scores in 13 drivers of adherence behavior, grouped in 4 categories of factors: social, psychological, usage and rational<sup>2</sup>.

The tool has been subject to a number of studies to validate its predictive value<sup>3,4</sup>.

The SPUR tool is designed to be administered digitally, facilitating its usage in digital adherence technology (DAT) applications.

As DATs offer a degree of flexibility and often incorporate dynamic data-gathering techniques, the SPUR profile can address other questions to the patient to gain a more complete profile, to be acted upon by a DAT's behavioral change techniques and functions.

Depression is recognized as a major contributor to non-adherence<sup>5</sup> and anxiety can impact effective behavioral change intervention and is itself linked to hypertension<sup>6</sup>. The study finds that SPUR may potentially be used to identify risk of depression or anxiety, thereby allowing DATs to react accordingly and/or notify healthcare professionals that their patients are at risk of mental illness.

## Aims

1. Determine whether the SPUR diagnostic tool retains its **predictive validity to measure non-adherence for patients with hypertension**
2. Investigate whether the SPUR tool can **identify patients** who may suffer from **clinical depression**
3. Investigate whether the SPUR tool can **identify patients** who may suffer from **General Anxiety Disorder patients**



### What:

- Patient-Reported Outcome Measures (PROMs) of adherence: SPUR, MMAS-8, MARS-5, ENA, BMQ
- Patient Mental Health Assessment Questionnaires: PHQ-8, GAD-7
- Pearson Correlation Coefficient Table



### Who:

- 563 Patients living with hypertension
- Under anti-hypertension medication
- Recruited through Amazon's Mechanical Turk facility



### Where:

U.S.A

## Methods

- Patients were recruited through Amazon's Mechanical Turk facility and filled out the SPUR questionnaire and other PROMs used to measure and understand adherence, notably:
  - the Morisky Medication Adherence Scale-8 (MMAS-8),
  - the Medication Adherence Report Scale- 5 (MARS-5),
  - the Extent of Non-adherence Scale (ENA) and
  - the Beliefs about Medication Questionnaire (BMQ).
- Patients also provided demographic and health-related information and filled out two other questionnaires used to assess mental health in the general population:
  - the Patient Health Questionnaire-8 (PHQ-8), often used to diagnose depression
  - the Generalized Anxiety Disorder-7 (GAD-7), widely used to diagnose general anxiety disorder.

- Pearson Correlation Coefficients were calculated to examine correlations between the various PROMs. Average scores in all the PROMs and scores of individual SPUR drivers were then compared for patients who had PHQ-8 scores greater than or equal to 10 as opposed to those with scores less than 10.
- Various individual scores were so tested, as were combinations of SPUR scores. Individual PHQ item responses were then applied to patients identified as being at risk to investigate whether a single PHQ item might be used to further refine results. The same methodology was then used for anxiety, using GAD-7.

## Results

- With respect to the first objective, the PROMs were all correlated to each other with high levels of significance ( $p < 0.01$  in all cases). **SPUR risk of non-adherence was most highly correlated with the BMQ results, which is to be expected, as both go beyond questions of expressed behavior to address attitudes.** The correlations are in line with similar correlations to these and other PROMs in other validation studies examining SPUR in diabetes.
- Of the different PROMs, SPUR's risk of non-adherence demonstrated the largest average difference between patients with PHQ-8 scores greater than or equal to 10 (32.1 vs 19.2 for those below 10), a difference of 40.1%.

The only other PROMs with differences above 20% were ENA and BMQ Specific Necessity, with 23.1% and 23.7% respectively. **In the case of anxiety, SPUR's risk of non-adherence was likewise the most predictive, with a difference of 43.9%**, followed by ENA and BMQ Specific Necessity with 25.3% and 23.9% respectively, as well as MMAS-8, with 22.2%.

**Individual SPUR driver scores were more highly predictive than risk of non-adherence or the PROMs, however.** In the case of depression, the most predictive drivers were the two dealing with social factors, social immediate (Si), addressing concerns about the patient's immediately social environment, and social societal (Ss), addressing concerns about the patient's place in society.

