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Research article

Validation and psychometrics for the Health Skills Profile

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ABSTRACT

Introduction: Few measures can comprehensively explore the extent to which individuals are able to effectively identify areas of concern, create a personalized health action plan and target these areas for improvement. Thus, the aim of this paper was to validate the Health Skills Profile (HSP©) as a measure for assessing health-related skills and explore the relationship between the HSP skills with existing validated measures.
Method: Participants completed a battery of self-report measures (including validated measures and visual analogue scales [VAS] that relate to each of the health-related skills) and the HSP measure online.
Results: We explored the association between each skill within the HSP with their corresponding validated measure. We found a significant positive relationship between the HSP skills and the validated measures. Further, we found a significant positive relationship between the HSP skills and the corresponding VAS.
Conclusion: These findings suggest that the HSP can be combined with other assessment data to develop more complete personalized profiles of individual and organizational health and health behaviors.

1. Introduction

1.1. Background

Health management refers to the ability to assess, identify, and target aspects of health in various settings in order to improve the overall well-being of an individual or organization (Schewchuk, 2001). To date, various measures have been developed to fulfill those needs. For example, the Perceived Health Competence Scale (Smith et al., 1995) examines perceived self-efficacy associated with health perception and health behaviors of the individual. In another example, the Short Form Health Literacy Survey examines the degree to which an individual is capable of comprehending and applying health-related information (Duong et al., 2017). Yet, both measures fall short in their domain specificity in that they only assess a narrow aspect of health management. Additionally, they lack the ability to isolate target areas for future improvements.

While each measure may have their respective strengths and focuses, few measures can comprehensively explore the extent to which individuals are able to effectively identify areas of concern, create a personalized plan of action for their health and target these areas for improvement. To date, few areas of research converge to highlight various areas of health management. Indeed, existing measures fail to capture several important skills that may be integral to health management.

Review of the literature has identified seven important skills that relate to managing one's health. First, the ability for an individual to adapt to change has been shown to correlate with positive health outcomes throughout the lifespan (Grzywacz et al., 2007). Additionally, the level of commitment an individual exhibits to a specific task has been hypothesized to influence well-being (Kelly, 2008). Third, the level of perceived control over one's own health correlates with better health outcomes assessed at midlife (Lachman and Firth, 2004). In addition, a systematic review has identified that the access and availability of health information contribute to positive health outcomes in patients (Giardina et al., 2014). In those previously diagnosed with a condition, the ability to adhere to prescribed health behaviors or regimes are key in experiencing positive changes or maintaining well-being in the face of chronic illness (Osterberg and Blaschke, 2005). Additionally, the maintenance of positive outlook is key in fostering resilience and well-being despite adversities, such as impending surgery or chronic illness (Duggal et al., 2016). Finally, the availability of social support has been linked to lower rates of morbidity and mortality, and thus has been suggested to buffer against detrimental health outcomes throughout the lifespan (Uchino, 2006). Taken together, these skills collectively help shape an individual's ability to manage health and medical concerns. To our knowledge, no existing measure successfully captures all of the above-stated skills in a single measure.

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Furthermore, there is a rapidly growing need for higher quality, integrated data in a format that can be used in combination with retrospective data such as insurance claim history or medical record data. There is an unmet need to provide a tool that delivers higher quality data on health status and health-related behaviors.

1.2. What is the HSP?

The Health Skills Profile (HSP©) is a digital assessment tool developed by MediResource Inc. (2012) that measures skills associated with improved health outcomes. The HSP focuses on these seven skills of health behaviors, including: adaptability, commitment, control, investigation, medical management, positivity, and social building. The intended goal of the HSP is to allow organizations and individuals to identify where they may stand, their strengths and/or weaknesses, and where to focus efforts, and resources, in order to maximize health behaviors. At its core, it is a communication tool for health behavior changes. The HSP measures seven health skills associated with effective health management by communicating tailored recommendations for skills to target according to responses.

