Evaluation of Accountability Measurement Tool in Patients with Psoriasis: A Validation Study

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ABSTRACT

Introduction: The role of accountability in promoting patient adherence to medication is not well characterized. An accountability measurement tool (AMT) has been developed to quantify accountability but has not been investigated for use with patients with skin disease. We aim to test the reliability and validity of the AMT for patients with psoriasis.
Methods: A 12-item AMT was used for patients with psoriasis. English-speaking adults with psoriasis who were expected to continue their medication were asked to complete the questionnaire. Reliability was measured using Cronbach's alpha. Validity was measured using Pearson's correlation coefficient and t-tests between the AMT and other validated scales measuring fear of negative evaluation and self-regulation.
Results: A total of 30 patients were recruited for this study. The AMT demonstrated excellent internal consistency (Cronbach's $\alpha = 0.86$). Total accountability positively correlated with fear of negative evaluation ($r = 0.59$), autonomous motivation ($r = 0.46$), introjected regulation ($r = 0.60$), and external regulation ($r = 0.57$), demonstrating good convergent validity. Divergent validity was supported by nonsignificant associations between psoriasis accountability and age, gender, race, education level, years with physician, and amotivation.

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Conclusions: The AMT has been further validated for measuring accountability in patients with psoriasis.

Keywords: Accountability; Adherence; Patient behavior; Psoriasis; Questionnaire; Reliability; Self-efficacy; Self-determination theory; Validity

Key Summary Points
Why carry out this study?
Accountability plays a key role in adherence.
The accountability measurement tool (AMT) has been developed and validated for use in chronic diseases but has not been investigated for use with patients with skin disease.
What was learned from this study?
The AMT appears to have sufficient reliability and validity to assess accountability in our sample of patients with psoriasis.
The AMT provides a foundation for studies to develop and test new interventions to improve accountability in dermatology, where adherence to therapy is poor.

INTRODUCTION

Poor adherence to medication is ubiquitous in dermatology. In particular, patients with psoriasis tend to struggle with their prescribed therapies. With more than 90% of psoriasis patients having a chronic course and therefore requiring continual control of disease activity, adherence to treatment is crucial for successful management [1]. Poor adherence to topical treatment results in inadequate treatment, persistent disease, and continued suffering [2]. This can lead to escalation of treatment to toxic systemic agents (such as methotrexate and cyclosporine) or extremely costly medications such as

biologics. The very poor long-term adherence of psoriasis patients makes psoriasis an exceptionally good model system for studying the factors that contribute to self-efficacy and self-management of chronic disease [3].

We have previously demonstrated that the self-management of psoriasis can be enhanced by external factors such as increasing the frequency of office visits [4–6]. Psoriasis treatments are used more frequently around the time of office visits [3]. The increased use of treatment around the time of office visits is seen across a wide range of chronic conditions [7–11]. The accountability derived from the expectation of a social interaction between the patient and the health care provider may affect patients' motivation to adhere to treatment.

Accountability is an internal, psychobehavioral construct involving an expected social interaction [12]. Anticipation of a social interaction tends to promote accountability and, in turn, the self-regulation of behavior. The social interaction between physician and patient is no exception. A sense of accountability may mediate the effects of increasing office visits, which may explain why adherence to therapy increases leading up to a doctor's visit [13]. This concept has started to become incorporated into adherence models and in clinical practice [12]. By understanding the accountability and psychology by which office visits act, we could create better approaches that modify accountability. To understand the effects of accountability on adherence, a reliable tool to measure the construct must be created and applied to dermatology.

We previously developed and validated an accountability measurement tool (AMT) for patients with any disease lasting more than 3 months [14]. However, whether it is generalizable to patients with a specific chronic disease is unknown. In this study, we used the AMT on patients with psoriasis to test the reliability and validity of the AMT for a specific disease.

METHODS

The Wake Forest University School of Medicine Institutional Review Board (IRB) determined that

this study met the regulatory criteria for exemption from IRB oversight, and that this research meets criteria for a waiver of written (signed) consent according to 45 CFR 46.117(c)(2).

Patients

The primary validation of the AMT had 292 respondents [14]. For this study, we aimed to recruit 10% of this sample size to confirm its utility in a specific disease population. Participants were recruited at the clinic if they met the following inclusion criteria: subjects with psoriasis and a working knowledge of English who were prescribed at least one medication for the past month and are expected to continue for another month, who have a regular physician they have seen at least twice during the past 2 years, and aged 18 years or older [15]. Those who agreed to participate were asked to fill out the survey on a tablet.

Accountability Measurement Tool

The AMT divides accountability into two categories based on the self-determination theory and Bandura's theory of self-efficacy: autonomous accountability and controlled accountability [14, 16]. Autonomous accountability refers to one's internal desire to please a physician. Controlled accountability is based on one's tendency to avoid shame and guilt from others [12]. Six items fall under autonomous accountability, and six items fall under controlled accountability. Items were measured using a Likert scale (from 1 = "Strongly disagree" to 5 = "Strongly agree") to detect small differences.

Psychometric Evaluation

The items were compiled into a survey instrument that also included the following measures used to assess the reliability and validity of the adapted scale.