**By flagging patients at risk of non-adherence and with important drivers in either of these two factors, 38 out of the 88 patients who scored 10 (diagnosed cutpoint for depression) or above on the PHQ-8 were flagged, as well as 50 who had PHQ-8 scores less than 10.** This represents a capture rate of 43.2% with a probability of correct attribution of 33.3%. By then adding one item from the PHQ-8, only one positive patient was unflagged.

**In the case of anxiety, a similar analysis led to the retention of three SPUR levers: social immediate (Si), as with depression, as well as psychological identity (Pi) and psychological reactance (Pr), the former dealing with reticence in accepting the disease as part of one's persona and the second dealing with response to authority.**

	MARS-5	MMAS-8	ENA	BMQ Specific Concern	BMQ General Harm	SPUR Risk of Non-Adherence
MARS-5	1	0.69	0.52	0.33	0.33	0.41
MMAS-8	0.69	1	0.67	0.40	0.37	0.49
ENA	0.52	0.67	1	0.29	0.36	0.45
BMQ Specific Concern	0.33	0.40	0.29	1	0.59	0.54
BMQ General Harm	0.33	0.37	0.36	0.59	1	0.56
SPUR Risk of Non-Adherence	0.41	0.49	0.45	0.54	0.56	1

Table 1. Pearson Correlation Coefficient table

	SPUR		SPUR + 1 item from mental health questionnaire	
	High score for Si <sup>1</sup> or SS <sup>2</sup> (depression) High Score for Si or Pi <sup>3</sup> or Pr <sup>4</sup> (anxiety)	Percentage of high risk patients flagged (capture rate)	Percentage of high risk patients flagged (capture rate)	Probability of correct attribution
Depression PHQ-8		43,2% (38/88)	42%	63,8%
Anxiety GAD-7		69,4%	69,4%	59,7%

Table 2. SPUR Capture rate of patients with high risk of depression and patients with high risk of anxiety with and without adding one item from the PHQ-8 (« How often have you experienced feeling bad about yourself - or that you are a failure or have let yourself or your family down? ») and the GAD-7 (« How often do you experience feeling afraid, as if something awful might happen? »)

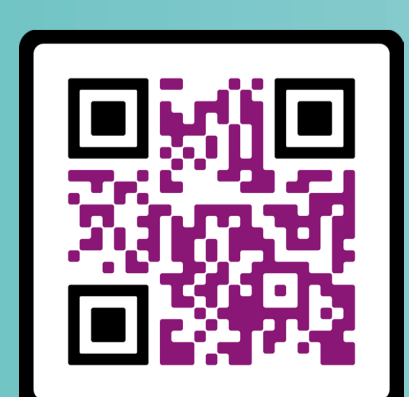
<sup>1</sup>Si: Social immediate <sup>2</sup>Ss: Social Societal <sup>3</sup>Pi: Psychological identity <sup>4</sup>Pr: Psychological reactance

## Conclusion

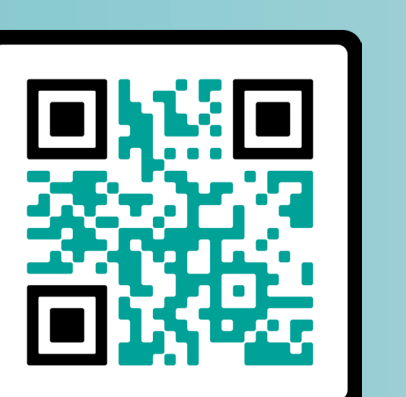
The ability of SPUR to flag patients at risk of depression and anxiety represents an important extension of its value.

The first objective, determining the ability of SPUR to identify patients at risk of non-adherence, was demonstrated via correlations with existing PROMs. In a DAT, adding just one item from the PHQ-8 or GAD-7 in a dynamic interface, such as SPUR, does not represent an important increase in testing burden for the patient and can greatly enhance both the feedback to the patient as well as providing an important indication to the DAT itself as well as to the patient and any healthcare professionals with access to the patient's profile that the individual may be at need of a mental health intervention, and should be subjected to a more complete mental health diagnosis.

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