1.3. Aims and study objectives

The aim of the current project is threefold: (a) to validate the HSP as a measure for assessing health-related skills, (b) to examine the overall acceptability of the HSP as a measure for evaluating specific skills, and (c) to explore the relationship between the HSP skills with existing validated measures.

2. Methods

2.1. Participants

Three hundred individuals participated in this study. All participants were 18 years and older, currently employed with a minimum of 35 h worked per week. All participants were residents of the United States or Canada. Participants were recruited through an online human intelligence market research interface, Amazon Mechanical Turk (MTurk) and completed the questionnaire package through Qualtrics, an online survey platform. Participants received financial compensation for their participation.

2.2. Measures

2.2.1. Demographic measure

This measure asked participants to indicate information concerning their sex, education, annual income, whether they have healthcare coverage, and whether they have been diagnosed with a long-term condition. These questions were used to describe the sample and/or examine the potential relationship between individual-level characteristics and HSP skills. Given that prior research has shown that those with higher levels of education and greater annual income are associated with better quality, health-related decisions (Rothman et al., 2008; Trachtenberg et al., 2005), correlations between HSP skills and education and income were conducted.

2.2.2. Health skill profile (HSP)

This is the proposed measure that comprised of 21 items (3 items for each skill) on a 5-point Likert scale that captures the seven skills above (Table 1). For this measure, the Cronbach's alphas for the seven skills were: Adaptability ($\alpha = .70$), Commitment ($\alpha = .64$), Control ($\alpha = .55$), Investigation ($\alpha = .68$), Medical Management ($\alpha = .65$), Positivity ($\alpha = .66$) and Social Building ($\alpha = .72$).

2.2.3. Visual analogues scales (VAS; Wewers and Lowe, 1990)

The VAS has shown to be a reliable and valid measure in psychosocial research. We included one VAS for each of the seven health-related skills: Adaptability (i.e., how good one is at adjusting their life and priorities to accommodate change), Commitment (i.e., how good one is at committing to a course of action), Control (i.e., how much influence a person has over their health or their life in general), Investigation (i.e., how proactive one feels about researching relevant information to their health), Medical Management (i.e., how good one feels about following doctor's advice and taking medication), Positivity (i.e., how good one is at maintaining a positive outlook on life), and Social Building (i.e., how good one feels about finding support to help with their health). For each VAS, participants were asked to rate their current feelings at the moment with 0 meaning "no confidence in the skill" and 100 meaning "high confidence in the skill".

Table 1
Health Skill Profile assessment items.

Item	Statement
1	I understand how to modify my lifestyle to improve my health.
2	I establish and follow through on short-term and long-term health goals.
3	I am the best person to take charge and manage my own well-being.
4	I do regular research and ask questions to understand the cause(s) of my health issue(s).
5	When I'm prescribed a medication I always understand the reason(s) why.
6	I know how to keep a positive frame of mind even when my situation becomes difficult.
7	I know when I need extra help from others and how to get it.
8	Even when life gets busy I'm certain I can adapt to maintain a healthy lifestyle.
9	I am resolute in maintaining the changes I'm making to improve my health.
10	I have the confidence to change my situation in order to improve my health.
11	I believe I can find the best solutions for my health challenge(s).
12	I follow advice and instructions to improve my health.
13	Even when things are bad I'm still hopeful they will improve over the next year.
14	I can rally family and friends to change their lifestyle in a way that will support me.
15	I adjust my plans and habits to prioritize and solve my health problems first.
16	I regularly use a digital or paper tracker to follow my progress and measure results.
17	I am comfortable discussing my health in any situation, including sensitive ones.
18	I try new approaches to find the best way to manage my health.
19	I take medication exactly as directed, whenever it is prescribed for me.
20	I use positive self-talk and other self-motivation techniques to help reach my goals.
21	I have someone I can rely on for day-to-day activities or emotional support.

2.2.4. Coping flexibility scale (CFS; Kato, 2012)

The CFS is a validated scale that measures psychological flexibility in coping with change. This measure was selected to correspond to the skill of adaptability within the HSP. This measure included 10 items on a 4-point Likert scale where 1 represents "very applicable" and 4 represents "not applicable". The Cronbach's alpha for the sampled population was great, $\alpha = .83$.