Fear of Negative Evaluation
The brief fear of negative evaluation (BFNE) scale is used to measure fear of negative evaluation [17]. The previous study, in which the AMT was developed, used a 12-item variant consisting of 4 reverse-worded and 8 straightforwardly worded questions. Instead, in the present study, we replaced the full BFNE scale with an eight-item variant consisting of only the straightforwardly worded questions (BFNE-S). This version is reliable and more concise than other versions [18]. Responses were measured using a Likert scale (from 1 = "Not at all characteristic of me" to 5 = "Extremely characteristic of me"). The BFNE-S scores range from 8 to 40, with higher scores positively correlating with fear of negative evaluation. A score of at least 25 demonstrates clinically significant social anxiety [18].

Treatment Self-Regulation
The treatment self-regulation questionnaire (TSRQ) is commonly used to study behavioral regulation in healthcare settings. The TSRQ was modified to assess why patients with psoriasis take their medications. The 15-item TSRQ evaluates behavioral regulation using four subscales: autonomous motivation (6), introjected regulation (2), external regulation (4), and amotivation (3) [19]. Responses were measured using a Likert scale (from 1 = "Not at all true" to 7 = "Very true"). The TSRQ has been validated across multiple sites and various health behaviors [19].

Other Variables
Standard survey questions assessing age, sex, race, ethnicity, education level, and duration of the physician–patient relationship in years were included. Whether the patient had a past disagreement or dispute with his/her physician and whether the patient was satisfied with his/her physician were also evaluated (yes/no).

Statistical Analyses

Descriptive statistics were calculated for the surveyed sample and the AMT scores. Cronbach's α reliability test was used to estimate the internal consistency of the whole accountability questionnaire in addition to each subscale (autonomous accountability and controlled

accountability). Values above 0.7 are considered reliable [20].

Validity was tested using bivariate correlation analyses and *t*-tests. Construct validity was assessed by examining the convergent and divergent validity of numerous variables. Based on the previous AMT results, we predicted that total, autonomous, and controlled accountability would be related to the BFNE-S and the TSRQ autonomous motivation, introjected regulation, external regulation, and amotivation scores (convergent validity). We also predicted that age, gender, education level, and duration with provider would not be significantly associated with the psoriasis AMT (divergent validity). All statistical tests were two-tailed, and a *p*-value < 0.05 was considered significant. The Statistical Package for the Social Sciences (SPSS) software was used to execute statistical tests.

RESULTS

Sample Characteristics

A total of 30 patients participated in the study (Table 1). The average age (standard deviation, SD) of the sample was 54 (14) years. A majority of the patients were White (83%) and female (57%). Patients spent an average of 8.2 (7.4) years with their medical provider. No participant reported a past dispute with his/her physician. All participants reported satisfaction with their physicians. The average total accountability score for psoriasis patients was 47 (7.8). The mean fear of negative evaluation score was 16 (8.7), indicating the sample was not socially anxious. Regarding the average TSRQ subscale scores, autonomous motivation was 38 (4.9); introjected regulation was 9.3 (4.3); external regulation was 11 (7.1); and amotivation was 8.5 (4.8) (Table 1).

Internal Consistency

The 12-item scale demonstrated good internal consistency overall (Cronbach's $\alpha = 0.86$). Autonomous and controlled accountability also

Table 1 Characteristics of total sample

Variable	Total (%)
n	30
Age in years (SD)	54 (14)
Gender (female)	17 (57%)
Race	
White	25 (83%)
Black or African American	4 (13%)
Asian	1 (3.3%)
Ethnicity	
Hispanic or Latino	0.0
Level of education	
High school	11 (37%)
Technical degree	1 (3.3%)
Associate degree	6 (20%)
Bachelors	8 (27%)
Masters	4 (13%)
Time spent with medical provider in years (SD)	8.2 (7.4)
Past disagreement or dispute with physician	0.0
Overall satisfied with doctor	30 (100%)
Psoriasis accountability (SD)	
Total	47 (7.8)
Autonomous accountability	25 (3.7)
Controlled accountability	22 (5.2)
Brief fear of negative evaluation score (SD)	16 (8.7)
Treatment self-regulation scores (SD)	
Autonomous motivation	38 (4.9)
Introjected regulation	9.3 (4.3)
External regulation	11 (7.1)
Amotivation	8.5 (4.8)

showed good internal consistency (Cronbach's $\alpha = 0.75$ and 0.82, respectively).

Among our sample, the BFNE-S was very reliable (Cronbach's α = 0.94). Regarding the TSRQ, autonomous motivation (Cronbach's α = 0.74), introjected regulation (Cronbach's α = 0.74), and external regulation (Cronbach's α = 0.87) showed good reliability; however, amotivation did not show good internal consistency (Cronbach's α = 0.60).

Construct Validity

Correlations between the AMT and other factors were measured using Pearson's correlation coefficient (Table 2). Accountability positively correlated with fear of negative evaluation ($r = 0.59$), autonomous motivation ($r = 0.46$), introjected regulation ($r = 0.60$), and external regulation ($r = 0.57$), demonstrating convergent validity.