2.2.5. Commitment to health scale (CHS; Kelly, 2005)

The CHS is a validated scale that measures the magnitude of one's commitment to their health. This measure was selected to correspond to the skill of commitment within the HSP. This measure included 6 items on a 5-point Likert scale where 1 represents "strongly disagree" and 5 represents "strongly agree". The Cronbach's alpha for the sampled population was $\alpha = .58$.

2.2.6. General self-efficacy scale (GSES; Schwarzer and Jerusalem, 1995)

The GSES is a validated scale that examines the degree an individual perceives he or she has control over various situations. This measure was selected to correspond to the skill of control within the HSP. The measure included 10 items on a 4-point Likert scale in which 1 represents "not at all true" and 4 represents "exactly true". The Cronbach's alpha for the sampled population was excellent, $\alpha = .90$.

2.2.7. Health literacy – short form 12 (HL-12; Duong et al., 2017)

The HL-12 is a validated scale that measures the individual's health literacy. This measure was selected to correspond to the skill of investigation within the HSP. The measure included 12 items on a 4-point Likert scale where 1 represents "very difficult" and 4 represents "very easy". The Cronbach's alpha for the sampled population was great, $\alpha = .87$.

2.2.8. Perceived health competence scale (PHCS; Smith et al., 1995)

The PHCS is a validated scale that measures the extent to which an individual feels they can manage their own health. This measure was selected to correspond to the skill of medical management within the HSP. The measure included 8 items on a 5-point Likert scale in which 1 represents "strongly disagree" and 5 represents "strongly agree". The Cronbach's alpha for the sampled population was great, $\alpha = .88$.

2.2.9. Adult hope scale (AHS; Snyder et al., 1991)

The AHS is a validated scale that measures the degree of hope an individual feels. This measure was selected to correspond to the skill of positivity within the HSP. The measure included 12 items on an 8-point Likert scale in which 1 represents "definitely false" and 8 represents "definitely true". The Cronbach's alpha for the sampled population was great, $\alpha = .85$.

2.2.10. Multidimensional scale of perceived social Support (MSPSS; Zimet et al., 1988)

The MSPSS is a validated scale that measures the extent an individual perceives to have social support, and was selected to correspond to the skill of social building within the HSP. The measure included 12 items on a 7-point Likert scale in which 1 represents "very strongly disagree" and 7 represents "very strongly agree". The Cronbach's alpha for the sampled population was excellent, $\alpha = .96$.

2.3. Procedure

The study was advertised online (MTurk), and made available to all individuals meeting study inclusion criteria (ages 18 years and older, and worked a minimum of 35 h per week). Interested participants read the study instructions outlining the project details (e.g., time and commitment), and subsequently provided informed consent to partake in this study. Once consent was obtained, participants were given a link to Qualtrics (an online survey interface) to complete a set of questionnaires. Once participants completed the questionnaires, they were thanked and received compensation through the same platform (MTurk). The study protocols were approved by an independent research ethics board (Community Research Ethics Office [#111]).

2.4. Statistical analysis plan

All analyses were conducted using IBM's Statistical Package for the Social Sciences (SPSS) Software®, version 24. Cronbach's alpha was generated to examine internal consistency (see Measures under Methods). We examined the relationship between the HSP skills and education and income level to examine whether these demographic variables were associated with these health skills. We also examined the relationship of the HSP with other validated measures. Specifically, we explored the association between each skill within the HSP with their corresponding validated measure. Pearson's product-moment correlation coefficients were computed to determine the directionality and strength of these hypothesized relationships across skills and existing measures. Exploratory factor analysis examined the overall structure of the proposed questionnaire.

3. Results

A diverse population completed the study with the sample dominantly consisting of Caucasian individuals (75%). The mean age of the sampled participants was 36 years old, with the majority of participants working on average 42 h per week. The majority of the participants resided in the United States (63%), followed by Canada (12%). See Table 2 for demographic information.

3.1. Correlations across measures

Results showed no significant relationship between the HSP skills and education or income levels, suggesting that these variables are not related ($ps > .05$). Further, the results revealed a significantly positive relationship between each HSP skill and corresponding validated measure ($ps < .001$; Table 3), and statistically significant positive relationships between the HSP skills and the corresponding VAS ($ps < .001$; Table 4). Critically, when comparing the HSP skills with the VAS, the correlations between the HSP skills and validated measures (Table 3) were stronger than the correlations between the VAS and validated measures (Table 3).

3.2. Exploratory factor analysis

The factorability of the HSP was examined using an exploratory factor analysis (EFA). Criteria for the EFA were based on an un-rotated structure of correlations, and a minimum eigenvalue of one as a cut-off for the scree-plot. Results of the EFA indicate the presence of a uni-factor solution within the sampled items, where all 21-items loaded onto a single factor, which explained 39% of the variance with factor loadings ranging from .31 to .78.

4. Discussion

The current study reported evidence in support for both the feasibility and efficacy of the HSP in assessing health-related skills in a sample of full-time employees. The HSP had acceptable levels of internal consistency, as measured by Cronbach's alpha. Further, we found a positive relationship between HSP skills with their corresponding validated measures, and their corresponding VAS. Critically, we found that the correlations between the HSP skills and validated measures were stronger than the correlations between the VAS and validated measures. This finding indicates that to some extent, we were successful in capturing the skills of interest. Finally, an exploratory factor analysis confirmed a single factor solution, indicating that these skills cohesively represent a single construct of health management.

Table 2
Sample demographic.

Variable	*N*	%
Sex		
Female	133	44.3%
Male	167	55.7%
Healthcare Coverage		
Yes	273	91.0%
No	26	8.7%
Diagnosed Long-Term Condition		
Yes	88	29.3%
No	211	70.3%
Education Level		
Not applicable	1	3.0%
High school diploma	30	10.0%
Some college	50	16.7%
College/professional diploma/degree	140	46.7%
Some post-secondary	7	2.3%
Post-secondary degree	18	6.0%
Graduate degree	54	18.0%
Income		
Not applicable	6	2.0%
$19,999 and under	28	9.3%
$20,000 – $34,999	67	22.3%
$35,000 - $74,999	143	47.7%
$75,000 and over	56	18.7%

Table 3
Pearson's Correlations of the HSP and VAS Skills with the Validated Measures.

	HSP-A	HSP-CM	HSP-CT	HSP-I	HSP-MM	HSP-P	HSP-SB	VAS-A	VAS-CM	VAS-CT	VAS-I	VAS-MM	VAS-P	VAS-SB
Coping Flexibility Scale	.36***	–	–	–	–	–	–	.32***	–	–	–	–	–	–
Commitment to Health Scale	–	.49***	–	–	–	–	–	–	.37***	–	–	–	–	–
General Self-Efficacy Scale	–	–	.57***	–	–	–	–	–	–	.46***	–	–	–	–
Health Literacy-Short Form 12	–	–	–	.43***	–	–	–	–	–	–	.27***	–	–	–
Perceived Health Competence Scale	–	–	–	–	.48***	–	–	–	–	–	–	.34***	–	–
Adult Hope Scale	–	–	–	–	–	.63***	–	–	–	–	–	–	.58***	–
Multidimensional Scale of Perceived Social Support	–	–	–	–	–	–	.65***	–	–	–	–	–	–	.53***

Notes. HSP = Health Skills Profile; VAS = Visual Analogue Scale; A = Adaptability; CM = Commitment; CT = Control; I = Investigation; MM = Medical Management; P = Positivity; SB = Social Building.
*** $p < .001$.

Table 4
Pearson's Correlations of the Skills with the HSP and VAS.