The correlations between the AMT and the TSRQ subscales were also analyzed for validity. As predicted, total accountability correlated with autonomous motivation ($r = 0.46$), introjected regulation ($r = 0.60$), and external regulation ($r = 0.57$). However, total accountability did not show significant correlation with amotivation, which was not predicted. Similarly, autonomous accountability had significant associations with autonomous motivation ($r = 0.51$), introjected regulation ($r = 0.56$), and external regulation ($r = 0.54$) but not amotivation. Consistent with previous findings, controlled accountability correlated with introjected ($r = 0.52$) and external regulation ($r = 0.49$). In contrast to our predictions, it did not significantly correlate with autonomous motivation or amotivation.

Divergent validity was supported by non-significant associations between accountability and age, gender, race, education level, and years with physician.

DISCUSSION

Overall, the AMT and its subscales showed excellent internal consistency when used for patients with psoriasis. The accountability measures for patients with psoriasis showed consistencies with the original AMT. Both found positive associations between accountability and fear of negative evaluation [14]. Although we did not predict the lack of association between accountability and amotivation, these results were not unexpected. The previous validation of the AMT showed a weak correlation between amotivation and accountability ($r = 0.38$, $p = 0.01$) [14]. The lack of significant correlation between accountability and amotivation suggests that patient accountability stems from an external (e.g., from their physician) and/or internal (i.e., from oneself) drive to use one's medication. Ultimately, the accountability between patient and healthcare provider appears to have underlying intention. Another difference is how controlled accountability is only associated with introjected and external regulation. However, this is unsurprising as introjected and external regulation are forms of controlled motivation [21]. Age, gender, education level, and reported duration with physician had no significant associations with accountability or any of its factors. The results from this study further support accountability as an independent construct [14].

By creating a validated research tool to measure the psychosocial construct of accountability, we can elucidate how accountability affects dermatology patients' behavior. We may use this measure to evaluate interventions aimed to improve accountability and thereby adherence to dermatological treatment. Previous suggestions to increase the frequency office visits are not practical for patients who would have to miss work and pay more copays. An example of a sensible solution is to encourage patients to communicate with their physicians through patient portals. About 52% of patients are already offered access to their medical record by their health provider [22]. Instructing patients to report their progress by messaging their providers online creates the expectation of a social interaction, thus promoting accountability. Therefore, utilizing the concept of accountability can create less-costly highly feasible approaches to improving patient adherence.

This study presents multiple limitations. First, the small sample size did not produce variation in some responses. As a result,

Table 2 Intercorrelations between variables to demonstrate construct validity[a]

	Age	Gender	Race	Education	Physician–patient relationship duration	BFNE-S	Autonomous motivation	Introjected regulation	External regulation	Amotivation	Autonomous acct.	Controlled acct.
Accountability	0.19	−0.34	−0.19	0.02	0.04	0.59**	0.46*	0.60**	0.57**	0.12	0.85**	0.93**
Age		0.05	0.06	0.21	0.18	−0.02	0.24	0.08	−0.06	0.11	0.12	0.20
Gender			0.22	−0.04	0.00	−0.22	−0.40*	−0.32	−0.39*	−0.24	−0.33	−0.29
Race				0.34	−0.19	−0.24	−0.30	−0.10	−0.37*	0.18	−0.34	−0.05
Education					−0.27	−0.08	0.04	−0.14	−0.33	−0.32	−0.05	0.06
Physician–patient relationship duration						0.06	−0.35	−0.07	0.12	0.20	−0.06	0.10
BFNE-S							0.20	0.52**	0.65**	0.09	0.51**	0.54**
Autonomous motivation								0.39*	0.30	0.05	0.51**	0.33
Introjected regulation									0.52**	0.19	0.56**	0.52**
External regulation										0.51**	0.54**	0.49**
Amotivation											0.01	0.18
Autonomous acct.												0.59**

BFNE-S brief fear of negative evaluation-straightforward scale

*Correlation significant at the 0.05 level (two-tailed)

**Correlation significant at the 0.01 level (two-tailed)

[a] Values shown are *r*-values

analyses could not be performed to determine whether ethnicity, prior dispute with the physician, and physician satisfaction correlated with our measure of accountability. Due to the small sample size, these results should be interpreted with caution. Second, the psoriasis-specific AMT was not analyzed for its test–retest reliability; however, the original AMT demonstrated high temporal stability.

CONCLUSIONS

The AMT provides a foundation for studies to develop and test new interventions to improve accountability in dermatology, where adherence to therapy is poor. Future studies should recruit a larger sample of patients and explore the use of AMT for other chronic skin conditions. Future studies should also add a measure of adherence to better understand how accountability is correlated patient adherence. All in all, the AMT was further validated for measuring accountability in patients with psoriasis.

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Compliance with Ethics Guidelines. The Wake Forest University School of Medicine Institutional Review Board (IRB) determined that this study met the regulatory criteria for exemption from IRB oversight, and that this research meets criteria for a waiver of written (signed) consent according to 45 CFR 46.117(c)(2).

Data Availability. The data supporting the results reported in this article were generated during the study and are available from the corresponding author by request.

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