	VAS-A	VAS-CM	VAS-CT	VAS-I	VAS-MM	VAS-P	VAS-SB	VAS-Total
HSP-A	.43***	–	–	–	–	–	–	–
HSP-CM	–	.37***	–	–	–	–	–	–
HSP-CT	–	–	.41***	–	–	–	–	–
HSP-I	–	–	–	.51***	–	–	–	–
HSP-MM	–	–	–	–	.55***	–	–	–
HSP-P	–	–	–	–	–	.62***	–	–
HSP-SB	–	–	–	–	–	–	.67***	–
HSP-Total	–	–	–	–	–	–	–	.71***

Notes. HSP = Health Skills Profile; VAS = Visual Analogue Scale; A = Adaptability; CM = Commitment; CT = Control; I = Investigation; MM = Medical Management; P = Positivity; SB = Social Building.
*** $p < .001$

We present the development and validation of the HSP in a sample of full-time employees in the United States and Canada. Results suggest that the HSP is successful in identifying unique skills related to health management, and can provide a comprehensive profile of health in both individuals and organizations. Further, these skills relate to existing validated measures, and thus suggest that the HSP is a promising scale for the general workforce. Future studies should examine the efficacy of HSP in identifying health-related skills in different populations, such as those with chronic illnesses, younger and/or older adults, and part-time employees. Further, we observed stronger correlations between the HSP and validated measures compared with the correlations between the VAS and validated measures. These findings suggest that HSP is a better instrument for assessing health skills relative to the VAS measures. Therefore, the HSP measure is a useful tool for the assessment of health-related skills in identifying both strengths and areas for target interventions.

The HSP can be implemented as an online, mobile or paper-based survey. It was designed to be modular. Additional skills can be added to the existing 7 we measured here (adaptability, commitment, control, investigation, medical management, positivity, and social building). The HSP also includes a participant insight report, outlining the value of each skill and how an individual can improve each. Future enhancements for a workplace setting may include adding other skills to measure employee performance and productivity. Examples may be financial stress management or coping with stressful managers and co-workers. Further, managing employee related health plan costs is at an inflection point with the increasing social acceptance of mental health disorders. Costly short- and long-term disability claims for mental health will continue to rise with this increased social acceptance.

There continues to be a large unmet need from employers and health insurance providers for scalable digital tools that identify specific areas of employee strength and weakness. Current tools identify whether an individual is “at risk”, however we are not aware of an assessment that provides a similar detailed behavior profile with an employee insight report. In this way, the HSP offers employers a new and practical tool that fits within today's workplace environment.

Findings from the current study should be considered in lieu of some limitations. The Cronbach alphas for the Control skill domain on the HSP and the Commitment to Health Scale were low ($\alpha = .55$; $\alpha = .58$, respectively). Although these values suggest low internal consistency for these measures, test-retest consistency may be a more accurate indicator of the scale's reliability, which was not assessed in the current study but could be examined in future research. Sampling of the current study is conducted through Amazon Mechanical Turk, an online human intelligence interface. Despite the heterogeneities in sampling, as well as the wide-geographical span of populations sampled across North America, it is possible that self-selection into completing this online study may bias the results. Another limitation is the single population in which we conducted our validation of the HSP. It may be that future studies sampled may find variations in associations and relationships not otherwise uncovered in the current study. Despite these limitations, the current study provides a comprehensive overview of health skills in a single measure of health management.

Ultimately, findings from the HSP can be combined with other assessment data to develop more complete personalized profiles of individual and organizational health and health behaviors. While health insurance claims and clinical data are retrospective and have limitations in developing predictive and comprehensive profiles of individuals and organizations, the HSP provides behavioral data, that when combined with claims or clinical data, can develop more accurate and powerful predictive models for both the individual and the organization.

Declaration

Author contribution statement

Amy Shi, Michelle Rajpal: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Paul Kostoff: Conceived and designed the experiments; Analyzed and interpreted the data.

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Competing interest statement

The authors declare the following conflict of interests: All authors were employed by the organization that funded the study.

Additional information

No additional information is available for this paper.

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Disclaimer: The Health Skills Profile (HSP) is a copyrighted instrument and requires permission from MediResource Inc. to use.

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